

SOIL SURVEY

Hillsborough County Florida



UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
FLORIDA AGRICULTURAL EXPERIMENT STATION

How to Use THE SOIL SURVEY REPORT

THIS SURVEY of Hillsborough County will help you plan the kind of farming that will protect your soils and provide good yields. It describes the soils; shows their location on a map; and tells what they will do under different kinds of management.

Find Your Farm on the Map

In using this survey, you start with the soil map, which consists of the 97 sheets bound in the back of this report. These sheets, if laid together, make a large photographic map of the county as it looks from an airplane. You can see woods, fields, roads, rivers, and many other landmarks on this map.

To find your farm on the large map, you use the index to map sheets. This is a small map of the county on which numbered rectangles have been drawn to show where each sheet of the large map is located.

When you have found the map sheet for your farm, you will notice that boundaries of the soils have been outlined in red, and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map.

Suppose you have found on your farm an area marked with the symbol A_a. You learn the name of the soil this symbol represents by looking at the map legend. The symbol A_a identifies Adamsville fine sand.

Learn About the Soils on Your Farm

Adamsville fine sand and all the other soils mapped are described in the section, Descriptions of Soils. Soil scientists, as they walked over the fields and through the woodlands, described and mapped the soils; dug holes and examined surface soils and subsoils; measured slopes with a hand level;

noted differences in growth of crops, weeds, brush, or trees; and, in fact, recorded all the things about the soils that they believed might affect their suitability for farming.

After they mapped and studied the soils, the scientists talked with farmers and others about the use and management each soil should have and its capabilities for use. They then placed it in a capability unit, or management group. A capability unit is a group of similar soils that need and respond to about the same kind of management. For example, Adamsville fine sand is in capability unit IVs-2. Turn to the section, Management of Capability Units, and read what is said about soils of capability and unit IVs-2. You will want to study the table, which tells you how much you can expect to harvest from Adamsville fine sand under two levels of management.

Make a Farm Plan

For the soils on your farm, compare your yields and farm practices with those given in this report. Look at your fields for signs of runoff and erosion. Then decide whether or not you need to change your methods. The choice, of course, must be yours. This survey will aid you in planning new methods, but it is not a plan of management for your farm or for any other farm in the county.

If you find that you need help in farm planning, consult the local representative of the Soil Conservation Service or the county agricultural agent. Members of your State Experiment Station staff and others familiar with farming in your county will also be glad to help you.

Fieldwork for this soil survey was completed in 1950. Unless otherwise specifically indicated, all statements in this publication refer to conditions in Hillsborough County at that time.

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SOIL SURVEY OF HILLSBOROUGH COUNTY, FLORIDA

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United States Department of Agriculture in cooperation with the Florida Agricultural Experiment Station

General Nature of the Area

HILLSBOROUGH COUNTY is one of the few places in the United States where fruits and vegetables can be grown in winter. Nearly 60 percent of the county is in farms, and from these farms citrus fruits and vegetables are sent to northern markets. In addition large quantities of poultry and dairy products are shipped to local markets or to markets in nearby counties. Many large areas are still covered by the natural vegetation and are used mainly as range pasture. Some of these areas could be cleared and used for crops or for improved pasture. On many of them, however, drainage would be a problem, for if the water level is lowered too much in one area, nearby soils may be drained excessively. Furthermore, nearly all of the soils of Hillsborough County need heavy fertilization, some of them with the minor elements. Each farmer needs to weigh the possible returns against the cost of clearing the land and preparing it for crops, before he decides whether clearing will be justified.

Location and Extent

Hillsborough County occupies approximately 1,040 square miles, or 665,600 acres, in the west-central part of Florida (fig. 1). It is bounded on the south by Manatee County, on the east by Polk County, on the north by Pasco County, and on the west by Pinellas County and Tampa Bay. Except for the irregular coastline on the west, the county is nearly square. Tampa, the county seat, is in the west-central part. It is 205 miles southeast of Tallahassee, 210 miles northwest of Miami, and 170 miles southwest of Jacksonville.

Physiography, Relief, and Drainage

Hillsborough County is within the Floridian section of the Atlantic Coastal Plain (4).² Cooke (3) includes the western and southern parts of the county in the Coastal Lowlands and the eastern part in the Central Highlands. The Coastal Lowlands are low, nearly level plains that lie next to the coast. The Central Highlands are the gently undulating to rolling areas in the eastern part of the county.

In the southwestern part of the county, Tampa Bay extends for a considerable distance inland. Its northern section is separated into Old Tampa Bay

and Hillsboro Bay by a peninsula that extends southward from Tampa.

In the western, southern, and northeastern parts of the county, there are large, nearly level plains, commonly called flatwoods. These plains rise gradually from the coast to elevations of more than 100 feet in the eastern part of the county. Numerous intermittent ponds, swamps, marshes, and a few permanent lakes occupy areas in the flatwoods. There are many permanent lakes and intermittent ponds in the northwestern and north-central parts of the county. Some of the larger lakes are Lake Thonotosassa, Lake Valrico, Mango Lake, Keystone Lake, and Lake Magdalene.

Elevations in the county range from sea level, along the coast, to about 144 feet at a point about 3.4 miles east of Plant City (6). Tampa is at an elevation of about 19 feet.

The surface drainage is towards Old Tampa Bay, Hillsboro Bay, and Tampa Bay. The principal streams are the Hillsborough, Alafia, and Little Manatee Rivers and Rocky, Sweetwater, Sixmile, and Bullfrog Creeks. Many ditches and small bays extend inland from the coast for short distances.

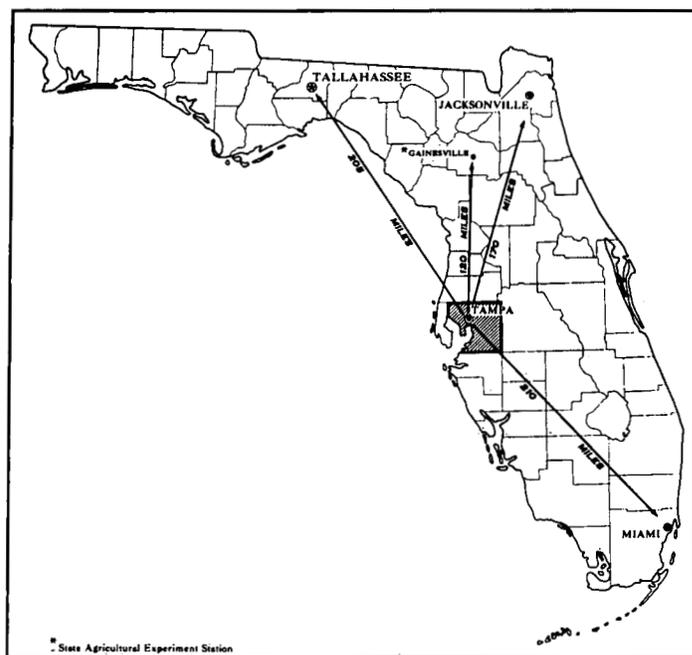


Figure 1.—Location of Hillsborough County in Florida.

¹ Fieldwork for this survey was done when Soil Survey was part of the Bureau of Plant Industry, Soils, and Agricultural Engineering. Soil Survey was transferred to the Soil Conservation Service on November 15, 1952.

² Italic numbers in parentheses refer to Literature Cited, p. 59.

Only a few streams flow through the gently undulating uplands in the north-central part of the county. Many depressions, some of which contain water that has drained or seeped from surrounding soils, occur in these areas. Drainage is slow in the flatwoods. It is provided by the slight depressions occupied by swamps and sloughs and by the few large streams that pass through the areas. The depressions contain water during the wet season; during the dry season, most of the water evaporates.

Several canals and many ditches have been dug to remove excess surface water. In only a few of these has provision been made for controlling the rate of runoff. Dams or locks would be desirable in the ditches or canals. They would help to control the rate of runoff and would thus help to regulate the water table in soils next to the drainage areas.

Climate

The climate of Hillsborough County is subtropical. The temperatures are modified, however, by winds that sweep across the peninsula from the Gulf of Mexico. The long summers are warm and humid, but thundershowers occur almost every afternoon and prevent temperatures from becoming extremely high. Winters are short and mild; many of the days are bright and sunny, and little rain falls. Cold spells, accompanied by cold winds, can be expected only a few times during the year, and they last for only a few days. Occasionally, thin ice forms, and a few flakes of snow fall at long intervals.

Data on climate for Hillsborough County are given in table 1. This information was compiled from records taken at the United States Weather Bureau Stations at Plant City and Tampa, Fla.

The average length of growing season varies somewhat between Plant City and Tampa. According to the 1941 Yearbook of Agriculture (8), the growing season is about 301 days at Plant City and about 348 days at Tampa. Many kinds of vegetables and fruits can be grown during fall and winter in Hillsborough County. Frosts severe enough to damage tender vegetables and some fruits come about once every 2 years. Though not usual, frosts have occurred as late as March 18 and as early as November 14 at Plant City, and as late as March 19 and as early as November 21 at Tampa. Wiregrass, carpetgrass, and other grasses can be grazed continuously throughout the year, and shelters for livestock are unnecessary.

The average annual precipitation is about the same at both weather stations. It is 50.21 inches at Plant City and 49.94 inches at Tampa. Generally the rainy season begins in June and continues into September. During this period the rainfall comes mainly in the form of heavy thunderstorms that generally last for 1 or 2 hours. The average rainfall at Plant City during these 4 months is 29.46 inches, and that at Tampa is 30.39 inches. In some years no rain has fallen during an entire month in the period from December through April.

Moderately high winds and accompanying thunderstorms occur at all seasons of the year. From August through November, occasional disturbances of vary-

TABLE 1.—Normal temperatures and precipitation at two weather stations
PLANT CITY, (Elevation 121 feet)

Month	Temperature ¹			Precipitation ²		
	Average	Absolute maximum	Absolute minimum	Average	Total for the driest year	Total for the wettest year
	° F.	° F.	° F.	Inches	Inches	Inches
December.....	61.0	91	19	2.17	1.62	1.68
January.....	61.0	88	15	2.38	1.43	1.02
February.....	62.1	90	21	2.44	.76	4.79
Winter.....	61.4	91	15	6.99	3.81	7.49
March.....	66.5	99	26	2.81	2.80	5.76
April.....	70.7	97	32	1.95	1.35	6.36
May.....	74.3	101	41	4.53	2.91	4.87
Spring.....	70.5	101	26	9.29	7.06	16.99
June.....	79.8	104	49	7.58	4.95	11.00
July.....	81.0	100	60	7.69	7.09	10.00
August.....	82.8	101	58	8.25	11.56	8.67
Summer.....	81.2	104	49	23.52	23.60	29.67
September.....	79.6	98	51	5.94	.75	17.09
October.....	73.6	98	38	2.97	.62	3.55
November.....	66.0	90	24	1.50	.52	4.41
Fall.....	73.1	98	24	10.41	1.89	25.05
Year.....	71.5	104	15	50.21	³ 36.36	⁴ 79.20

TAMPA, (Elevation 19 feet)

December.....	62.7	84	19	1.96	0.39	0.56
January.....	61.5	83	23	1.99	2.14	2.60
February.....	62.9	86	22	2.50	1.10	1.00
Winter.....	62.4	86	19	6.45	3.63	4.16
March.....	66.0	92	32	3.12	.08	3.20
April.....	71.5	91	38	2.51	2.07	1.90
May.....	76.5	94	52	3.29	1.81	8.85
Spring.....	71.3	94	32	8.92	3.96	13.95
June.....	80.4	98	59	7.77	6.18	6.72
July.....	81.7	96	65	8.11	2.75	24.52
August.....	82.0	97	66	8.06	7.48	23.40
Summer.....	81.4	98	59	23.94	16.41	54.64
September.....	80.5	96	54	6.45	5.73	7.75
October.....	74.6	93	43	3.14	1.18	4.80
November.....	66.7	88	32	1.04	1.34	4.56
Fall.....	73.9	96	32	10.63	8.25	17.11
Year.....	72.2	98	19	49.94	⁵ 32.25	⁶ 89.86

¹ *Plant City*: Average temperature based on a 59-year record, through 1955; highest temperature on a 53-year and lowest temperature on a 52-year record, through 1952. *Tampa*: Average temperature based on a 66-year record, through 1955; highest and lowest temperatures on a 41-year record, through 1930.

² *Plant City*: Average precipitation based on a 59-year record, through 1955; wettest and driest years based on a 57-year record, in the period 1892-1955. *Tampa*: Average precipitation based on a 66-year record, through 1955; wettest and driest years based on a 95-year record, in the period 1840-1955. ³ In 1909. ⁴ In 1947. ⁵ In 1908. ⁶ In 1840.

ing intensity, but of hurricane force, move northward from the tropics across the county. The heavy rains that accompany these storms are usually more damaging than the wind.

Water Supply

The county is well supplied with water. Numerous ponds, lakes, streams, and swamps supply water for livestock on the range or on the improved pastures that have been established in various parts of the county. Shallow wells, 20 to 40 feet deep, are easily driven or drilled in the sands and clays. These provide additional water for livestock and for some homes. Many farms and schools have drilled wells that are 60 to 100 feet deep. Electric power is generally used to pump the water, but some gasoline motors are used. Most of the farm homes have running water.

Strawberries, most vegetable crops, and some of the citrus groves are irrigated. The water is pumped from shallow ponds or from natural or artificial lakes, or from driven or drilled wells if other sources are not available. In the vicinity of Ruskin, water for irrigation is obtained from flowing artesian wells.

Native Vegetation

Hillsborough County was once covered by thick forests, mainly of pine. These forests have all been cut, except for a few of the original trees that still grow in the swamps. In the scattered second- and third-growth forests now growing in the county, the trees are generally small.

In large part, the well drained and somewhat poorly drained soils have been cleared. They are used to grow vegetables and citrus fruits or have been seeded to pasture grasses. Some areas that were once cultivated are now grown up to weeds, broomsedge, persimmon trees, oaks, and pines. A few areas have been replanted to pine trees.

Originally, longleaf pines and a few shrubs and grasses were the principal vegetation on the well-drained deep sands. Since the longleaf pines were cut, turkey oaks and bluejack oaks have grown up, and live oaks grow on some of the wetter areas. The undergrowth consists mainly of wiregrass and a few shrubs. The well-drained deep sands and phosphatic materials now have a cover of oak, hickory, magnolia, and longleaf pine and a fairly thick undergrowth of shrubs and grasses.

Scrub vegetation covers the excessively drained deep sands. This consists of scrub live oak, sand pine, rosemary, a few turkey oaks and bluejack oaks, saw-palmettos, and grasses.

The somewhat poorly drained dark-colored soils have a cover of pines, live oaks and bluejack oaks, hickory, a few saw-palmettos, shrubs, and wiregrass and some other grasses.

The flatwood areas, which make up a large part of the county, have a cover of pines, saw-palmettos,

huckleberry bushes, gallberry bushes, runner oaks, and grasses. Cabbage palmettos, live oaks, myrtle bushes, and vines also grow on the soils that consist partly of calcareous materials.

Mixed forests of cypress, gum, elm, hickory, live oak, water oak, maple, ironwood, cabbage palmetto, and vines, shrubs, and grasses grow in the swamps in the interior of the county. Sedges, rushes, grasses, and a few pines grow on the wet prairies. On some of the wetter prairie areas, there are lilies, bonnets, arrowheads, pickerelweeds, and other aquatic plants. In a narrow strip along the coast, where the areas are sometimes covered by high tides, mangrove trees and salt-tolerant plants form the vegetative cover.

Social and Industrial Development

It was about 1820 when the first American settlers moved into this area. They found some small communities of Spanish-speaking settlers already established. Few Americans came for some time, because transportation was poor and there was no industrial development.

The early settlers planted orange trees near Lake Thonotosassa, but they had no markets for the fruit. Some grew corn, vegetables, sugarcane, oats, rice, and cotton for their own use. Fish and game also were a source of food. A few hogs and cattle were pastured on the open range.

Larger numbers of settlers came after the Seminole War ended in 1842. After the railroads were built, about 1884, commerce and industry developed in Tampa and agriculture expanded in the rural sections. Vegetables were first shipped to northern markets about 1900. Since that time the production of winter vegetables, strawberries, and citrus fruits for the northern markets has increased, and these products are now a major source of income.

Organization and population

The county was organized in 1834 by the governor and the legislative council of the Territory of Florida (5). The county was originally much larger than it is today. Soon after Florida became a State, in 1845, a large part of Hillsborough County was taken to form the counties of Pasco, Polk, Manatee, Sarasota, DeSoto, Charlotte, Highlands, and Hardee. The present boundaries of Hillsborough County were not fixed until 1911, when another part of the area was taken to form Pinellas County.

The railroads brought rapid expansion in the population. According to the Federal census, the population in 1950 was 249,894, of which about 25 percent was rural. The population of Tampa was 124,681 in 1950; that of Plant City, 9,230; and that of Port Tampa, 1,497. Smaller towns and agricultural trading centers are Ruskin, Wimauma, Sun City, Brandon, Gibsonton, Riverview, Mango, Seffner, Dover, Valrico, Thonotosassa, Lutz, and Citrus Park.

Industries

After railroads were built, industry developed rapidly in Tampa. In January 1886 two cigar factories located at Ybor City, in the eastern part of Tampa. Today Tampa is considered the "Clear Havana" cigar center of the world. Phosphate mining was begun early in the 20th century. It has progressed until now more than 75 percent of the phosphate exported from the United States is shipped from Tampa.

Other important industrial establishments in the Tampa area are packing plants for processing vegetables, strawberries, and citrus fruits; slaughterhouses for processing beef cattle and swine; breweries; bottling plants; and lumber companies. Factories are numerous. They produce building supplies, including aluminum window casements, cement, and paints; trailers; many types of containers; fertilizers; feeds; furniture; heaters; mattresses; and batteries.

In addition to the packing plants at Tampa, a State Farmers' Market and a farmers' cooperative, located in Plant City, receive and pack many vegetables and truck crops. A privately owned packinghouse at Ruskin processes and packs vegetables and trucks them to northern markets.

Dairying and poultry raising have become important in Hillsborough County. Beef cattle have been raised more extensively during the past few years.

Transportation and markets

Hillsborough County has good transportation facilities. The Seaboard Air Line Railroad and the Atlantic Coast Line Railroad have a number of branches in the county, so that nearly all sections are within a few miles of railway freight stations.

Several Federal highways connect Tampa with other cities. Highway 41 crosses from north to south through the central part of the county. It passes through Lutz, Tampa, and Gibsonton and extends southward from Tampa to Ruskin and beyond. Highway 92 joins Tampa with Plant City and extends eastward from Plant City. Highway 301 enters the county near Hillsborough River State Park, and it extends in a southwesterly direction to Tampa and from there southward.

Many State highways connect the various parts of the county, and there are some hard-surfaced roads in most agricultural communities. The connecting graded roads are kept in fair condition all year.

Passenger buses operate over all of the Federal highways and over several of the State highways. Motor-trucks, operating over the hard-surfaced roads, are used to transport a large part of the agricultural products to outside markets.

Facilities for traveling by water or air are excellent in Hillsborough County. About 15 steamship lines maintain offices in Tampa. Ships of these and other lines dock at Tampa and Port Tampa to load and unload passengers and large volumes of freight. Vegetables, truck crops, strawberries, and citrus fruits are trucked or shipped by rail to northern markets. Some products, harvested when they are in short sup-

ply on distant markets, are shipped by air. Gladioli blossoms are shipped by air or by motortruck to the northern cities. Several airlines connect Tampa with other cities in Florida and with the major cities in the United States. The Tampa International Airport is located about 4½ miles northwest of the center of Tampa, and the MacDill Army Air Base is located in the southwestern part of that city. There are several smaller airports near Tampa and in Plant City and Ruskin.

Schools, churches, and hospitals

Students are transported from outlying areas by bus to the consolidated schools located in the larger communities throughout the county. Several high schools are located in Tampa, and there are high schools at Plant City, Brandon, Wimauma, Turkey Creek, and Pinecrest. A vocational school, several parochial and private schools, and the University of Tampa, a private institution, are located at Tampa. Several of the schools in the eastern part of the county are called "strawberry schools." This is because the school term extends from April to December so that the children can pick strawberries and vegetables during the winter months.

Churches are conveniently located in most communities. There are two municipal hospitals in Tampa. In addition, small children are given dental care by means of a "Dentomobile," and the county health department operates a "Healthmobile." Other health services are provided by the county clinic.

Recreational facilities

Tampa Bay and the numerous lakes and rivers in the county provide excellent facilities for boating, fishing, and swimming. Because of the mild climate, these activities can be carried on during most of the year. The Hillsborough River State Park, located in the northern part of the county along United States Highway 301, provides additional opportunities for recreation.

Agriculture

The agriculture of Hillsborough County is based on the growing of citrus fruits and winter vegetables and the raising of livestock. On the following pages the more outstanding features of this agriculture are pointed out. The statistics used are from reports published by the United States Bureau of the Census.

Farm Income

In 1950, total income derived through sale of farm products was divided as follows:

	<i>Percent</i>
Crops sold:	
Fruits and nuts.....	29.2
Vegetables	24.4

Horticultural specialties -----	4.0
Field crops -----	1.7
Livestock and livestock products sold:	
Dairy products -----	20.6
Poultry and poultry products -----	8.8
Other livestock and livestock products -----	10.9
Forest products and other products sold -----	.4

As indicated in this list, crops account for about 60 percent of sales off the farms, and livestock, for about 40 percent.

Land Use

Hillsborough County covers about 665,600 acres, and in 1950 approximately 60 percent of this was land in farms. Of the land in farms, only about 18 percent was cropland in 1950. A large part of the cropland is used to grow citrus fruits, vegetables, and truck crops.

Between 1930 and 1950 the area of land in farms increased from 98,029 acres to 398,171 acres. Most of the added acreage has been used to grow citrus trees and vegetables or has been seeded to pasture grasses. Land not in farms is in forest, range, or building sites, or is included in the Hillsborough River State Park or in other recreational areas.

Some tracts have been cropped for a few years and then seeded to pasture grasses. After being pastured for a time, the areas will again be used for crops. Only a few areas once cultivated or used for pasture have been reforested.

The following list shows how land in farms was used in 1949:

	<i>Acres</i>
Cropland harvested -----	36,801
Cropland used only for pasture -----	17,160
Cropland not harvested and not pastured -----	16,224
Woodland pastured -----	254,207
Woodland not pastured -----	26,197
Other pasture (not cropland and not woodland) -----	22,674
Other land (house lots, roads, wasteland, etc.) -----	24,908
Cropland, total -----	70,185
Land pastured, total -----	294,041
Woodland, total -----	280,404

Types and Sizes of Farms

Of the 3,753 farms in Hillsborough County in 1950, 1,723 were miscellaneous and unclassified. The remaining farms were listed by type as follows:

	<i>Number</i>
Vegetable farms -----	582
Fruit and nut farms -----	756
Field-crop farms other than vegetable and fruit and nut -----	20
Poultry farms -----	256
Dairy farms -----	110
Livestock farms other than dairy and poultry -----	144
General farms -----	162

Most of the vegetable farms are located within 12 miles of Plant City or near Ruskin. The farms that grow fruits or nuts, principally citrus fruits, are mainly in the vicinity of Thonotosassa, Brandon, Valrico, Citrus Park, Lutz, Tampa, and Plant City.

The poultry farms are principally on well-drained soils near Tampa, Mango, Seffner, Valrico, and Plant City; the dairy farms are near Tampa and Plant City; the general farms are in various parts of the county; and the livestock farms, or ranches, are in the northwestern, northeastern, and southern parts of the county.

Farms ranged in size from less than 10 acres to more than 1,000 acres in 1950. Of the 3,753 farms in the county, 38.3 percent were between 10 and 29 acres in size, and 26.7 percent were less than 10 acres. There were 65 farms of 1,000 acres or more. The average size of farms in the county was 106.1 acres in 1950.

Many of the smaller farms are near Plant City. They are located mainly on Scranton and Ona soils and on small areas of Leon and Blanton soils. Many of the larger farms are in the southwestern part of the county. Soils of the Ruskin and Adamsville series are the principal soils in these farms.

Most of the citrus groves are 20 to 50 acres in size. They are generally the main source of income on larger farms where other types of farming are also carried on.

Most of the cattle ranches are 1,000 acres or more in size. They are generally on Leon, Blanton, Pomello, Immokalee, and Ona soils, in the southern, northeastern and northwestern parts of the county.

Crops

The climate of Hillsborough County is well suited to winter vegetables and to many of the subtropical fruits. Vegetables are grown principally near Plant City and Ruskin. Tree fruits are grown mainly on the well-drained soils near Thonotosassa, Brandon, Valrico, Plant City, Lutz, Citrus Park, and Tampa. The acreage of the principal crops and the number of bearing fruit trees, nut trees, and grapevines in Hillsborough County are shown in table 2 for 1929, 1939, and 1949.

The principal vegetables and truck crops are tomatoes, peppers, strawberries, sweet corn, snapbeans, green limabeans, cucumbers, squash, and watermelons. These crops are usually shipped by truck, but the early produce is shipped by air. Some of the vegetables are processed by local canneries, and some are sold on local markets.

The tree fruits grown in the county are principally oranges, grapefruit, and tangerines. Lemons, limes, avocados, peaches, and grapes are also grown to some extent.

A fairly large acreage of cowpeas has been grown during the past few years. The corn acreage is not large; the corn is used to feed animals on the farm. Small grains and hay are grown on only a small acreage. The oats and rye are mainly used for winter grazing.

Sugarcane was once grown fairly extensively for sirup. The acreage has decreased, and in 1949 only 22 acres of sugarcane and sorghum was harvested for sirup.

TABLE 2. — *Acreage of principal crops and number of bearing fruit trees, nut trees, and grapevines in 1929, 1939, and 1949*

Crop	1929	1939	1949
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>
Corn for all purposes.....	5,418	5,563	1,306
Sugarcane or sorghum harvested for sirup.....	83	6	22
Cowpeas for all purposes, grown alone.....	500	1,212	2,241
Peanuts for all purposes, grown alone.....	101	352	120
Velvetbeans for all purposes, grown alone.....	130	1 128	84
All hay.....	² 1,033	² 1,054	³ 299
Vegetables and truck crops:			
Cabbage.....	188	128	385
Cucumbers.....	243	257	976
Eggplant.....	34	172	312
Green beans (snap, wax, string).....	⁴ 1,013	1,625	790
Green limabeans.....	8	561	598
Lettuce.....	24	52	345
Okra.....	69	154	478
Peas, green.....	146	664	96
Peppers, sweet and pimiento.....	577	1,450	2,112
Potatoes, Irish.....	314	257	⁵ 584
Squash.....	41	416	1,537
Strawberries.....	2,486	4,219	1,632
Sweet corn.....	218	728	1,783
Sweet potatoes.....	243	100	⁵ 104
Tomatoes.....	995	1,995	2,440
Watermelons.....	427	201	757
	<i>Number</i> ⁶	<i>Number</i> ⁶	<i>Number</i> ⁶
Orange trees.....	456,284	686,624	659,849
Grapefruit trees.....	113,358	156,536	135,944
Lemon trees.....	858	2,516	1,614
Lime trees.....	236	3,490	2,632
Tangerine and mandarin trees.....	⁷ 40,089	48,420	32,054
Avocado trees.....	638	149	456
Fig trees.....	192	153	445
Pear trees.....	43	505	93
Peach trees.....	542	1,063	1,262
Plum and prune trees.....	86	191	25
Pecan trees.....	155	833	746
Grapevines.....	2,818	2,670	2,055

¹ Includes vetches, mungbeans, and horsebeans.

² Does not include sorghum hay.

³ Does not include cowpeas and peanuts grown for hay.

⁴ Does not include waxbeans.

⁵ Does not include acres for farms with less than 15 bushels harvested.

⁶ Number in the census year, which is 1 year later than the crop year given at the head of the column.

⁷ Includes Satsuma oranges.

Livestock and Livestock Products

The number of domestic animals on farms and ranches and the quantity of livestock and livestock products sold in stated years are shown in table 3. Dairy cattle are predominant. Jersey, Holstein, Guernsey, and Brown Swiss are the most common breeds. Most of the dairy farms are located near Tampa and in rural settlements extending southward to the Alafia River.

Because of increased local demand for dairy products, the number of milk cows has increased considerably during the past few years. In 1949 there were 11,181 milk cows in the county, and 5,728,802 gallons

of whole milk was sold. In contrast, the number of cows and heifers milked in 1929 was 5,341, and only 1,990,436 gallons of whole milk was sold. Though some of the milk is trucked to towns in nearby counties, most of the dairy products are sold within the county.

Second to dairying in importance is poultry raising. White Leghorns and New Hampshire Reds are the most common breeds. In 1949, 663,734 chickens and 1,534,971 dozen eggs were sold in Hillsborough County. Other poultry raised included 8,801 Bronze and Beltsville White turkeys and 2,901 ducks.

Beef cattle are increasing in Hillsborough County. These animals are raised on the range or on improved pastures, mainly in the southern, northeastern, and northwestern parts of the county. The range generally supplies only a fair amount of forage. The improved pastures have been cleared of palmettos and other shrubs, fertilized, and seeded to pasture grasses.

Most of the beef cattle are grade animals. Since 1935, the stock has been improved by using Brahman bulls or bulls of the English beef breeds, such as Hereford, Aberdeen-Angus, and Shorthorn. A few of the herds are of purebred Brahman or English beef breeds. Most of the beef animals are bought by packers and slaughtered at packinghouses in and near Tampa.

In 1950 there were 5,688 swine in the county. Though a few farms have registered Duroc-Jersey or Hampshire swine, most are grade animals. The swine are generally not turned on the range pastures. Many

TABLE 3. — *Number of domestic animals on farms and livestock and livestock products sold in stated years*

LIVESTOCK ON FARMS			
Livestock	1930	1940	1950
	<i>Number</i>	<i>Number</i>	<i>Number</i>
Horses and colts.....	806	¹ 853	1,532
Mules and mule colts.....	955	¹ 1,228	854
Cattle and calves.....	14,224	¹ 28,520	41,313
Hogs and pigs.....	7,688	² 6,510	5,688
Sheep and lambs.....	2	³ 92	37
Chickens.....	¹ 131,980	² 149,495	¹ 243,944
Turkeys raised ⁴	2,751	3,253	8,801
Beehives.....	1,099	1,981	⁴ 1,039

LIVESTOCK AND LIVESTOCK PRODUCTS SOLD

Item	1929	1939	1949
Cattle and calves..... number..	(⁵)	7,857	20,777
Hogs and pigs..... number..	(⁵)	2,434	5,910
Chickens..... number..	127,616	230,501	663,734
Milk, whole..... gallons.....	1,990,436	2,979,978	5,728,802
Chicken eggs..... dozens.....	848,216	⁶ 1,189,826	1,534,971
Honey ⁶ pounds.....	14,079	64,849	17,686

¹ Over 3 months old.

² Over 4 months old.

³ Over 6 months old.

⁴ In year preceding census year.

⁵ Not reported.

⁶ Total produced.

are fed sterilized garbage and sour milk. Most of the swine are sold to local slaughterhouses for processing.

The 1,039 hives of bees in the county in 1949 produced 17,686 pounds of honey. The bees also help to pollinate the vegetables and fruits. Additional apiaries are needed in the county to help pollinize the citrus trees and vegetable crops.

Farm Tenure

In 1950, nearly 80 percent of the farms in the county were operated by full owners, and nearly 9 percent, by part owners. The rest were operated mainly by tenants, though 28 farms were operated by managers.

Of the 404 tenants who operated farms in Hillsborough County in 1950, 176 paid cash rent and 110 were croppers. The rest were unclassified. In addition to the rent, cash tenants pay the expenses of planting, cultivating, fertilizing, and harvesting the crop. If the farm is sharecropped, the owner generally pays for the seed, fertilizer, and spraying materials. The sharecropper supplies the necessary labor and power. The harvested crop is divided equally between the owner and the sharecropper.

Farm Power and Mechanical Equipment

Horses and mules are used to some extent as a source of power. The animals are of small to medium size. They are used to draw one-horse implements—seeders, rollers, double-shovel cultivators, and the like. Many farms have no mules or horses. Most farms that have work stock keep from 1 to 4 animals.

Tractors are used for most heavy farmwork. In 1950 there were 1,299 tractors on 1,012 farms. The tractors are mainly the all-purpose type, but some farms have caterpillar tractors. On some tractors, the engine is elevated so that the body of the tractor will pass over the stakes in the tomato fields. These special-built tractors are also used to draw equipment for fertilizing, cultivating, and spraying corn and other tall-growing plants. Moldboard plows, diskplows, disk harrows, cultivators, cultipackers, dusting and spraying apparatus, potato diggers, seeding drills, and rolling choppers are common equipment on many farms.

In 1950, 1,553 farms had 1,912 motortrucks. These trucks are used to haul seed, fertilizer, implements, and workers to the fields. They are also used to transport the farm products to packinghouses and markets.

Some of the larger producers and cooperatives have power-driven machinery for use in washing and grading vegetables and citrus fruits.

Farm and Home Improvements

Most of the farm dwellings in the county are one-story wooden structures. Because of the mild climate, expensive farm buildings are not needed. Milking barns, a place to care for the milk, and sheds in which to store the more expensive machinery and pack the

farm produce are generally the only buildings needed besides the dwelling.

In 1950, 3,164 of the farm homes in the county had electricity and 2,320 had running water. Telephones were in 1,026 of the farm homes. All parts of the county were served by rural mail routes.

Soil Series and Their Relationship

The soils of Hillsborough County are similar in some characteristics and qualities, but vary greatly in others. As a consequence, they have a wide range of suitability for agricultural use. In general, they are nearly level or gently sloping, acid, very sandy, very permeable, low in clay, low in organic matter, and low in plant nutrients. Their natural drainage, however, ranges from very poor to excessive. Some are underlain by calcareous materials, and some have loose acid sand to a depth of several feet. Approximately 176,000 acres of soil have a brown-stained pan at depths of 14 to 42 inches, whereas other soils are entirely free of this layer.

Excessively Drained Soils

Excessively drained Lakewood and St. Lucie soils occupy about 1.6 percent of the county. These soils were derived from thick beds of sand. They have surface layers of light gray or gray fine sand. The areas are generally nearly level, but there are a few gentle slopes.

Somewhat Excessively Drained to Moderately Well Drained Soils

About 16.2 percent of the county is occupied by somewhat excessively drained to moderately well drained soils. This group consists of the Blanton; Eustis, Lakeland, and Orlando soils and of Sandy local alluvium.

In most places these soils are fine sand to depths greater than 42 inches. In a few areas of the Lakeland soils, sandy clay loam occurs at depths between 30 and 42 inches. The topography is nearly level to undulating, but there are a few short steeper slopes near streams, sinkholes, ponds, or lakes. Sandy local alluvium occurs in depressions or at the bases of slopes.

Well Drained to Somewhat Poorly Drained Soils

Soils that are well drained to somewhat poorly drained occupy about 4.6 percent of the county. These soils belong to the Arredondo, Blichton, Fellowship, Fort Meade, Gainesville, Kanapaha, and Alachua series. All have developed from sand that overlies beds of phosphatic materials. Small phosphate pebbles occur on the surface and throughout the profiles.

The Arredondo, Blichton, Fellowship, Fort Meade, and Gainesville soils are nearly level to undulating, although a few areas have slopes of as much as 15 percent. The Kanapaha soil is nearly level, and the Alachua occurs in depressions or at the bases of slopes occupied by areas of Arredondo, Fort Meade, and Gainesville soils.

The surface layers of the Arredondo, Blichton, and Kanapaha soils are fine sand. The Fellowship, Fort Meade, Gainesville, and Alachua soils have surface layers of loamy fine sand.

Moderately Well Drained to Somewhat Poorly Drained Soils

The Pomello soil is the only moderately well drained to somewhat poorly drained soil of the county. It occupies about 2.3 percent of the county. It was derived from thick beds of sand. The surface layer is gray or light-gray fine sand. The fine sand extends to depths greater than 42 inches. The topography is nearly level.

Somewhat Poorly Drained Soils

Many of the soils of Hillsborough County are somewhat poorly drained. These soils have been separated into three subgroups according to differences in parent material.

Somewhat poorly drained soils derived from moderately thick beds of sands.—Somewhat poorly drained soils derived from moderately thick beds of sands occupy about 7.5 percent of Hillsborough County. These soils belong to the Ona and Scranton series. Most of the areas are nearly level to level, but some occupy slopes of as much as 5 percent. Ona fine sand has a black or dark-gray surface layer. Ona fine sand, light-colored surface phase, has a surface layer that is light gray or gray. A brown, organic-stained layer occurs in the Ona soils within 14 inches of the surface. The Scranton soil has a black or very dark gray surface layer.

Somewhat poorly drained soils derived from sands over calcareous materials.—About 4.9 percent of the county is occupied by somewhat poorly drained soils derived from sands over calcareous materials. These soils belong to the Adamsville, Bradenton, Broward, Keri, Parkwood, Ruskin, and Sunniland series. They occur mainly along the coast and near some of the larger streams. Generally, these soils have gray or dark-gray surface layers of fine sand.

The Adamsville soil consists of neutral or alkaline fine sand throughout its 42-inch profile. The Bradenton soil has a sandy clay layer underlain by marl of a fine sandy clay or sandy clay loam texture. The Broward soil consists of fine sand over limestone. The Keri soil has a thin layer of marl, 6 to 12 inches thick, beginning at depths of 12 to 24 inches. The marl is underlain by fine sands.

The Parkwood soil consists of fine sand over a thick bed of marl. The Ruskin soil consists of fine sand over

fine sandy clay loam and shelly marl. In most places the marl occurs at depths of less than 42 inches.

The Sunniland soils are somewhat similar to the Ruskin. Sunniland fine sand, moderately shallow over marl, is underlain at depths of 40 to 48 inches by marl that has a sandy clay loam or sandy clay texture. Sunniland fine sand, shallow over marl, is underlain at depths between 22 and 40 inches by marl that has a fine sandy clay texture.

Somewhat poorly drained soils derived from thick beds of sands.—About 29.2 percent of the county is occupied by the somewhat poorly drained Immokalee and Leon soils, which were derived from thick beds of sands. An organic pan is characteristic of these soils. In the Leon soils the pan occurs at depths between 14 and 30 inches, and in the Immokalee soils it is at depths of more than 30 inches. The areas are generally level or nearly level, but there are occasional slopes of as much as 5 percent. The soils have gray or dark-gray surface layers of fine sand.

Poorly Drained to Very Poorly Drained Soils

The poorly drained to very poorly drained soils have been separated into four subgroups according to differences in their parent materials.

Poorly drained to very poorly drained soils derived from moderately thick beds of noncalcareous sands.—The poorly drained Plummer and Rutlege soils were derived from moderately thick beds of noncalcareous sands. These soils occupy about 7.5 percent of the county. They occur on level areas or in depressions.

Plummer fine sand has a surface layer of dark-gray or gray fine sand and a lower horizon of light-gray fine sand that extends to depths of more than 42 inches. The inextensive shallow phase of Plummer fine sand is underlain at depths of 30 to 42 inches by fine sandy clay loam or fine sandy clay.

Rutlege fine sand has a surface layer of black fine sand, which is underlain by lighter colored fine sand that extends to depths of more than 42 inches. The inextensive shallow phase of Rutlege fine sand has clayey materials at depths between 30 and 42 inches. Rutlege mucky fine sand has considerably more organic matter in the surface layer than typical Rutlege fine sand.

Poorly drained to very poorly drained soils derived from thin beds of sands over noncalcareous clays.—The poorly drained to very poorly drained Portsmouth and Rains soils were derived from thin beds of sands over noncalcareous clays. These soils occupy only about 0.14 percent of the county. Fine-textured materials begin at depths of about 30 inches.

Portsmouth fine sand has a surface layer of black to very dark gray fine sand. It has less organic matter in the surface layer than Portsmouth mucky fine sand.

The Rains soil has a surface layer of dark-gray or gray fine sand. The finer textured lower layers are streaked or mottled with shades of yellow and brown.

Poorly drained to very poorly drained soils derived

from moderately thick beds of nearly neutral or alkaline sands.—The Charlotte, Delray, and Pompano soils are poorly drained to very poorly drained. They were derived from moderately thick beds of nearly neutral or alkaline sands. These soils occupy about 1.0 percent of the county. They occur on level areas or in depressions and are often under water for long periods.

Poorly drained to very poorly drained soils derived from thin deposits of sands over neutral or alkaline clays.—The poorly drained to very poorly drained soils of the Felda and Manatee series were derived from thin deposits of sands over neutral or alkaline clays. These soils occupy about 0.7 percent of the county. They occur on level areas or in depressions.

The Felda soil has a very dark gray or dark gray surface layer of fine sand, 3 to 9 inches thick. Sandy clay loam occurs within 30 inches of the surface.

Manatee fine sandy loam and Manatee loamy fine sand have black surface layers. Manatee fine sandy clay, heavy variant, has a very dark gray or dark gray surface layer. In the Manatee soils, fine sandy clay occurs within 30 inches of the surface. In many places a layer of marl underlies the sandy clay.

Very Poorly Drained Organic Soils

The very poorly drained organic soils occupy about 0.6 percent of the county. They belong to the Brighton, Istokpoga, Pamlico, and Terra Ceia series. The soils occupy level areas or depressions. They are under water many months of the year.

The Brighton soils have a very dark brown or black peat or muck surface layer. The surface layer of Brighton peat consists of fibrous peat, and the fibrous materials extend downward to depths of 20 to 48 inches. The surface layer of Brighton mucky peat is nonfibrous mucky peat, 6 to 10 inches thick, underlain by fibrous organic material.

Istokpoga peat and Istokpoga mucky peat are somewhat similar to the Brighton soils. They were derived from woody plants, however, and small pieces of hard wood occur in their surface layers.

Pamlico muck has a surface layer of black muck 12 to 15 inches thick, that is underlain by gray or light-gray fine sand.

Terra Ceia peaty muck has a black nonfibrous surface layer, 12 to 20 inches thick. The underlying black or dark-gray sandy clay loam contains small shells.

Miscellaneous Land Types

Miscellaneous land types occupy about 18.4 percent of the county. They consist of materials that vary in composition, texture, color, and thickness. The land types mapped in the county are Alluvial land; Fresh water swamp (unclassified soils); Mines, pits, and dumps; Mixed alluvium, high bottom phase; Peace River soils; Shallow ponds with grass; Tidal marsh (unclassified soils); and Tidal swamp (unclassified soils).

The Peace River soils have a nearly black surface

layer of varying textures. This is underlain by calcareous fine sandy clay. The other mapping units consist of mixed soil materials, generally ranging from dark gray to light gray in color and from fine sand to sandy clay in texture. Some areas have a thin covering of muck or peat. Many areas are under water for long periods. Tidal marsh (unclassified soils) and Tidal swamp (unclassified soils) occupy low-lying areas next to Tampa Bay, Hillsboro Bay, and Old Tampa Bay. These areas may be covered by salt water during high tides.

Mines, pits, and dumps and Made land consist chiefly of the overburden and waste materials that remained after the phosphate gravels were washed. These materials were returned to the excavations or were dumped on nearby soils.

Made land consists of the leveled areas of waste materials and of areas raised by additions of materials dredged from the streambeds when stream channels were widened.

Airports and the urban areas of Greater Tampa were not mapped. These areas account for approximately 5.4 percent of the county.

Soil Associations

Soils that normally occur together in a characteristic geographic pattern may be shown in a small-scale map on the basis of their close association. An association may contain many soils or only a few. It may include soils that are unlike each other in many ways but that share the quality of relationship in occurrence or association. The nature of the soil association influences not only the type of agriculture but also the agricultural practices required for proper use and maintenance of the soils.

The soils of Hillsborough County have been placed in 12 associations. These are described below in terms of the kind of major soils in the association. These associations have been delineated and are shown by number and color on a small map in the back of this report. Such a grouping should be helpful in understanding the broad pattern of soil development and use in the county and in guiding county-wide agricultural planning.

Excessively Drained or Well-Drained Deep Sands

This soil association, number 6 on the soil association map, is made up of excessively drained or well drained deep sands. Pomello, St. Lucie, and Lakewood soils are the principal constituents, but the association may include areas of Blanton, Immokalee, and Leon soils that are too small to be shown separately on a map of the scale used. The Pomello, St. Lucie, and Lakewood soils occur on nearly level areas throughout the association.

The texture of all the soils is fine sand. The St. Lucie and Lakewood are excessively drained, and the Pomello is well drained to imperfectly drained.

Grazing is poor on the soils of this association, and

the forest products are of poor quality. Under good management smooth areas of Lakewood soils can be used to grow citrus trees.

Well-Drained Deep Sands

This soil association, number 1 on the soil association map, consists of well-drained deep sandy soils. It is dominated by the Blanton and Lakeland soils; Eustis and Orlando soils are also extensive. Small areas of somewhat poorly drained Leon, Ona, Plummer, Pomello, Rutlege, and Scranton soils that are too small to show separately on a map of the scale used may be included. The Blanton, Lakeland, Eustis, and Orlando soils occupy areas that are nearly level to undulating. A few short, steeper slopes occur near streams, sink-holes, ponds, or lakes. Most of the association is in the north-central and northwestern parts of the county.

The Blanton, Lakeland, Eustis, and Orlando soils generally consist of fine sand to depths of more than 42 inches. In a few areas of Lakeland soils, however, a sandy clay layer occurs at depths between 30 and 42 inches.

Large areas of the soils in this association are used to grow citrus fruits or are covered by forests. Smaller areas are pastured or are used to grow general crops or for poultry farms. The soils are droughty, and some crops need irrigation during dry spells. Where water and equipment are available, portable sprinkling systems are used to irrigate.

The dominant soils of this group are well suited to citrus trees, general farm crops, watermelons, improved pastures, and forest. The soils need fertilization and the maximum use of soil-building crops to obtain and maintain high productivity.

Well-Drained Sands Mixed with Phosphatic Materials

This soil association, number 2 on the soil association map, consists of well-drained sandy soils that contain a few phosphatic pebbles. Nearly half of the association is made up of Arredondo soils; Fort Meade soils are extensive; and Gainesville, Blichton, Alachua, Fellowship, and Kanapaha soils occur to a lesser extent. Small areas of Blanton, Eustis, Lakeland, Leon, and Scranton soils, too small to show separately on a map of the scale used, may be included.

The Arredondo, Fort Meade, Gainesville, Blichton, and Fellowship soils are nearly level to undulating, but a few slopes as steep as 15 percent are included. The Kanapaha soil is nearly level, and the Alachua soil occupies depressions or occurs at the bases of slopes.

The Arredondo, Blichton, and Kanapaha soils consist of fine sands; the Fort Meade, Fellowship, and Alachua soils are loamy fine sands. In most places the Gainesville soils are loamy fine sand throughout, but in small areas sandy clay loam occurs at depths between 30 and 42 inches. Small phosphatic pebbles are scattered on the surface and occur throughout the profiles of these soils.

Large areas of Arredondo, Fort Meade, and Gaines-

ville soils occur near Brandon, Valrico, and Bloomingdale, and north of Plant City. The areas are used to grow citrus fruits, general crops, and vegetables. Some are in pasture or in forest. Most of the soils are somewhat droughty and require irrigation for good yields.

Somewhat Poorly Drained, Dark-Colored Sands

This soil association group, which is number 3 on the soil association map, is comprised of somewhat poorly drained, dark-colored sandy soils. Most of the association consists of Ona and Scranton soils. Small areas of Blanton, Leon, Plummer, Pomello, and Rutlege soils, too small to be shown separately on a map of the scale used, may be included. The Ona and Scranton soils are level or nearly level or occupy short slopes of as much as 5 percent.

The surface layer of the Ona and Scranton soils is black to dark-gray fine sand. A brown-stained layer occurs within 14 inches of the surface in the Ona soils.

The Ona and Scranton soils are used to grow strawberries, vegetables, and general crops. Some better drained areas, mainly of the Scranton soil, are used to grow citrus fruits. Large areas of the Ona soils in the southern and southeastern parts of the county are used for range pasture. Under good management, crops yield very well on these soils. During dry periods portable or stationary sprinkling systems are used to irrigate many of the crops.

Pine trees grow very well on the soils of this association.

Somewhat Poorly Drained Sands Over a Calcareous Substratum

This soil association, number 4 on the soil association map, consists of somewhat poorly drained sandy soils that overlie calcareous material. It is comprised of large areas of Ruskin, Sunniland, Adamsville, and Bradenton soils and of less extensive areas of Broward, Keri, and Parkwood soils. Small areas of poorly drained Delray, Felda, Manatee, and Pompano soils, and of somewhat poorly drained Immokalee and Leon soils, may be included because they are too small to show separately on a map of the scale used.

This soil association occurs mainly along the coast and near some of the major streams. The Ruskin soil occupies areas between Sun City and Tampa. The Sunniland soils occur mainly along the Hillsborough River in the northern part of the county. The Adamsville, Keri, and Parkwood soils occur along Tampa Bay, and the Bradenton and Broward along Tampa Bay and farther inland.

The Ruskin and Adamsville soils between Sun City and the Alafia River are used mainly to grow vegetables. Gladiolus are grown to a small extent. Some areas have been seeded to improved pasture grasses. Most of the areas of Sunniland, Broward, and Keri soils are used as range pasture or are covered by pine forests.

Under good management, yields of vegetables and other crops are high on the soils of this association.

Somewhat Poorly Drained Sands with Organic Hardpan

This soil association, number 5 on the soil association map, is comprised of somewhat poorly drained sandy soils. The principal soils contain organic pans. The Leon soils dominate this association, but Immokalee soils are also extensive. Small areas of Ona, Plummer, Pomello, and Rutlege soils, and Alluvial land, Shallow ponds with grass, and organic soils may be included, because they are too small to be shown separately on a map of the scale used. The Leon and Immokalee soils occur throughout the association. They occupy level or nearly level areas, though a few slopes are as steep as 5 percent.

A dark-brown or black organic pan, at depths between 14 and 42 inches, is typical of the Leon and Immokalee soils.

The soils of this association are used mainly for range, improved pasture, and forest. Some small areas are used to grow vegetables and strawberries. Fair yields of vegetables can be produced under a good management system that includes using liberal applications of fertilizers and lime and controlling the water table. The range provides fair to poor grazing, and the quality of the timber is fair to good, although the trees grow slowly. Good pastures can be established under good management.

Poorly Drained Acid Sands

This soil association, number 7 on the soil association map, is made up of poorly drained acid sands. It consists mainly of Rutlege and Plummer soils and of lesser areas of Portsmouth and Rains soils. Areas of Leon and Ona soils, Shallow ponds with grass, and organic soils may be included because they are too small to be shown separately on a map of the scale used.

The soils of this association are used primarily for range pasture and forest. Grazing is fair to good on the range, and it is good on some areas that have been seeded to improved grasses. The forests consist largely of pines mixed with some hardwoods. Tree growth is fair to good. On cultivated areas, where water has been controlled and good management has been practiced, good yields of vegetables have been obtained.

Poorly Drained Neutral to Alkaline Sands and Sandy Clays

This soil association, number 8 on the soil association map, is made up of poorly drained neutral to alkaline soils of sandy and sandy clay textures. It consists mainly of Pompano, Felda, Manatee, Delray, and Charlotte soils, but may include areas of Leon and Ona soils, Shallow ponds with grass, and organic soils, too small to show separately on a map of the scale used. The soils and miscellaneous land types occur within larger areas of, or next to, somewhat poorly drained

sandy soils that overlie calcareous material. They are near the coast and along the Hillsborough River.

The soils of this group are used primarily for grazing and forest. Small areas of these soils included in fields of Ruskin and Adamsville soils are used to grow vegetables. Under proper management, which includes control of water and application of suitable fertilizers, good yields of vegetables are obtained. The quality of the pastures and forests is fair to good.

Very Poorly Drained Organic Soils

This soil association, number 9 on the soil association map, consists of very poorly drained organic soils. It is the least extensive in the county. It consists mainly of Brighton, Terra Ceia, Istokpoga, and Pamlico soils. A few small areas of Manatee, Delray, Felda, and Rutlege soils, Shallow ponds with grass, and Fresh water swamp (unclassified soils) may be included.

The soils of this association are covered with water during many months of the year. The Brighton, Istokpoga, and Pamlico soils are acid in reaction. The Terra Ceia is neutral or alkaline. Except for the Terra Ceia soil, which occurs mainly near the intersection of United States Highways 92 and 301, the soils occur throughout the county.

The soils of this association are used mainly for pasture. They provide good grazing when they are not under water. Some of the areas provide organic materials for use on lawns, as a compost, or as a filler for fertilizer.

Under favorable weather conditions and good management practices, which include using applications of fertilizers and controlling water adequately, good yields are obtained from many truck and special crops and from improved pasture on these soils.

Bottom Lands, Swamps, and Ponds

This association of land types, number 10 on the soil association map, consists of bottom lands, swamps, and ponds. The principal constituents are Peace River soils; Alluvial land; Fresh water swamp (unclassified soils); Mixed alluvium, high bottom phase; and Shallow ponds with grass. Small areas of Leon, Rutlege, and Plummer soils may be included. Areas of the association occur throughout the county. In many places they are covered by water for long periods.

The Peace River soils have a nearly black surface layer of varying texture, underlain by calcareous sandy clay. The other mapping units consist of mixed soil materials that range from dark gray to light gray in color and from fine sand to sandy clay in texture. Some areas are covered by a thin layer of muck or peat.

The bottom lands, swamps, and ponds are used mainly for pasture or are under forest. The grasses and shrubs provide some grazing for cattle and hogs. The forests, which consist mainly of cypress, hardwoods, and pine, provide a habitat for wildlife. The higher lying areas of the association should provide good grazing if seeded to improved grasses.

Tidal Lands

This group of land types, number 11 on the soil association map, consists of tidal land, mainly Tidal swamp (unclassified soils) and Tidal marsh (unclassified soils). It includes a narrow strip of coastal beach, which is not mapped separately in Hillsborough County. These low-lying areas occur next to Tampa Bay and are covered by salt water during the high tides.

The marsh supports salt-tolerant grasses and a few shrubs. The swamp supports a dense growth of mangrove trees. These areas are used mainly for wildlife. The coastal beach is used mainly for recreational purposes.

Mines, Pits, and Dumps and Made Land

This group of land types, number 12 on the soil association map, consists of Mines, pits, and dumps and Made land. The Mines, pits, and dumps are in

the eastern part of the county, where phosphate has been mined. Made land was formed by dredgings brought up when channels were widened in Tampa Bay.

Most of this association is wasteland, but grasses, shrubs, and pines grow on some of the older areas. This vegetation provides some grazing. Some areas have been leveled, fertilized lightly, and planted to improved grasses.

Descriptions of Soils

This section contains detailed descriptions of the soils mapped in Hillsborough County. After the name of each soil is the letter symbol that identifies that particular soil on the map placed in the back of this report. Under the subheading, Use and Management, the capability classification of each soil is given. The approximate acreage and proportionate extent of each mapping unit are shown in table 4.

TABLE 4.—Approximate acreage and proportionate extent of the soils

Soil	Acreage	Proportionate extent	Soil	Acreage	Proportionate extent
		Percent			Percent
Adamsville fine sand	6,767	1.0	Undulating deep phase	527	0.1
Alachua loamy fine sand	224	(¹)	Lakewood fine sand	1,025	.2
Alluvial land	27,965	4.2	Leon fine sand	154,107	23.2
Arredondo fine sand:			Heavy substratum phase	4,976	.7
Level phase	10,251	1.5	Light-colored surface phase	17,117	2.6
Gently undulating phase	4,777	.7	Made land	4,080	.6
Blanton fine sand:			Manatee fine sandy loam	1,120	.2
Level phase	48,267	7.3	Manatee loamy fine sand	398	.1
Gently undulating phase	9,454	1.4	Manatee fine sandy clay, heavy variant	692	.1
Undulating phase	537	.1	Mines, pits, and dumps	3,384	.5
Brown-layer phase	1,642	.2	Mixed alluvium, high bottom phase	1,483	.2
Blichton fine sand	433	.1	Ona fine sand	13,779	2.1
Bradenton fine sand	2,289	.3	Light-colored surface phase	16,510	2.5
Thin surface phase	3,682	.6	Orlando fine sand	2,438	.3
Brighton peat	1,707	.3	Pamlico muck	328	(¹)
Brighton mucky peat	423	.1	Parkwood fine sand	517	.1
Broward fine sand	194	(¹)	Peace River soils	15,824	2.4
Charlotte fine sand	781	.1	Plummer fine sand	18,431	2.8
Delray fine sand	1,025	.2	Shallow phase	458	.1
Shallow phase	199	(¹)	Pomello fine sand	15,276	2.2
Eustis fine sand:			Pompano fine sand	4,249	.6
Level phase	1,234	.2	Shallow phase	527	.1
Gently undulating phase	2,687	.4	Portsmouth fine sand	398	.1
Felda fine sand	2,632	.4	Portsmouth mucky fine sand	269	(¹)
Fellowship loamy fine sand	149	(¹)	Rains fine sand	264	(¹)
Fort Meade loamy fine sand:			Ruskin fine sand	9,803	1.5
Level phase	8,360	1.3	Rutlege fine sand	26,771	4.0
Undulating phase	1,742	.3	Shallow phase	328	(¹)
Fresh water swamp (unclassified soils)	41,550	6.2	Rutlege mucky fine sand	3,707	.6
Gainesville loamy fine sand:			St. Lucie fine sand	9,355	1.4
Level phase	2,737	.4	Sandy local alluvium	350	(¹)
Gently undulating phase	1,921	.3	Scranton fine sand	19,586	2.9
Immokalee fine sand	18,347	2.8	Shallow ponds with grass	16,419	2.5
Alkaline variant	398	.1	Sunniland fine sand:		
Istokpoga peat	277	(¹)	Moderately shallow over marl	4,080	.6
Istokpoga mucky peat	100	(¹)	Shallow over marl	3,792	.5
Kanapaha fine sand	109	(¹)	Terra Ceia peaty muck	846	.1
Keri fine sand	1,224	.2	Tidal marsh (unclassified soils)	4,817	.7
Lakeland fine sand:			Tidal swamp (unclassified soils)	6,499	1.0
Level phase	15,227	2.3	Urban area of Greater Tampa and		
Gently undulating phase	22,392	3.4	Airports	36,406	5.5
Undulating phase	1,229	.2			
Shallow phase	239	(¹)			
Level deep phase	1,493	.2			
			Total	665,600	100.0

¹ Less than 0.1 percent.

Adamsville fine sand (Aa).—This soil has developed from moderately thick beds of sand that overlie finer textured alkaline material or marl. It occupies level or nearly level areas along the coast. The areas extend from the county line on the south to the Pinellas County line in the northwest. Large areas extend northwest from Tampa, along Old Tampa Bay.

This soil occurs next to areas of Ruskin fine sand and Leon fine sand. In places it separates these two soils. It is somewhat similar to the associated soils, but the texture throughout the profile is fine sand. In contrast, the Ruskin soil contains a layer of fine sandy clay loam or fine sandy loam and generally has some shell marl within the profile. The Leon soils are characterized by an organic pan and are much more acid than Adamsville fine sand.

The natural vegetation consists of second-growth pine, saw-palmetto, an occasional cabbage palmetto, other shrubs, and wiregrass.

Profile description:

- 0 to 4 inches, dark-gray to gray loose fine sand, which has a salt-and-pepper appearance.
- 4 to 12 inches, light-gray loose fine sand.
- 12 to 24 inches, light yellowish-brown loose fine sand.
- 24 to 34 inches, yellowish-brown loose fine sand.
- 34 to 42 inches +, brownish-yellow loose fine sand.

In places the surface layer is very dark gray. The horizon immediately below the surface layer ranges from 6 to 30 inches in thickness. In places the light yellowish-brown horizon extends downward to depths of as much as 30 inches. The brownish-yellow layer is lacking in some profiles.

The surface layer of this soil is slightly acid. The lower layers are neutral or alkaline. Drainage is somewhat poor. Surface runoff is slow, and internal drainage is rapid if not retarded by the high water table.

Small areas of Keri fine sand, which occur near the Pinellas County line, are mapped with Adamsville fine sand. These areas, only about 25 to 50 feet in diameter, are too small to be shown separately on the soil map.

Also included with this mapping unit are small areas where the layer of light-gray fine sand is underlain by a layer that is stained brown or dark brown by organic matter. The brown layer begins at depths of 30 to 36 inches and is 6 to 12 inches thick. This inclusion is most common near the coast and in areas transitional between Adamsville fine sand and Leon fine sand, or between Ruskin fine sand and Leon fine sand.

Use and management.—Several hundred acres of this soil near Ruskin, Sun City, and Adamsville are used to grow vegetables and truck crops (fig. 2). Yields are good if the soil is well managed. Water from flowing artesian wells is used for irrigation in most of the areas. Liberal applications of fertilizers containing the minor elements are needed.

The large areas of this soil in the northwestern part of the county along Old Tampa Bay are generally covered by pines, saw-palmettos, cabbage palmettos, shrubs, wiregrass, and other grasses. This vegetation provides poor grazing. Some small tracts have been cleared and seeded to pasture. These areas need ap-

plications of mixed fertilizer each year. Only 2 or 3 acres of the improved pasture is needed to support a cow for a year. In contrast, 15 to 40 acres of the unimproved range pasture is needed to graze 1 cow. Pine trees make fair to good growth on this soil.

This soil is in capability unit IVs-2 and in the soil association of Somewhat Poorly Drained Sands Over a Calcareous Substratum.

Alachua loamy fine sand (Ab).—This dark-colored, well-drained soil consists of recent colluvium and alluvium that has washed, rolled, or sloughed from areas of Arredondo, Fort Meade, and Gainesville soils. These materials have accumulated in depressions or at the bases of slopes, or have spread over level areas. This soil occurs mainly in small patches in an area generally occupied by phosphatic soils. It occurs near Brandon, Valrico, Bloomingdale, and Seffner, and north and northeast of Plant City.

The natural vegetation consists of live oak, hickory and some other hardwoods; pine; and a few shrubs and grasses.

Profile description:

- 0 to 10 inches, very dark grayish-brown to grayish-brown loamy fine sand.
- 10 to 20 inches, dark-brown to pale-brown loamy fine sand.
- 20 to 40 inches +, yellowish-brown or brown to strong-brown loamy fine sand.

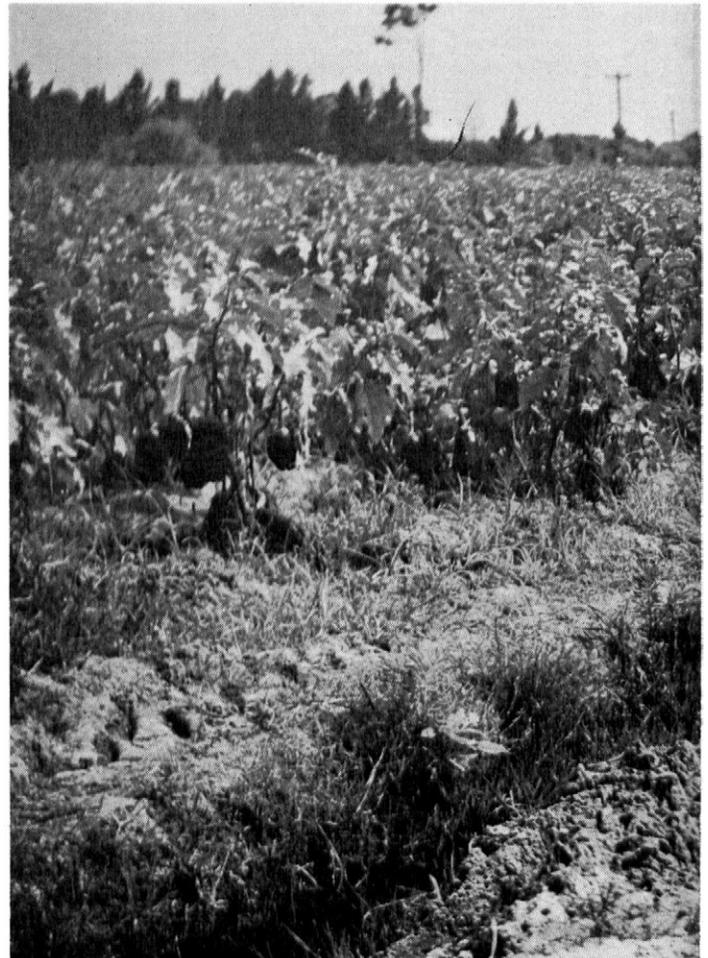


Figure 2.—Eggplant on Adamsville fine sand near the coast.

A few small pebbles occur on the surface and throughout the profile. In places the surface layer is 20 inches or more thick. In some areas the horizons below the surface soil are pale brown.

Alachua loamy fine sand is medium acid throughout. It is predominantly well drained. Both surface runoff and internal drainage are medium.

Use and management.—This soil is used for pasture or to grow general crops and a few vegetables. During dry seasons vegetable crops need irrigation. Yields are high and pastures are good if the soil is fertilized and otherwise well managed.

This soil is in capability unit IIw-1 and in the soil association of Well-Drained Sands Mixed with Phosphatic Materials.

Alluvial land (Ac).—Because of the intricate pattern of soil materials and the dense undergrowth that covers many areas, and because the land is so wet, it is impractical to map areas of Alluvial land by soil types and phases. The areas consist of alluvial materials of mixed origin that have been deposited near streams. During much of the year, they are covered by water from overflowing streams. Large areas occur along the Alafia, Little Manatee, and Hillsborough Rivers; along Rocky, Sweetwater, and Bullfrog Creeks; and along other streams in the county.

The vegetation is generally dense. It consists of shrubs, vines, hardwoods, cypress, and a few pine trees.

Alluvial land is strongly acid to neutral or alkaline. Its color ranges from nearly black to light gray, and its texture, from fine sand to fine sandy clay. In places the land is underlain by limestone.

Use and management.—Alluvial land provides fair to poor grazing for cattle and hogs. Most areas are so wet and are covered by such a dense plant growth that clearing them for improved pasture would be too expensive to be practical. In addition, if these areas were cleared and drained, the water table would be lowered and vegetation on nearby higher lying soils would be injured. The areas are suitable for wildlife refuges. Some of the timber of commercial value is harvested.

Alluvial land is in capability unit Vw-1 and in the group of miscellaneous land types of Bottom Lands, Swamps, and Ponds.

Arredondo fine sand, level phase (Ad).—This well-drained, dark-colored soil has a few phosphatic pebbles throughout its profile. It has developed from moderately thick beds of fine sand mixed with materials from phosphatic limestone. It occurs principally near the towns of Seffner, Mango, Valrico, Brandon, Bloomingdale, and Knights.

The native vegetation consists of pine, live oak, bluejack oak, and other hardwoods, and various grasses.

Profile description:

- 0 to 6 inches, very dark grayish-brown to grayish-brown fine sand; contains a moderate amount of partly decayed organic matter and a few small rounded pebbles; a few small rounded pebbles are scattered on the surface.
- 6 to 28 inches, dark yellowish-brown to yellowish-brown fine sand; contains a few phosphatic pebbles.
- 28 to 42 inches +, yellowish-brown to brownish-yellow fine sand; contains a few phosphatic pebbles.

In places the surface layer is up to 8 inches thick. The color of the horizons below the surface layer ranges from light yellowish brown, yellowish brown, or yellow, to brownish yellow.

This soil is medium acid to slightly acid throughout. It is well drained. Surface runoff is medium, and internal drainage is rapid.

Use and management.—Large areas of this soil are used to grow citrus fruits and general crops, or for pasture. Crops yield well if they are fertilized and other management is good. The soil is droughty; consequently, irrigation may be needed during dry seasons.

This soil is in capability unit IIIs-1 and in the soil association of Well-Drained Sands Mixed with Phosphatic Materials.

Arredondo fine sand, gently undulating phase (Ae).—In color and texture, this soil resembles Arredondo fine sand, level phase, but it differs in relief. Slopes generally range from 2 to 5 percent, but short slopes near sinkholes and near major streams are steeper. The soil is associated with Arredondo fine sand, level phase, and with Gainesville, Fort Meade, Lakeland, and Eustis soils. It occurs mainly near the towns of Brandon, Valrico, Seffner, and Picnic; north of Dover; and north and northeast of Plant City.

Use and management.—Most of this soil is used to grow citrus fruits and general crops. Some is used for vegetables. Some areas are pastured or in forest. Because of its gently undulating relief, air drainage is good; therefore the soil is slightly better suited to citrus fruits than the level phase. If the soil is fertilized, irrigated during dry seasons, and otherwise well managed, crops yield well and pastures will provide good grazing. Slopes steeper than 5 percent are subject to erosion during heavy rains if cultivated and should be managed as suggested for unit IIIs-1.

Pines and other trees make good growth on this soil. This soil is in capability unit IIIs-1 and in the soil association of Well-Drained Sands Mixed with Phosphatic Materials.

Blanton fine sand, level phase (Ba).—This soil has developed from thick beds of unconsolidated sands. It occurs throughout the county on low ridges and knolls in the flatwoods. Large areas occur near Citrus Park, Lutz, Riverview, Wimauma, Bloomingdale, Tampa, Antioch, and Plant City.

This soil is associated with Lakeland, St. Lucie, Pomello, Scranton, and Leon soils. It lacks the dark grayish-brown or black organic pan that is typical of the Leon soils. The surface layer is not so thick or so dark colored as that of the Scranton soil.

The natural vegetation consists of bluejack, turkey, and live oak; pine; a few saw-palmettos; and wiregrass.

Profile description:

- 0 to 6 inches, dark-gray or gray, nearly loose fine sand.
- 6 to 18 inches, grayish-brown to light brownish-gray loose fine sand.
- 18 to 42 inches +, very pale brown or light gray loose fine sand, splotched with pale yellow or yellow.

In some places the surface layer is grayish brown, and in other places it is very dark gray. In thickness it ranges from 4 to 8 inches. In places the hori-



Figure 3.—Brahman cattle grazing Pensacola Bahiagrass on Blanton fine sand, level phase, and Leon fine sand; a cypress pond is in background.

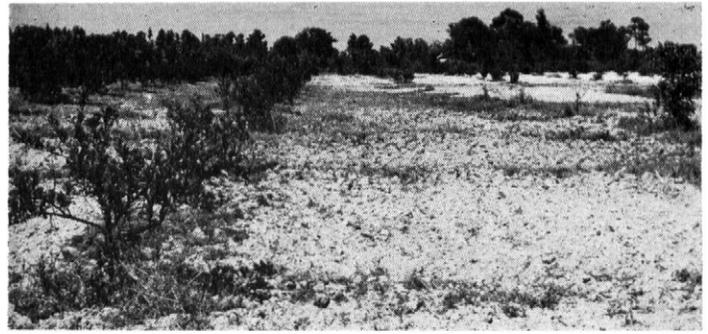


Figure 4.—At left, 6-year-old orange trees on well-drained Blanton fine sand, gently undulating phase. These trees have made good growth; those on the somewhat poorly drained Leon fine sand in center and at right are stunted.

zon immediately below the surface layer is yellow or yellowish brown, but the color grades to light gray or mottled light gray and pale yellow at increasing depths. In small areas a faint, brown-stained layer occurs at depths between 6 and 9 inches.

This soil is medium acid throughout. It is well drained to moderately well drained; surface runoff is slow, but internal drainage is rapid.

Use and management.—This soil is used mainly to grow citrus fruits, general crops, and a few vegetables. Some areas are used for improved pasture (fig. 3) or are in forest. If the soil is well managed, crop yields are fair to good and improved pastures are good. Crops and pastures need liberal applications of mixed fertilizer each year, and citrus groves and pastures need lime every third or fourth year. Some crops need to be irrigated.

Pines and hardwoods grow fairly well on this soil.

This soil is in capability unit IIIs-1 and in the soil association of Well-Drained Deep Sands.

Blanton fine sand, gently undulating phase (Bb).—Except that it occurs on slopes of 2 to 5 percent, this soil resembles Blanton fine sand, level phase. It is associated with other phases of Blanton fine sand and with the Lakeland and Leon soils.

Use and management.—Crops on this soil are about the same as those grown on the level phase, and management is about the same. Large acreages are in citrus fruits. Because runoff is more rapid and air drainage is better, this soil is better suited to citrus fruits than the level phase (fig. 4).

This soil is in capability unit IIIs-1 and in the soil association of Well-Drained Deep Sands.

Blanton fine sand, undulating phase (Bc).—This soil occurs on short slopes next to some of the sinkholes, ponds, lakes, and major streams in the central part of the county. It resembles Blanton fine sand, level phase, in many ways, but the slope range is 5 to 12 percent. Slopes are mostly between 5 and 8 percent, but a few acres are on slopes of 8 to 12 percent. Because of the fairly steep slopes, this soil will erode if unprotected during heavy rains, although its open, porous texture tends to keep damage to a minimum.

Use and management.—Only a little of this soil is used to grow citrus fruits and other crops. Turkey

oak, bluejack oak, live oak, and a few pines grow on the rest. The soil is in capability unit IIIs-1 and in the soil association of Well-Drained Deep Sands.

Blanton fine sand, brown-layer phase (Bd).—A brown-stained layer, occurring at depths of 8 to 18 inches, distinguishes this soil from Blanton fine sand, level phase. This layer is 3 to 9 inches thick. The soil occurs throughout the county, most extensively in the flatwoods. In places it occupies low ridges or slight knolls that are surrounded by soils of the Leon series. In other places it occurs between areas of other Blanton soils or between areas of Lakeland and Leon soils.

The natural vegetation consists of bluejack, turkey, and runner oaks; a few pines; a few saw-palmettos; and grasses.

Profile description:

- 0 to 4 inches, dark-gray or gray, nearly loose fine sand, which has a salt-and-pepper appearance.
- 4 to 10 inches, gray or light brownish-gray fine sand.
- 10 to 16 inches, dark grayish-brown to brown, organic-stained fine sand.
- 16 to 22 inches, grayish-brown or pale-brown fine sand.
- 22 to 42 inches +, very pale brown or light gray fine sand, spotted with pale yellow.

This soil is not so well drained as the other phases of Blanton fine sand. Surface runoff is slow. Internal drainage is medium.

Use and management.—Because of the slightly lower position and poorer drainage of this soil, it is less suitable for citrus fruits than the other phases of Blanton fine sand. The soil is suitable for many crops, however, and for improved pasture. Water control and liberal fertilization are necessary to obtain good crop yields and to maintain pastures of high carrying capacity.

Pines and other trees grow well on this soil.

This soil is in capability unit IIIs-1 and in the soil association of Well-Drained Deep Sands.

Blicton fine sand (Be).—This soil has developed from thin beds of fine sand over sandy clays that were partly mixed with residuum from phosphatic limestone. It occurs mainly in the north-central part of the county. Relief is nearly level to undulating. The undulating areas occur near sinkholes and streams.

This soil is associated with soils of the Fellowship, Arredondo, Gainesville, Blanton, and Lakeland series. In texture it differs from the associated Fellowship

and Gainesville soils, which have surface layers of loamy fine sand. Clay occurs at greater depths in this Blichton soil than in the Fellowship soil, and the surface layer of the Blichton soil is a little lighter colored than that of the Fellowship soil. The Blichton soil is grayer in color than the Gainesville and Arredondo soils. The Blanton and Lakeland soils were not derived from phosphatic materials and do not have clayey materials common to the Blichton soil.

The natural vegetation on Blichton fine sand consists of live oaks and other hardwoods, pines, shrubs, a few cabbage palmettos and saw-palmettos, and grasses.

Profile description:

- 0 to 8 inches, dark-gray fine sand that contains a small to moderate amount of organic matter; a few pebbles on the surface.
- 8 to 25 inches, grayish-brown or gray loamy fine sand; contains a few pebbles and rounded stones.
- 25 to 42 inches +, mottled light yellowish-brown and yellow fine sandy clay or fine sandy clay loam that contains many pebbles and rounded stones.

The surface layer in places is very dark gray, gray, or grayish brown and is 6 to 9 inches thick. In some areas the horizon immediately below the surface layer is light gray; this horizon ranges from fine sand to fine sandy loam in texture. Fine sandy clay or fine sandy clay loam occurs at depths of 18 to 36 inches. In some places many pebbles and rounded stones occur on the surface; in others, the pebbles and stones occur only in the clayey materials. Pebbles and stones are more numerous on the slopes than on nearby level areas.

This soil is medium acid to strongly acid. Drainage is moderately good to somewhat poor. Both surface drainage and internal drainage are slow to medium.

Use and management.—The more sloping areas of this soil are generally planted to citrus trees. The rest is range pasture or is used to grow general crops. Yields are fair to good if the soil is well managed. Liberal amounts of fertilizer and lime are needed, and irrigation is required on some cultivated areas. Cover crops or grasses should be grown on the stronger slopes, or the natural growth of weeds should be allowed to remain when the soil is not covered by tilled crops. Otherwise, heavy rains may cause these areas to erode slightly.

The natural vegetation on the range pastures provides grazing of fair quality. Pines and hardwoods grow well.

This soil is in capability unit IIe-1 and in the soil association of Well-Drained Sands Mixed with Phosphatic Materials.

Bradenton fine sand (Bf).—This somewhat poorly drained soil has developed from thin beds of sand that overlie clayey materials and marl. As a rule it occupies level or nearly level areas near the coast or near streams, but a few acres are on slopes of 2 to 5 percent. Most of the soil occurs near Sun City, Ruskin, and Gibsonton.

This soil is associated with soils of the Ruskin, Adamsville, Sunniland, Keri, Broward, Leon, Manatee, Pompano, and Delray series. The clayey materials, typical of this Bradenton soil do not occur in the profile of the associated Adamsville, Keri, and Broward

soils. In the Ruskin and Sunniland soils, the lower horizons are mottled yellowish-brown and light-gray fine sandy clay loam instead of gray clay. The Manatee, Pompano, and Delray soils occur in wetter areas than the Bradenton soil. The Leon soils have an organic pan and commonly lack the clayey materials that occur in the Bradenton profile.

The natural vegetation on Brandenton fine sand consists of live oak, cabbage palmetto, saw-palmetto, pine, vines, shrubs, and a few grasses.

Profile description:

- 0 to 4 inches, dark-gray fine sand; contains a small to a moderate amount of organic matter; strongly acid.
- 4 to 14 inches, light grayish-brown or light-gray, nearly loose fine sand; strongly acid to medium acid.
- 14 to 20 inches, pale-brown or grayish-brown, nearly loose fine sand; medium acid.
- 20 to 32 inches, grayish-brown fine sandy clay, streaked in a few places with yellowish brown; sticky and plastic when wet and hard when dry; slightly acid to neutral.
- 32 to 42 inches +, light-gray marl having a texture of fine sandy clay or sandy clay loam.

In some places the surface layer is very dark gray, and in other places it is grayish brown. The surface layer ranges from 4 to 9 inches in thickness. The depth to the clayey materials ranges from 18 to 30 inches.

This soil is strongly acid to neutral. Drainage is somewhat poor. Both surface runoff and internal drainage are slow to medium.

Use and management.—Practically all of this soil is covered by natural vegetation, which provides fair grazing for cattle on the range pastures. A few areas are included in fields where vegetable crops and truck crops are grown, and yields are fair to good if fertilizer is applied liberally and water is controlled.

Pines and other trees grow well on this soil. If well managed they produce valuable timber.

This soil is in capability unit IIIs-2 and in the soil association of Somewhat Poorly Drained Sands Over a Calcareous Substratum.

Bradenton fine sand, thin surface phase (Bg).—Clayey materials occur at depths of less than 18 inches in this soil. The marl horizon generally occurs at depths between 20 and 30 inches; in a few areas, however, it is lacking. Otherwise, this soil is similar to typical Bradenton fine sand.

This soil occupies level to nearly level areas near the coast and near streams and fresh-water swamps in the southern and northeastern parts of the county. Drainage is somewhat poor.

The natural vegetation consists of live oak, gum, elm, hickory, magnolia, cabbage palmetto, a rank growth of saw-palmetto, shrubs, vines, and a few grasses.

Use and management.—Practically all of this soil is used as range pasture. The natural vegetation furnishes fair to good forage for cattle throughout the year. Fair to good yields of many vegetable and truck crops could be obtained if the soil were cleared and well managed. The cost of removing the dense hammock vegetation would be high. Fertilizer and some means of water control would be needed.

Trees grow rapidly on this soil. They can be grown profitably if good forestry management is practiced.

This soil is in capability unit IIIs-2 and in the soil association of Somewhat Poorly Drained Sands Over a Calcareous Substratum.

Brighton peat (Bh).—This organic soil has developed from the remains of sedges, lilies, bonnets, water-tolerant grasses, and other aquatic plants. The organic layers overlie acid sands. The soil occurs in fairly large marshes or shallow depressions in the flatwood sections, mainly in the east-central, northern, and southeastern parts of the county. Sedges, grasses, lilies, bonnets, and other water-tolerant plants grow on all the areas.

Profile description:

0 to 10 inches, very dark brown fibrous peat.

10 to 40 inches, dark grayish-brown or brown, fibrous, felty peat; sands are mixed with the organic materials in lower part of horizon.

40 to 60 inches +, dark-gray or gray loose fine sand.

The fibrous material is 20 to 48 inches thick. The spots where it is shallowest are small, and they occur near the outer boundaries of the areas. The underlying sandy material ranges from dark gray to light gray in color.

This soil is strongly to very strongly acid. It is very poorly drained and is under water during many months of the year.

Use and management.—When the areas of this soil are not covered too deeply by water, the aquatic plants provide good forage. During the dry seasons, some of the peaty materials are dug and used as filler in mixed fertilizer or as an organic fertilizer for lawns and shrubbery.

Some of the areas are partly drained by canals and ditches. Water control would make it possible to use this soil for improved pasture or to grow vegetables.

This soil is in capability unit IIIs-4 and in the soil association of Very Poorly Drained Organic Soils.

Brighton mucky peat (Bk).—The organic materials in this soil are in a more advanced stage of decomposition and are less fibrous than those in Brighton peat. The soil occurs in fairly large areas, mainly in the east-central part of the county.

The native vegetation consists of various grasses, sedges, and aquatic plants.

This soil consists of black, nonfibrous, organic materials, 6 to 10 inches thick, underlain by dark-brown or grayish-brown, fibrous, felty peat. The organic material is 15 to 40 inches thick. It overlies gray or light-gray fine sand.

Use and management.—This soil is under water much of the time. When it is not covered too deeply by water, the natural vegetation provides good grazing. The soil is in capability unit IIIs-4 and in the soil association of Very Poorly Drained Organic Soils.

Broward fine sand (Bl).—This inextensive soil has developed from a thin layer of sand that overlies limestone. It occupies level or nearly level areas along the coast, mainly west and northwest of Tampa, near Old Tampa Bay, and north of the bottom lands along the Hillsborough River.

This soil is associated with soils of the Ruskin, Sunniland, Adamsville, Pompano, Felda, and Leon series. The Ruskin and Sunniland soils, unlike the Broward, have a horizon of sandy clay loam or sandy

clay more than 6 inches thick that underlies the sandy layers. They are also deeper. The Ruskin soil, and in many places the Sunniland soil, are underlain by marl at depths of as much as 42 inches. The Adamsville soil resembles the Broward soil, but it lacks the limestone layer. The Broward soil is shallower over limestone than the Pompano soils, and it is better drained. In some places the Broward soil has a brown-stained layer above the limestone, but it does not have the organic pan that is characteristic of the Leon soils.

The natural vegetation on Broward fine sand consists of second-growth pine, cabbage palmetto, saw-palmetto, and runner oak; gallberry and other shrubs; and wiregrass.

Profile description:

0 to 5 inches, dark-gray or gray loose fine sand, which has a salt-and-pepper appearance; slightly acid to neutral.

5 to 14 inches, light-gray loose fine sand; slightly acid to neutral.

14 to 28 inches, very pale brown to yellowish brown loose fine sand; neutral to alkaline.

28 to 36 inches +, nearly white limestone.

The surface layer in places is gray to very dark gray, and it ranges from 3 to 8 inches in thickness. The horizon immediately below ranges from nearly white to light yellowish brown and in places has nearly white to light yellowish-brown mottles.

In some areas limestone is only 12 inches from the surface. There are a few areas, including one north of the Hillsborough River bottom lands, where the limestone is exposed. In a few places, a 1- to 2-inch layer of fine sandy clay, mottled light gray and yellowish brown, overlies the limestone. There are a number of places where a brown or grayish-brown stained horizon occurs just above the limestone.

This soil is somewhat poorly drained. Surface runoff is slow. Internal drainage is medium to rapid if not retarded by the high water table.

Use and management.—Practically all of this soil is covered by natural vegetation and is used for pasture. The carrying capacity of unimproved pasture is about 1 cow to each 15 to 25 acres. If the soil is cleared, fertilized, and seeded to improved pasture grasses, only 2 or 3 acres is needed to support a cow.

Second-growth pines make fair to good growth on this soil, but few grow to saw-log size.

This soil is in capability unit IVs-2 and in the soil association of Somewhat Poorly Drained Sands Over a Calcareous Substratum.

Charlotte fine sand (Ca).—This poorly drained soil has developed from moderately thick beds of fine sand that overlie calcareous materials. It occupies level or slightly depressed areas. It occurs principally near the coast, northwest and southeast of Tampa, and near some of the larger streams. The soil is associated with Leon and Pompano soils. It lacks the organic pan that is characteristic of the Leon soils, and the Leon soils occupy slightly higher positions. It differs from the Adamsville soil in being more poorly drained and in having brighter colors in the lower horizons. The lower part of its profile differs in color from that of the Pompano soils.

The natural vegetation consists of various short grasses, a few pines, and cabbage palmettos.

Profile description:

- 0 to 4 inches, grayish-brown loose fine sand containing enough organic material to give it a salt-and-pepper appearance; slightly acid to neutral.
- 4 to 12 inches, light brownish-gray or light yellowish-brown loose fine sand; neutral to alkaline.
- 12 to 30 inches, brownish-yellow or yellowish-brown loose fine sand; neutral to alkaline.
- 30 to 48 inches +, pale brown to very pale brown or white loose fine sand with splotches of yellow; neutral to alkaline.

The surface layer ranges from 3 to 8 inches in thickness and in places is very dark gray or light brownish gray. The surface layer generally has light colors where the soil adjoins areas of Adamsville or Leon soils. In these border areas the horizon immediately below the surface layer is light gray to a depth of 15 to 24 inches, and the third layer is bright yellow to brownish yellow or yellowish brown. This third layer may have a few iron concretions in the lower part, and it overlies sandy materials that become lighter colored at increasing depths.

Near the Pinellas County line in the northwestern part of the county, there are several areas where mottled gray, yellowish-brown, and brownish-yellow fine sandy clay loam or fine sandy clay begins at depths of 30 to 42 inches. These areas are under water several months of the year, and the mottling indicates their poor drainage.

Use and management.—Practically all of this soil is covered by native grasses, a few cabbage palmettos, and pines and shrubs. This natural vegetation provides fair grazing for cattle. The carrying capacity is 1 cow to each 10 to 20 acres. Improved pastures will support a cow on 2 or 3 acres.

Little of this soil is used for crops, but it would give good yields of vegetables if well managed. Fertilization and water control are needed for crops or for improved pasture.

This soil is in capability unit IVs-3 and in the soil association of Poorly Drained Neutral to Alkaline Sands and Sandy Clays.

Delray fine sand (Da).—This dark-colored soil has formed from moderately thick beds of sand that overlie calcareous materials. It occupies level or slightly depressed areas, mainly near the coast between Sun City and the Pinellas County line, and near Sixmile Creek. Some areas occur in the southern and north-eastern parts of the county.

The soil is associated with soils of the Ruskin, Adamsville, Keri, Bradenton, Leon, Immokalee, Pompano, Charlotte, and Manatee series. It has a darker surface layer than the Ruskin and Bradenton soils and lacks the clayey materials that occur in the profiles of those soils. It occupies wetter areas and has a darker, thicker surface layer than the Adamsville soil. It does not have the organic pan that occurs in the Leon and Immokalee soils. It has a darker colored surface layer than Charlotte fine sand and it lacks the yellowish lower layer that occurs in that soil. The Manatee soils have finer textured materials within 30 inches of the surface.

The natural vegetation consists of various grasses, gallberry, myrtle bushes, a few cabbage palmettos, and pines and hardwoods.

Profile description:

- 0 to 12 inches, black fine sand; contains a large amount of organic matter; slightly acid to neutral.
- 12 to 26 inches, very dark gray or dark gray nearly loose fine sand; slightly acid to neutral.
- 26 to 42 inches, gray or light-gray nearly loose fine sand streaked with pale yellow and brown; neutral to alkaline.

The dark surface soil ranges from 7 to 20 inches in thickness. In places it grades to light-gray sand, and the very dark gray or dark gray horizon is absent. In some places a grayish-brown horizon of fine sand occurs at depths between 30 and 42 inches.

This soil is poorly drained to very poorly drained. Surface runoff is slow. Internal drainage is rapid if not retarded by the high water table.

Use and management.—A few areas of this soil near Ruskin have been included in fields of other soils and are used to grow vegetables. The rest is used as range pasture. Fairly high yields of vegetable crops are obtained under good management. The soil requires fertilizer, however, and some means of water control. The natural vegetation provides fair to good grazing. A few areas that have been fertilized and seeded to improved pasture grasses provide good forage.

Ditches and canals have been dug to drain some of the areas. Many of these, however, should have dams or locks to control the rate of runoff. If the water is allowed to drain into the ditches without any control, the water table in the adjacent higher lying soils may be lowered so much that plant growth on the higher soils will be retarded. Many of the depressions serve as natural reservoirs for water.

This soil is in capability unit IIIs-3 and in the soil association of Poorly Drained Neutral to Alkaline Sands and Sandy Clays.

Delray fine sand, shallow phase (Db).—This inextensive soil generally occupies level or slightly depressed areas near Ruskin and Sun City in the southwestern part of the county. Except that clayey materials occur at depths of 30 to 42 inches, it is similar to typical Delray fine sand. The clayey materials consist of gray or light-gray fine sandy clay loam or fine sandy clay, mottled with pale yellow and grayish brown. This soil resembles the Manatee soils, but the clayey materials in the Manatee soils are nearer the surface.

Use and management.—A few areas of this soil are included in fields of other soils that are used to grow vegetables and truck crops. Fair to good yields are obtained under good management. Most areas are used as range pasture. Where the soil is not flooded too often, the natural vegetation provides good forage. Water control and liberal fertilization are necessary.

This soil is in capability unit IIIs-3 and in the soil association of Poorly Drained Neutral to Alkaline Sands and Sandy Clays.

Eustis fine sand, level phase (Ea).—This strongly acid soil has developed from thick beds of sand. It occupies nearly level areas, principally in the north-central part of the county. Fairly large areas occur between Thonotosassa and Seffner and near Brandon, Valrico, and Limona. The soil is associated with soils of the Lakeland, Blanton, and Gainesville series. It differs from the Lakeland and Blanton soils in color

and from the Gainesville soils in texture. The Gainesville soils, which are finer textured, were derived from loamy sands mixed with phosphatic materials.

The natural vegetation consists of scrub live oaks, turkey oaks, bluejack oaks, sand pines, rosemary, a few saw-palmettos, and grasses.

Profile description:

- 0 to 6 inches, dark grayish-brown or grayish-brown loose fine sand; contains a small amount of organic matter; has a salt-and-pepper appearance.
- 6 to 12 inches, yellowish-brown or brownish-yellow loose fine sand.
- 12 to 48 inches +, strong-brown, reddish-yellow, or yellowish-red loose fine sand.

This soil is strongly acid throughout. It is well drained to somewhat excessively drained.

Use and management.—A large acreage of this soil has been planted to citrus trees. A few areas are used to grow watermelons and general crops. Citrus trees yield well if well managed, but they need fertilizer, and irrigation must be provided during extremely dry periods. Many areas are still covered by native grasses and shrubs, which provide poor to fair grazing during part of the year.

This soil is in capability unit IIIs-1 and in the soil association of Well-Drained Deep Sands.

Eustis fine sand, gently undulating phase (Eb).—Most of this soil is on slopes of 2 to 5 percent, but some areas near sinkholes, lakes, ponds, or streams are on short slopes of 5 to 10 percent. Except for slope the soil resembles Eustis fine sand, level phase. It occurs in the north-central part of the county. Large areas occur between Thonotosassa and Seffner and near Valrico, Brandon, and Limona.

This soil is strongly acid throughout. It is well drained to somewhat excessively drained. Surface runoff is medium to rapid. Internal drainage is rapid.

Use and management.—Much of this soil is in citrus groves. A small acreage is planted to watermelons and general crops. Citrus trees produce good yields if well managed. They need liberal applications of fertilizer and should be irrigated during extremely dry seasons. Cover crops should be grown between the rows. The soils on slopes steeper than 5 percent are subject to erosion during hard rains if cultivated and should be managed as suggested for soils in capability unit IVs-4.

This soil is in capability unit IIIs-1 and in the soil association of Well-Drained Deep Sands.

Felda fine sand (Fa).—This poorly drained gray soil has a thin mantle of fine sand over alkaline clayey materials. The clayey materials, in places, contain calcareous concretions or shell fragments. The soil generally occupies level or slightly depressed areas, but a few areas are on slopes of 2 to 5 percent.

This soil is more poorly drained than the Ruskin, Sunniland, and Adamsville soils. Unlike the Pompano soils, which consist of fine sand throughout, this soil has clayey materials in its profile.

Fairly large areas occur next to or within areas of Sunniland soils near the Hillsborough River in the northern part of the county. Small areas occur next to areas of Ruskin and Adamsville soils along the coast from Sun City to the vicinity of Oldsmar. Some

areas occur within or next to areas of Bradenton soils. Other associated soils belong to the Pompano, Charlotte, and Manatee series.

The natural vegetation consists of various grasses; a few pines, saw-palmettos, and cabbage palmettos; and gallberry bushes, myrtle bushes, and other shrubs.

Profile description:

- 0 to 6 inches, very dark gray or dark gray nearly loose fine sand; contains a large quantity of organic matter and has a salt-and-pepper appearance; slightly acid.
- 6 to 18 inches, grayish-brown to light-gray nearly loose fine sand; slightly acid.
- 18 to 30 inches, light brownish-gray or light-gray fine sandy clay loam in which a few yellow, yellowish-brown, or brownish-yellow mottles occur; slightly acid to neutral.
- 30 to 48 inches +, mottled light-gray, brownish-yellow, and yellow fine sandy clay loam; contains a few lime and iron concretions; alkaline.

The surface layer ranges from 3 to 9 inches in thickness, and in some places it is gray. The sand mantle ranges from 6 to 30 inches in thickness.

No appreciable runoff occurs, and internal drainage is slow. During the rainy season, water drains onto this soil from nearby higher lying soils. The areas in depressions are covered by water for many days at a time.

Use and management.—Most of this soil is used for range pasture. The native grasses provide fair grazing. A few areas near Ruskin are included in fields used to grow vegetables and truck crops. Good yields are obtained if good management practices, including liberal fertilization and water control, are followed.

This soil is in capability unit IIIs-3 and in the soil association of Poorly Drained Neutral to Alkaline Sands and Sandy Clays.

Fellowship loamy fine sand (Fb).—This dark-colored soil was derived from thin beds of loamy sand and sandy clay, mixed with residuum from phosphatic limestone. It occupies a few of the high ridges in the north-central part of the county. Most of the areas occur a few miles north and northwest of Mango and near the Hillsborough River. Approximately one-third of the areas are nearly level. The rest are on slopes of 2 to 8 percent.

This soil is associated with soils of the Blichton, Gainesville, and Arredondo series. It has a darker colored and finer textured surface layer than the Blichton soil, and fine sandy clay occurs at shallower depths. Its texture is not so coarse as that of the Gainesville and Arredondo soils.

The natural vegetation consists of live oak, pine, shrubs, and grasses.

Profile description:

- 0 to 6 inches, very dark gray loamy fine sand; contains a few pebbles; many pebbles and small stones occur on the surface; strongly acid.
- 6 to 12 inches, dark-gray loamy fine sand; contains many pebbles; strongly acid.
- 12 to 42 inches +, mottled gray, yellowish-brown, and yellow fine sandy clay; sticky and plastic when wet and very hard when dry; contains many pebbles and rounded stones; strongly acid.

The surface layer ranges from nearly black to dark gray in color and from 4 to 8 inches in thickness. In many places the 6- to 12-inch layer is absent and the dark-colored surface soil immediately overlies the

horizon of mottled gray or grayish-brown, yellowish-brown, and yellow fine sandy clay.

Drainage is somewhat poor. Surface runoff is medium, and internal drainage is slow.

Use and management.—Most of this soil is covered by the native vegetation, which provides fair to good grazing. A few areas are included in fields with other soils that are used to grow general crops. Yields are fair to good under good management. Liberal applications of fertilizer are needed, however, and in places irrigation is required. Sloping areas should be planted to cover crops or kept under grass, when not used for tilled crops, to protect them from sheet erosion during heavy rains.

This soil is in capability unit IIe-1 and in the soil association of Well-Drained Sands Mixed with Phosphatic Materials.

Fort Meade loamy fine sand, level phase (Fc).—This dark-colored soil has developed from moderately thick beds of loamy sand mixed to some extent with materials from beds of phosphatic pebbles. It occupies fairly large level or nearly level areas in the east-central part of the county, mainly near Brandon, Valrico, and Seffner, east of Bloomingdale, and north of Dover and Plant City.

This soil is associated with the Gainesville, Arredondo, Lakeland, and Scranton soils. The surface layer is darker colored and thicker than that of the Gainesville, Arredondo, and Lakeland soils. The Lakeland soils were not derived from phosphatic materials. The Fort Meade soil is higher in phosphorus than the Scranton soil and is better drained.

The natural vegetation consists of live, bluejack, and turkey oaks, hickory, and other hardwoods; pine; and grasses.

Profile description:

- 0 to 12 inches, black loamy fine sand; contains a large amount of organic matter and a few phosphatic pebbles; a few pebbles are on the surface.
- 12 to 20 inches, dark grayish-brown loamy fine sand; contains a few phosphatic pebbles.
- 20 to 42 inches +, grayish-brown or brown loamy fine sand; contains many phosphatic pebbles and small rounded stones.

The surface layer ranges from 10 to 20 inches in thickness, and in places it is dark grayish brown. In some places the lower part of the profile is pale brown, yellowish brown, or reddish brown.

This soil is medium acid throughout. It is well drained. Surface runoff is slow to medium; internal drainage is medium to rapid.

Use and management.—A large acreage of this soil is used to grow citrus trees, vegetables, and general crops. Yields are high under good management if the weather is favorable. Many kinds of vegetables could be grown on this soil if the crops were irrigated during dry seasons. The soil is fairly high in phosphorus, but it needs fertilizer, including the minor elements, and some areas need lime. Some areas have been fertilized and seeded to Bahiagrass, Pangolagrass, and other improved pasture grasses. Pines and hardwood trees grow on a few areas.

This soil is in capability unit IIs-2 and in the soil

association of Well-Drained Sands Mixed with Phosphatic Materials.

Fort Meade loamy fine sand, undulating phase (Fd).—Except for slope this soil resembles Fort Meade loamy fine sand, level phase. Slopes generally range from 2 to 5 percent, but a few areas, near sinkholes and depressions, are on slopes of 5 to 8 percent. A small area of about 25 acres, in the western part of sec. 1, T. 30 S., R. 20 E., is on slopes as steep as 15 percent. Many pebbles and small rounded stones occur on the surface and throughout the profile. The soil occurs near Brandon, Valrico, Seffner, Cork, and Limona, and north of Dover, Plant City, and Knights.

Use and management.—This soil is used to grow citrus fruits, vegetables, and general crops, or for pasture. Several areas are covered by the natural vegetation of pines and hardwood trees, shrubs, and grasses. Good yields of tilled crops are obtained if management is good and weather is favorable. Fertilizers are needed, and cover crops should be grown. Some vegetable crops need irrigation during dry seasons. The areas planted to improved pasture grasses provide good grazing if fertilized adequately.

Some sloping areas have been damaged slightly by erosion during heavy rains. To prevent serious damage from runoff, cover crops or natural plant growth should cover the slopes in citrus groves and cultivated fields. Sloping areas that are not tilled should remain under a good vegetative cover. Slopes steeper than 5 percent are subject to erosion if not protected during heavy rains and should be managed as suggested for soils of capability unit IIs-2.

This soil is in capability unit IIs-2 and in the soil association of Well-Drained Sands Mixed with Phosphatic Materials.

Fresh water swamp (unclassified soils) (Fe).—This mapping unit occurs mostly in sloughlike depressions. It consists of swamps, cypress strands, and shallow ponds. Some of the areas serve as natural drainageways in the flatwoods. Fairly large areas occur in the southern, northern, northeastern, and northwestern parts of the county.

Included in the mapping unit are areas of Rutlege, Portsmouth, Plummer, Delray, Manatee, Pompano, and Istokpoga soils. It is impractical to try to map these soils separately because the soils are so intermingled, the vegetation so dense, and the land so wet.

Many areas support a growth of water oak, laurel oak, gum, ash, maple, bay, waxmyrtle, willow, cypress, and various shrubs. A few airplants grow on some of the trees. A mixture of trees grows in the swamps, and cypress grows in the strands and ponds. Cypress and a few shrubs and grasses grow in the small rounded or oval areas.

Within short distances the soils vary in the color, texture, composition, and thickness of the various layers. In places the topmost 2- or 3-inch layer is black or dark-gray mucky fine sand or sandy clay.

This mapping unit has practically no agricultural value and was not given a capability classification. Much of it is under water most of the time, but the water level varies from year to year and from season to season. Sometimes the surface is dry. Reclamation would be impractical because artificial drainage

would be likely to lower the water table of the higher land surrounding the swamps. In their present condition, the swamps provide cover for wildlife and produce some forest products. Some of the merchantable cypress and hardwood timber is being harvested.

Gainesville loamy fine sand, level phase (G_a).—This brown, well-drained soil has developed from moderately thick beds of loamy sand, which has been mixed to some extent with residuum from the underlying phosphatic limestone. It occupies level or nearly level areas, mainly in the east-central part of the county near Brandon and Valrico and north of Seffner.

This soil is associated with soils of the Arredondo, Fort Meade, Alachua, Eustis, and Lakeland series. Its surface layer resembles that of the Arredondo soils, but the lower horizons differ in color. Its surface layer is not so dark colored nor so thick as that of the Fort Meade soils. Its position differs from that of the Alachua soil, which occurs in depressions within areas of Gainesville soil. The Gainesville soil is not so sandy as the Eustis soils. It is fairly high in phosphorus, compared to the Eustis soils.

The natural vegetation consists of live oak, red oak, hickory, magnolia, pine, shrubs, and grasses.

Profile description:

- 0 to 8 inches, very dark grayish-brown loamy fine sand; contains a moderate amount of organic matter and a few small phosphatic pebbles; a few small pebbles occur on the surface.
- 8 to 18 inches, dark-brown loamy fine sand; contains a few phosphatic pebbles.
- 18 to 30 inches, brown loamy fine sand; contains a few phosphatic pebbles.
- 30 to 42 inches +, strong-brown loamy fine sand; contains a few phosphatic pebbles and small stones.

The surface layer ranges from nearly black to grayish brown in color and from 6 to 9 inches in thickness. At depths below about 18 inches, the soil is brown in some places, and in others it is strong brown, reddish yellow, or reddish brown. Many pebbles and small stones occur in places in the lower part of the profile. Included in the mapping unit are a few areas where brown or strong-brown fine sandy clay loam begins at depths between 30 and 42 inches. These areas are generally less than 5 acres in size, and their total extent is only about 60 acres.

This soil is medium acid throughout. It is well drained. Surface runoff is slow to medium, and internal drainage is medium to rapid.

Use and management.—Some areas of this soil are planted to citrus trees. Others are used for general crops. If the soil is well managed and the weather is favorable, citrus yields are good, and yields of cowpeas, corn, sweetpotatoes, and other crops are fair to good.

The soil needs applications of mixed fertilizer. Because it is somewhat droughty, it may be necessary to irrigate crops during dry seasons. If properly irrigated, many kinds of vegetables can be grown.

Most pastures are fertilized and seeded to improved pasture grasses. Lime is applied where needed. The pastures provide a large quantity of good forage. Trees grow well in the forested areas.

This soil is in capability unit IIs-2 and in the soil

association of Well-Drained Sands Mixed with Phosphatic Materials.

Gainesville loamy fine sand, gently undulating phase (G_b).—This soil occurs principally near Brandon, Valrico, and Seffner, and north of Dover and Plant City. It resembles Gainesville loamy fine sand, level phase, except that most of it is on slopes of 2 to 5 percent. A few short slopes range up to 8 percent. More phosphatic pebbles occur on the surface and throughout the profile than in the level phase.

In a few small areas, a layer of brown or strong-brown fine sandy clay loam occurs at depths between 30 and 42 inches. This layer contains many pebbles and small stones. The total extent of these areas is a little less than 100 acres.

Use and management.—This soil is used to grow citrus trees, general crops (fig. 5), and a few vegetables. Some areas are pastured. Yields are good if the soil is well managed and the weather is favorable.

This soil is somewhat droughty. If it is irrigated during dry seasons, many kinds of vegetables can be grown with good results. Cover crops such as hairy indigo, crotalaria, velvetbeans, and cowpeas, or beggarweeds or other natural vegetation, should be used to protect the soil when it is not in tilled crops. Cover crops should also be planted between the rows in citrus groves. The plant cover not only protects the soil from erosion but also replenishes and increases the content of organic matter.

Pastures on this soil are generally seeded to Pensacola Bahiagrass, common Bahiagrass, Pangolagrass, or other improved grasses, and they are fertilized each year. These pastures provide good forage. Forage is further improved by planting hairy indigo and alyce-clover with the grasses.



Figure 5.—Cowpeas on Gainesville loamy fine sand, gently undulating phase, near Valrico.

Hardwoods and pines, which grow rapidly on this soil, are on a few areas.

This soil is in capability unit IIs-2 and in the soil association of Well-Drained Sands Mixed with Phosphatic Materials.

Immokalee fine sand (la).—This somewhat poorly drained soil occurs in fairly large areas in the flatwoods of the southern, northeastern, and northwestern parts of the county. Most of it is level or nearly level, but the slope gradient ranges up to 5 percent in some areas. The parent material was thick beds of unconsolidated sand, deposited when the sea level was higher than at present. A black or dark-brown weakly cemented organic pan occurs at depths of 30 to 42 inches.

This soil is associated with the Leon, Ona, Pomello, Plummer, and Rutlege soils. The pan layer in the Leon soil is denser than in this soil and is nearer the surface. The brown, organic-stained layer in the Ona soils occurs within 14 inches of the surface. The Pomello soil has a lighter colored surface layer and lacks the pan that is typical of the Immokalee soil. The Plummer and Rutlege soils occupy wetter areas.

The natural vegetation consists of second-growth pine, saw-palmetto, runner oak, gallberry bushes, and wiregrass and other grasses.

Profile description:

- 0 to 6 inches, dark-gray loose fine sand, which has a salt-and-pepper appearance.
- 6 to 12 inches, gray loose fine sand.
- 12 to 32 inches, light-gray loose fine sand; has a few light brownish-gray splotches around old root channels.
- 32 to 38 inches, very dark brown fine sand, a slightly cemented organic pan.
- 38 to 42 inches +, dark grayish-brown loose fine sand; grades to lighter colors with increasing depth.

The surface layer ranges from very dark gray to gray in color and from 3 to 8 inches in thickness. In places the pan extends to depths of more than 48 inches before the sandy material grades to lighter colors.

This soil is strongly to very strongly acid throughout. It is somewhat poorly drained. Surface runoff is slow. Internal drainage is medium to rapid if not retarded by the high water table.

Use and management.—Nearly all of this soil is used for range pasture. The natural vegetation provides only poor to fair forage, and 15 to 25 acres is needed to graze 1 cow. Some areas have been cleared, fertilized, and planted to improved pasture grasses. About 80 acres of improved pasture, within 400 acres of range pasture, will support 70 head of cattle. Near Ruskin and Sun City, several acres of this soil are included in fields used to grow vegetables. Fair to good yields are obtained if good management is practiced. The soil needs liberal applications of a good fertilizer mixture and control of water.

Pine trees grow moderately well on this soil. The forested areas make profitable returns if well managed.

This soil is in capability unit IVs-2 and in the soil association of Somewhat Poorly Drained Sands with Organic Pan.

Immokalee fine sand, alkaline variant (lb).—This soil is like typical Immokalee fine sand except that the

profile is neutral or alkaline below the pan layer. It occurs mainly near the Gulf Coast and near the Little Manatee River in the southwestern part of the county. Some areas are narrow strips between Ruskin and Leon soils or between Adamsville and Leon soils.

The natural vegetation consists of pines and a rank growth of saw-palmettos, shrubs, and grasses.

Use and management.—Most of this soil is used for range pasture. The natural vegetation provides a fair amount of forage. By good management fair to good grass pastures can be established on cleared areas. Pine trees make fair to good growth and would be profitable under good forest management.

This soil is in capability unit IVs-2 and in the soil association of Somewhat Poorly Drained Sands with Organic Pan.

Istokpoga peat (lc).—This organic soil has developed over acid sand from the remains of woody plants. It occupies low, level or slightly depressed areas, mainly in the southern, central, and northeastern parts of the county.

The natural vegetation consists of redbays; cypresses; some maple trees and other hardwoods; and myrtle bushes, briars, vines, ferns, and a few grasses.

Profile description.

- 0 to 8 inches, black or very dark brown woody peat; contains small pieces of hard wood.
- 8 to 40 inches, dark reddish-brown or dark-brown woody peat.
- 40 to 60 inches +, gray or light-gray fine sand.

The woody organic material ranges from 30 to 60 inches in thickness. The lower part of the organic material contains some fine sand from the underlying sandy layer.

This soil is strongly to very strongly acid throughout. It is very poorly drained and is covered by water during much of the year.

Use and management.—This soil is used as range pasture. The natural vegetation provides some forage. Some of the cypresses and hardwoods are of merchantable size.

This soil is in capability unit IVs-4 and in the soil association of Very Poorly Drained Organic Soils.

Istokpoga mucky peat (ld).—The organic materials in this soil have reached a more advanced stage of decomposition than those in Istokpoga peat. This soil is not extensive. It occurs in the central and northeastern parts of the county.

The natural vegetation consists of bays, maples, cypresses, a few hardwoods, myrtle bushes, vines, and grasses.

The 6- to 10-inch surface layer of black mucky peat contains a few pieces of partly decayed woody material. Immediately below the surface layer is dark grayish-brown or reddish-brown woody peat. The organic material is from 20 to 40 inches thick and is underlain by gray or light-gray fine sand.

This soil is strongly to very strongly acid throughout. It is very poorly drained and is covered by water during much of the year.

Use and management.—Most of this soil is included in range pastures. When not covered too deeply by water, the natural vegetation provides some grazing.

This soil is in capability unit IVs-4 and in the soil association of Very Poorly Drained Organic Soils.

Kanapaha fine sand (Ka).—This inextensive soil has developed from moderately thick beds of sand, mixed to some extent with materials from phosphatic limestone. It occupies nearly level areas in the east-central part of the county, mainly south and northwest of Plant City. It is associated with soils of the Arredondo, Gainesville, Lakeland, and Blanton series. In color the lower layers differ somewhat from those of the associated Arredondo and Lakeland soils. The phosphorus content is higher than that of the Blanton soils.

The natural vegetation consists of gums, hickories, magnolias, oaks, cabbage palmettos, saw-palmettos, pines, shrubs, and grasses.

Profile description:

0 to 4 inches, dark-gray nearly loose fine sand; contains small amount of organic matter; a few leached phosphatic pebbles occur on the surface.

4 to 16 inches, light-gray or light yellowish-brown loose fine sand; contains a few phosphatic pebbles.

16 to 42 inches +, very pale brown loose fine sand with a few streaks of yellowish brown and brownish yellow; contains a few phosphatic pebbles.

This soil is strongly acid throughout. It is moderately well drained to somewhat poorly drained. Surface runoff and internal drainage are slow to medium.

Use and management.—Some of this soil is used to grow vegetables and citrus fruits. The rest is in range pasture. Fair to good yields of vegetables and citrus fruits are obtained under good management. Management requirements include water control and liberal fertilization. The natural vegetation provides a fair amount of forage.

Pines and hardwood trees grow rapidly on this soil. Under good management forested areas are profitable.

This soil is in capability unit IIIs-1 and in the soil association of Well-Drained Sands Mixed with Phosphatic Materials.

Keri fine sand (Kb).—This grayish soil has developed from stratified beds of marine sand and marl. The profile is characterized by layers of fine sand immediately above and below a layer of marl. The marl begins at depths of 18 to 30 inches and is 6 to 12 inches thick.

This soil occupies level or nearly level areas near the coast that extend from the southern boundary of the county to the Pinellas County line in the northwest. It is associated with soils of the Parkwood, Broward, Ruskin, Adamsville, Leon, Immokalee, Pompano, and Delray series.

In contrast to this soil, the Parkwood soil has a thick layer of marl extending to depths of more than 42 inches. The sandy layers of the Broward soil are underlain by limestone. Clayey materials occur between the thin mantle of sand and the underlying shell marl in the Ruskin soil. The Adamsville, Pompano, and Delray soils do not have marl layers. The Pompano and Delray soils occupy wetter positions than the Keri soil. The Leon and Immokalee soils have a black or very dark gray organic pan, which does not occur in the profile of the Keri soil.

The natural vegetation consists of pine, runner oak, gallberry bushes, a rank growth of saw-palmettos, a

few cabbage palmettos, and wiregrass and other grasses.

Profile description:

0 to 5 inches, dark-gray or gray nearly loose fine sand; contains a small amount of organic matter, which gives it a salt-and-pepper appearance.

5 to 18 inches, light-gray or light brownish-gray loose fine sand.

18 to 29 inches, light-gray marl streaked in a few places with yellow; fine sandy clay loam texture; contains a few shells.

29 to 42 inches +, mottled light-gray, brownish-yellow, and yellow fine sand.

The surface layer ranges from very dark gray to grayish brown and from 3 to 8 inches in thickness. Depth to marl ranges from 16 to 30 inches in most places. In areas near the Pinellas County line, marl occurs at a depth of 12 inches. In places a thin grayish-brown stained layer occurs immediately above the marl horizon.

The surface layer is strongly acid. It is underlain by a layer of medium acid to slightly acid fine sand. The marl layer is strongly alkaline, and the layer immediately below it is neutral to mildly alkaline. Drainage is somewhat poor. Surface runoff is slow, and internal drainage is medium.

Use and management.—This soil occurs in fairly large areas. Most of it is included in range pastures. The carrying capacity is 1 cow to 10 to 20 acres of the natural vegetation. Near Ruskin, a few areas have been cleared and planted to vegetables; fair to good yields are obtained under good management. Fertilizers must be used, and water control is needed. The second-growth pines do well on this soil.

This soil is in capability unit IVs-2 and in the soil association of Somewhat Poorly Drained Sands Over a Calcareous Substratum.

Lakeland fine sand, level phase (Lb).—Because of its natural cover, mainly of blackjack or turkey oak, this extensive soil is commonly called "blackjack land" or "scrub oak land." It has developed from moderately thick beds of unconsolidated acid sands. It occupies level or nearly level high sand ridges in the north-central part of the county, mainly near Brandon, Limona, Valrico, Seffner, Bloomingdale, and Thonotosassa and northeast of Tampa.

This soil is associated with the Blanton, Orlando, Eustis, and Arredondo soils. The lower layers differ somewhat in color from those of the Blanton and Eustis soils. The surface layer is not so dark colored nor so thick as that of the Orlando soil. The Arredondo soils have a higher content of phosphorus.

The natural vegetation consists of pine and a few shrubs and grasses, besides the blackjack oaks and bluejack oaks.

Profile description:

0 to 5 inches, dark-gray loose fine sand; low in organic matter.

5 to 12 inches, grayish-brown loose fine sand.

12 to 30 inches, yellowish-brown loose fine sand.

30 to 48 inches +, brownish-yellow loose fine sand.

The surface layer ranges from very dark gray to grayish brown in color and from 3 to 8 inches in thickness. In places the horizon immediately below the surface layer is light yellowish brown or pale brown. The rest of the profile is yellow, yellowish brown, or brown-

ish yellow. The finer textured material underlying the fine sand generally occurs at depths of 42 to 72 inches. In places it occurs at greater depths.

This soil is strongly to very strongly acid throughout. It is well drained to somewhat excessively drained. Surface runoff is slow to medium. Internal drainage is rapid. The soil is low in organic matter and plant nutrients.

Near the little Manatee and Alafia Rivers, small areas of a soil that resembles Huckabee fine sand, which is mapped in counties farther to the north, are included in this mapping unit. These areas occupy natural levees or terraces. Except that the included soil has stratified layers of fine sand and loamy fine sand or fine sandy loam in the lower part of its profile, it resembles Lakeland fine sand, level phase.

Use and management.—This soil needs to have cover crops or weeds turned under to replenish the organic matter. Fertilizers will supply the needed nutrients. Suitable cover crops are hairy indigo, crotalaria, cowpeas, and velvetbeans. Beggarweeds, turned under, are a good source of organic matter.

Several thousand acres of this soil is in citrus fruits. Good yields of oranges and grapefruit are obtained under a high level of management. The groves need liberal applications of a fertilizer mixture containing manganese, zinc, copper, and boron. Lime is needed to correct soil acidity and to supply calcium.

Watermelons yield well on this soil. To prevent damage from diseases that remain in the soil after the crop is harvested, the melons are planted on land that has not been cultivated or that has not been planted to watermelons for several years. The melons need liberal applications of a good fertilizer mixture, part of which should be applied as a topdressing.

Several areas are planted to general crops, mainly corn, cowpeas, and sweetpotatoes. Under good management, and with favorable weather, fair yields are obtained.

Several hundred acres of this soil have been seeded to improved pasture grasses. These include Pensacola Bahiagrass, common Bahiagrass, and Pangolagrass. If a good fertilizer mixture and lime are applied to these areas, only 2 or 3 acres of improved pasture is needed to graze 1 cow.

The natural vegetation of turkey and bluejack oaks, a few pines, and grasses cover a large part of the soil. The native grasses provide poor forage for animals on the range pastures.

The native trees grow fairly well on this soil. Some areas have been planted to pine seedlings. The growth of the young trees is fairly rapid.

This soil is in capability unit IIIs-1 and in the soil association of Well-Drained Deep Sands.

Lakeland fine sand, gently undulating phase (Ld).—This extensive soil occupies slopes of 2 to 5 percent. Except for slope it resembles Lakeland fine sand, level phase. It occurs mainly on the high sand ridges north and northeast of Tampa; north of Dover; and near Brandon, Bloomingdale, Limona, Valrico, Seffner, Lithia, and Picnic. This soil is associated with other phases of Lakeland fine sand and with soils of the Blanton, Eustis, Orlando, and Arredondo series.

The natural vegetation, which covers a large acre-

age of this soil, consists mainly of turkey and bluejack oaks, pines, and a few shrubs and grasses.

Drainage is good to somewhat excessive. Surface runoff is medium to rapid, and internal drainage is rapid. The water-holding capacity is low. During dry seasons the citrus trees and other crops need irrigation. This soil has better air drainage than the level phase. It is low in organic matter and in plant nutrients.

Use and management.—This soil needs to have the content of organic matter replenished by plowing under cover crops or the natural growth of weeds. Mixed fertilizers should be used to supply plant nutrients, and the acidity should be corrected by using lime.

Several thousand acres of this soil is planted to citrus trees (fig. 6). Some areas are used to grow watermelons (fig. 7) and a few other crops. Several hundred acres have been seeded to improved pasture grasses such as Pensacola Bahiagrass, common Bahiagrass, and Pangolagrass. Yields of crops are about the same as those obtained on Lakeland fine sand, level phase, the carrying capacity of pastures is about the same, and the soil needs about the same type of management.

This soil is in capability unit IIIs-1 and in the soil association of Well-Drained Deep Sands.

Lakeland fine sand, undulating phase (Le).—This soil generally occupies slopes of 5 to 8 percent, but a few acres are on slopes of 8 to 12 percent. Except for slope the soil resembles the level and gently undulating phases of Lakeland fine sand. The soil occurs near streams or on short slopes next to sinkholes and depressions. It occurs mainly in the north-central part of the county.

The natural vegetation is turkey and bluejack oaks, a few pines, and shrubs and grasses. Some areas have only a few trees and are covered by a sod consisting of various grasses.

Drainage is good to somewhat excessive. Surface runoff is rapid. Hard rains damage the soil if it is not kept under cover crops or under a cover of natural vegetation. The vegetation not only breaks the force of the falling rain, but also increases the amount of humus in the soil, thereby increasing its ability to absorb and retain water.

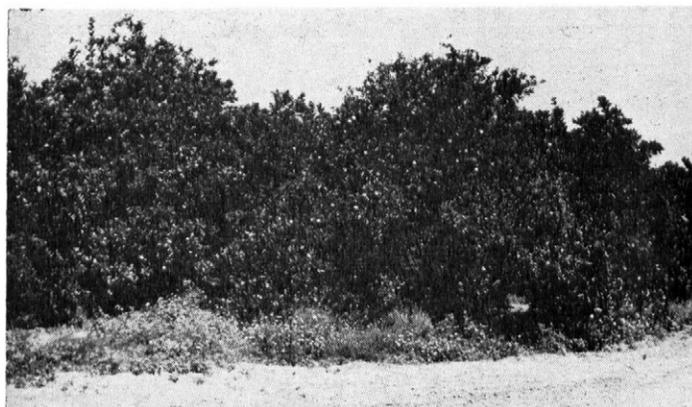


Figure 6.—A citrus grove on well-drained Lakeland fine sand, gently undulating phase, near Temple Terrace.



Figure 7.—Watermelons on Lakeland fine sand, gently undulating phase, near Temple Terrace.

Use and management.—About 120 acres of this soil is planted to citrus trees. If weather is favorable and a high level of management is practiced, the yields of oranges and grapefruit are fairly good. The citrus trees need liberal applications of fertilizer, and cover crops should be grown between the rows. Lime is needed on some areas.

Several areas have been seeded to Pensacola Bahiagrass, common Bahiagrass, Pangolagrass, and other improved pasture grasses. Seeded pastures need application of mixed fertilizer each year and lime every 5 to 7 years. The improved pastures provide good forage.

This soil is in capability unit IIIs-1 and in the soil association of Well-Drained Deep Sands.

Lakeland fine sand, shallow phase (La).—Except that finer textured materials occur at depths of 30 to 42 inches, this inextensive soil resembles the level and gently undulating phases of Lakeland fine sand. The finer textured material is pale yellow to brownish yellow, mottled in places with light gray and strong brown. The texture ranges from fine sandy clay to fine sandy clay loam.

About half of this soil is nearly level, and the rest is on slopes of 2 to 8 percent. The soil occupies small areas, generally in the north-central part of the county. Most of it occurs north and northeast of Mango. It is associated with the other Lakeland soils.

This soil is well drained. Because of the underlying clayey materials, it retains moisture better than most of the Lakeland soils. Surface runoff is slow to me-

dium. The content of organic matter and plant nutrients is low.

Use and management.—Some of this soil is included with other soils that are in citrus groves. Other areas are used for general crops or pasture. Yields of citrus fruits and other crops are fair to good if weather is favorable and good management is practiced. The natural vegetation provides poor to fair grazing.

This soil is in capability unit IIIs-1 and in the soil association of Well-Drained Deep Sands.

Lakeland fine sand, level deep phase (Lc).—Most of this soil occurs in the south-central and southern parts of the county. It is associated with the other phases of Lakeland fine sand and with Lakewood fine sand. The surface layer is lighter colored than that of the other Lakeland soils, the clayey material occurs at greater depths, and the soil materials are less coherent. This soil does not have the light-gray or white layer between the surface layer and the yellow subsoil that is typical of the Lakewood soil.

The natural vegetation consists of scrub live oaks, a few turkey oaks, sand pines, rosemary and a few other shrubs, and grasses.

The surface layer, to a depth of 4 to 8 inches, is gray or light-gray loose fine sand. In places the lower layers are the same color as those of the typical Lakeland soil, but generally they are pale yellow or yellow. The finer textured material occurs at depths of more than 72 inches.

This soil is somewhat excessively drained and has a very low moisture-holding capacity. It is low in organic matter and in mineral nutrients for plants.

Use and management.—Practically all of this soil is used for range pasture, but the natural vegetation provides only poor grazing.

This soil is in capability unit IIIs-1 and in the soil association of Well-Drained Deep Sands.

Lakeland fine sand, undulating deep phase (Lf).—This somewhat excessively drained soil occurs in the south-central part of the county. Except that it is on slopes of from 2 to 8 percent, it resembles Lakeland fine sand, level deep phase. It is very low in organic matter and mineral nutrients.

Use and management.—Practically all of this soil is covered by scrub vegetation consisting of upland live oak, sand pine, rosemary, saw-palmetto, and a few grasses. This vegetation provides very poor forage.

This soil is in capability unit IIIs-1 and in the soil association of Well-Drained Deep Sands.

Lakewood fine sand (Lg).—Because of the natural vegetation growing on this soil, it is commonly called "scrubland." The vegetation consists of sand pine, scrub oak, and a scattered undergrowth of saw-palmetto, rosemary, runner oak, pricklypear cactus, and wiregrass. A few turkey oaks and bluejack oaks grow on some areas.

The soil has developed from thick beds of very loose sand. Most areas occupy low ridges, or knolls. Slopes are generally less than 2 percent. About 100 acres is on slopes of 2 to 5 percent, and a few acres is on slopes of 5 to 12 percent. The soil occurs mainly near the Little Manatee River in the southern part of the county. Some areas occur in the south-central and eastern parts.

This soil is associated with soils of the St. Lucie, Pomello, Blanton, and Leon series. It has a yellow or brownish-yellow layer, beginning 10 to 24 inches below the surface, which does not occur in the associated St. Lucie and Pomello soils. The Lakewood soil does not have the very dark brown or nearly black organic pan that occurs at depths of 14 to 30 inches in the Leon soils.

Profile description:

- 0 to 3 inches, light-gray or gray, loose, noncoherent fine sand; contains a small amount of coarse organic matter.
- 3 to 18 inches, white, loose, noncoherent fine sand.
- 18 to 48 inches +, yellow or brownish-yellow, loose, noncoherent fine sand that grades to light gray and white with increasing depth.

This soil is strongly acid throughout. It is excessively drained and retains little moisture even during the rainy summer season. It is extremely low in organic matter and plant nutrients.

Use and management.—Most of this soil is in range pastures, but a few areas are used as building sites. The natural vegetation on the range pastures provides very poor forage.

This soil is in capability unit IVs-1 and in the soil association of Excessively Drained or Well Drained Deep Sands.

Leon fine sand (Lh).—This soil is the most extensive in the county. Typically it has a black or dark-brown organic pan beginning at depths between 14 and 30 inches. The soil has developed from thick beds of unconsolidated sand, laid down by high seas that once covered the area. It occurs in the flatwoods. Large areas are in the southern, northeastern, and northwestern parts of the county. The soil is mainly level to nearly level, but some areas near streams are on slopes of 2 to 5 percent.

Associated with this soil are soils of the Immokalee, Ona, Pomello, Blanton, Scranton, Adamsville, Plummer, and Rutlege series. The organic pan in this soil is more strongly cemented and nearer the surface than that in the Immokalee soils. Instead of an organic pan, the Ona soils have, within 14 inches of the surface, a layer that is stained brown by organic matter. The Pomello and Blanton soils do not have a pan, and they are better drained and lighter colored than the Leon soil.

Profile description:

- 0 to 5 inches, dark-gray nearly loose fine sand; contains a small amount of organic matter, which gives it a salt-and-pepper appearance.
- 5 to 20 inches, light-gray loose fine sand.
- 20 to 24 inches, very dark grayish-brown or black fine sand cemented with organic matter; firm and friable when moist; hard when dry.
- 24 to 30 inches, dark-brown fine sand; weakly cemented.
- 30 to 42 inches +, yellowish-brown loose fine sand in upper part; grades to lighter colors with increasing depth.

The surface layer ranges from very dark gray to gray in color and from 3 to 8 inches in thickness. The organic pan ranges from nearly black to dark brown and from 2 to 6 inches in thickness. As a rule the upper part of the pan is dense and hard. In places the dark-colored material extends to depths of more than 42 inches.

This soil is very strongly acid throughout. It is

somewhat poorly drained. Surface runoff is slow. Internal drainage is medium to rapid if not retarded by the high water table that is generally associated with the pan.

Use and management.—Most of this soil is used as range pasture (fig. 8). The natural vegetation provides poor to fair forage. From 15 to 25 acres is needed to graze a cow. Some areas have been cleared, limed and fertilized, and seeded to improved pasture grasses. Such areas yield approximately four times as much forage as those under the natural vegetation.

A few areas of this soil, near Ruskin and Plant City, have been included with other soils in fields used to grow vegetables and strawberries. Such areas need lime, liberal applications of mixed fertilizer, and control of water. Many farmers irrigate by means of sprinkling systems or by allowing water to seep through the soil from furrows. Under good manage-



Figure 8.—Natural cover of wiregrass, saw-palmetto, and pine on Leon fine sand. This soil is used as range pasture, but its carrying capacity is low.

ment fairly high yields of the vegetables and berries are obtained. Yields are not so high as those obtained on the Scranton, Ona, Ruskin, and Adamsville soils under similar management.

In the northwestern and eastern parts of the county, small areas are included with other soils used to grow citrus fruits. Because of the fluctuating high water table, the citrus trees on this soil are generally stunted and do not live long. Citrus trees can be grown if given special management, but the soil is not suitable for commercial citrus groves.

Pine trees grow fairly well on this soil. Under a good system of forestry management, they are fairly profitable.

This soil is in capability unit IVs-2 and in the soil association of Somewhat Poorly Drained Sands with Organic Pan.

Leon fine sand, heavy substratum phase (L).—Except that the organic pan is underlain by clayey materials, this soil resembles Leon fine sand. It occupies level or nearly level areas, mainly in the southern, northwestern, northern, and northeastern parts of the county. It occurs next to areas of other Leon soils or Immokalee soils, or separates areas of Leon and Immokalee soils from areas of Sunniland and Ruskin soils.

The natural vegetation consists of pine trees, runner oaks, gallberry bushes, a few myrtle bushes and other shrubs, and grasses.

The organic pan in this soil begins at depths of 24 to 32 inches. The clayey material begins at depths of 30 to 42 inches, and in most places it is mottled light-gray, yellow, and yellowish-brown fine sandy clay or fine sandy clay loam.

The upper part of the clayey material is strongly acid; the lower part, at depths of nearly 42 inches, is strongly acid but in places is neutral or alkaline. The areas that have neutral or alkaline clayey material generally occur near the coast or near areas of Ruskin, Sunniland, or Adamsville soils.

Use and management.—Practically all of this soil is in range pastures. Forage on these pastures is provided by the natural vegetation and is only fair. A few acres have been cleared, fertilized, and seeded to improved pasture grasses. Only 2 to 3 acres of improved pasture is needed to graze a cow.

Pine trees grow well on this soil. They are profitable if good forestry management is practiced.

This soil is in capability unit IVs-2 and in the soil association of Somewhat Poorly Drained Sands with Organic Pan.

Leon fine sand, light-colored surface phase (Lk).—This soil resembles typical Leon fine sand except that it has a lighter colored surface layer, is slightly deeper over the organic pan, and occupies slightly higher, better drained positions. The relief is nearly level, though in places there is a slight slope toward lower lying soils. Individual areas are fairly large and are scattered throughout the county. They occur within larger areas of other Leon soils or between areas of other Leon soils and areas of Pomello, Blanton, and Lakeland soils. This soil differs from the Pomello soil in having an organic pan.

The natural vegetation is similar to that on typical

Leon fine sand, but in most places it is not so dense, and in many places it includes scrub live oaks.

The surface layer of this soil is light-gray or gray fine sand, 1 to 3 inches thick. The pan layer occurs at depths of 24 to 42 inches.

This soil is somewhat poorly drained. Surface runoff is slow to medium, and internal drainage is medium to rapid when not retarded by the high water table.

Use and management.—Much of this soil is used for range pasture, but the natural vegetation provides only poor to fair grazing. A few areas are included in fields used to grow citrus fruits or other crops. Citrus fruits and other crops do not do well on this soil.

This soil is in capability unit Vs-1 and in the soil association of Somewhat Poorly Drained Sands with Organic Pan.

Made land (Ma).—In the western part of the county, this land type consists largely of areas built up by dredgings taken from the bottom of Tampa Bay, Old Tampa Bay, and Hillsboro Bay, and materials taken from the bottoms of lakes and ponds. A few areas of Coastal beach, not mapped separately in this county, are included. The materials consist of sand and shells, which were pumped into low-lying areas when nearby channels were widened and made deeper for boats or when lakes or ponds were deepened. Much of this material has been used as a foundation for highways and for roads across the bays. Some is used for building sites.

In the central and eastern parts of the county, this land consists largely of residues that have resulted from mining pebble phosphate. These areas have been leveled somewhat, and some of the more nearly level ones have been seeded to improved pasture grasses or planted to a few crops. Grasses and crops on these reclaimed areas yield fair to good returns under good management. Fertilizer must be used, however, and the crops must be irrigated during dry seasons.

Pine trees grow rapidly on some of this land. This mapping unit has practically no agricultural value and was not given a capability classification.

Manatee fine sandy loam (Mc).—This poorly drained soil has a thin layer of loamy sand over alkaline clay materials and marl. It occupies level areas or slight depressions. A large area occurs east of Harney in an area known as Harney Flats. Smaller areas occur near the coast in the southwestern and northwestern parts of the county, and some occur in the northeastern part. Some areas occur near the major streams.

This soil is associated with the Bradenton, Ruskin, Sunniland, Delray, Felda, and Pompano soils. The surface layer is darker colored than the surface layers of the associated soils, except the Delray, and thicker than the surface layers of the Bradenton, Ruskin, and Sunniland soils. This soil occurs on wetter areas than the Bradenton, Ruskin, and Sunniland soils. The fine-textured materials in its profile occur at depths of less than 30 inches, but those in the Delray soils occur at depths below 30 inches.

The natural vegetation in most places consists of various grasses, sedges, lilies, and other aquatic plants. few grasses.

In some areas it consists of hardwoods and cypress trees, a few cabbage palmettos, vines, shrubs, and a

Profile description:

- 0 to 9 inches, black friable fine sandy loam; contains a large amount of organic matter.
- 9 to 15 inches, black or very dark gray fine sandy clay; plastic and sticky when wet; very hard when dry.
- 15 to 28 inches, dark-gray or gray fine sandy clay, mottled with pale yellow and light gray.
- 28 to 42 inches +, light-gray marl streaked with pale yellow and gray; fine sandy clay texture.

The fine sandy loam surface layer ranges from 6 to 15 inches in thickness. In a few areas the surface texture is fine sandy clay loam, but these areas are so small and occur in such an intricate pattern that they were not mapped separately. Generally the marl occurs at depths between 18 and 36 inches. In some areas, however, there is no marl in the profile above depths of 48 inches.

Most of the area on or near Harney Flats appears to have once had a mucky surface layer overlying the fine sandy loam. This mucky layer, similar to the surface layer of Terra Ceia peaty muck, has been destroyed by fire or by oxidation. Much of this area is covered by large stumps that were left when the cypress trees were harvested in the 1920's.

The upper part of this soil is slightly acid to neutral. The lower horizons are neutral to alkaline. The soil is poorly to very poorly drained. It is usually covered by several inches of water during part of the year. Internal drainage is medium to slow when not retarded by the high water table. Canals and ditches have been dug in several areas to help remove excess water from this and other low-lying soils.

Use and management.—Some of this soil, on the eastern part of Harney Flats and near Ruskin, has been used to grow vegetables. Good yields are obtained under a high level of management. Fertilizers are needed, however, and the water must be controlled.

This soil is in capability unit IIIs-3 and in the soil association of Poorly Drained Neutral to Alkaline Sands and Sandy Clays.

Manatee loamy fine sand (Md).—This soil is coarser textured than Manatee fine sandy loam, which it resembles in other ways. It occupies level areas or slight depressions in the southwestern, southeastern, and northeastern parts of the county, and some areas near Sixmile Creek.

The natural vegetation on many areas is of a hammock type; it consists of oaks, cabbage palmettos, large saw-palmettos, and a few pines and cypress trees. On some areas there are no trees and the vegetation consists of sedges, lilies, pickerelweed, arrowhead, sawgrass, and other grasses.

Profile description:

- 0 to 10 inches, black loamy fine sand; contains a large quantity of organic matter; slightly acid to neutral.
- 10 to 24 inches, dark gray or very dark gray fine sandy clay loam; slightly plastic when wet and hard when dry; neutral to mildly alkaline.
- 24 to 42 inches +, gray or light-gray fine sandy clay, slightly mottled with pale yellow and yellowish brown; sticky and plastic when wet and very hard when dry; mildly alkaline or calcareous.

The surface layer ranges from 9 to 20 inches in thickness. The horizon immediately below the surface layer gradually becomes lighter colored and finer tex-

tured with increasing depth. In many places the clayey materials are underlain at depths of 30 to 36 inches by marl that has a sandy clay loam or sandy clay texture.

This soil is slightly acid to mildly alkaline or neutral. It is poorly to very poorly drained. Internal drainage is medium to slow when not retarded by the high water table. During part of the year, the soil is covered by several inches of water.

Use and management.—Most of this soil is in range pasture. The natural vegetation provides fair to good grazing. Some areas are used to grow vegetables; yields are good under a good system of management. The soil needs fertilizer, however, and some means of controlling the water.

This soil is in capability unit IIIs-3 and in the soil association of Poorly Drained Neutral to Alkaline Sands and Sandy Clays.

Manatee fine sandy clay, heavy variant (Mb).—This soil was derived from finer textured materials than Manatee fine sandy loam, and its surface layer is generally lighter colored. It has developed from clayey materials that overlie marl or contain concretions of lime. The soil occurs on level areas or in slight depressions, next to areas of Sunniland, Felda, and Peace River soils. Large areas occur north of the bottom lands along the Hillsborough River in the north-central part of the county.

This soil is more poorly drained than the associated Sunniland soils. The surface layer is fine sandy clay instead of the fine sand typical of the Sunniland and Felda surface layers. The Peace River soils occur on flood plains and consist of variable soil materials deposited when streams overflowed their banks.

The natural vegetation consists of various grasses, shrubs, and a few pines and hardwood trees.

Profile description:

- 0 to 8 inches, very dark gray or dark gray fine sandy clay; sticky and plastic when wet and very hard when dry; slightly acid.
- 8 to 24 inches, gray or grayish-brown fine sandy clay; slightly acid to neutral.
- 24 to 42 inches +, light-gray calcareous fine sandy clay, streaked or mottled with yellowish brown and brownish yellow.

The surface layer ranges from gray or grayish brown to nearly black. The underlying layers in areas next to Sunniland soils contain small concretions of lime in places. A few areas next to areas of Felda and Sunniland soils have a fine sandy loam surface layer, 3 to 6 inches thick.

The surface layer of this soil is slightly acid. The horizon immediately below is slightly acid to neutral, and the underlying fine sandy clay is alkaline. The soil is poorly drained to very poorly drained. Surface runoff is very slow.

Use and management.—Practically all of this soil is covered by a good growth of various grasses, which provide good grazing. Small pine trees grow on a few areas.

This soil is in capability unit IIIs-3 and in the soil association of Poorly Drained Neutral to Alkaline Sands and Sandy Clays.

Mines, pits, and dumps (Me).—This mapping unit

consists mainly of areas where pebble phosphate has been mined. It also includes excavations from which fill material for highways, railroads, and building sites has been taken, and areas where the waste material from mining and other operations has been dumped. Most of the mapping unit is in the eastern part of the county, mainly near Coronet, Hopewell, Keysville, and Picnic. Many of the pits are filled with water to a depth of several feet and are well stocked with fish.

Most of this unit is wasteland. Since it has practically no agricultural value, it was not given a capability classification. Grasses, shrubs, and pine trees have gained a foothold on the older areas. This natural vegetation provides some forage for cattle.

Mixed alluvium, high bottom phase (Mf).—This soil was derived from somewhat stratified old alluvium deposited by overflowing streams or by runoff from nearby soils. It occupies level or nearly level areas or low terraces next to the bottom lands near some of the larger streams. It occurs mainly along the Alafia and Little Manatee Rivers and their larger tributaries in the south-central and southern parts of the county. About 150 acres occurs near Cow House Creek in the north-central part.

This soil is associated with soils of the Leon, Immokalee, Ona, Plummer, and Rutlege series. It occupies lower positions than the Leon and Immokalee soils and lacks the organic pan typical of those soils.

The natural vegetation consists of live oaks, water oaks, pines, saw-palmettos, shrubs, and wiregrass and other grasses.

Profile description :

- 0 to 6 inches, dark-gray loose fine sand; contains a small amount of organic matter; has a salt-and-pepper appearance.
- 6 to 12 inches, grayish-brown loose fine sand.
- 12 to 20 inches, light-gray or very pale brown loose fine sand.
- 20 to 38 inches, mottled gray, light-gray, and yellowish-brown fine sandy clay loam.
- 38 to 42 inches +, light brownish-gray loamy fine sand.

The color of the surface layer ranges from nearly black to gray and the thickness from 3 to 8 inches. In places the light-gray fine sand immediately overlies the surface layer and extends downward to the finer textured material. Depth to the finer textured material ranges from 18 to 30 inches, and the reaction ranges from strongly acid to neutral within short distances. In places the clayey material is underlain by marl. In some places the soil resembles Stough fine sand, a soil mapped on terraces in counties farther north.

The upper part of the profile is strongly acid. The lower layers are strongly acid to neutral or mildly alkaline. Drainage is somewhat poor to poor. Surface runoff is slow, and internal drainage is slow to medium. As a rule the areas are not flooded by the normal overflow from streams, but sometimes they are covered when floodwaters are high.

Use and management.—All of this soil is used as range pasture. The natural vegetation provides a fair amount of forage. The areas could be seeded to improved pasture grasses if the underbrush and trees were removed, but lime and fertilizer would be needed for good pasture.

This soil is in capability unit IVs-2 and in the soil association of miscellaneous land types of Bottom Lands, Swamps, and Ponds.

Ona fine sand (Oa).—This dark-colored soil is distinguished by its dark-gray to nearly black surface layer, underlain at depths of less than 14 inches by a layer stained brown by organic matter. The soil generally occurs on level or nearly level areas, but in a few places it is on slopes of 2 to 5 percent. It generally occupies positions slightly lower than those occupied by the Scranton soil, or it may occur between areas of Scranton soil and Leon soils. In places the soil occupies areas between the Leon soils and the Plummer or Rutlege soils. It occurs in the flatwoods, principally in the south-central, eastern, and southeastern parts of the county. Large areas occur near Plant City, Keysville, Dover, Sydney, and Turkey Creek.

The soil is associated with the Scranton, Leon, Immokalee, Plummer, and Rutlege soils. It resembles the Scranton soil closely, but it differs in having a brown, organic-stained layer. The surface layer is thicker and darker colored than in the Leon and Immokalee soils, and the brown-stained layer occurs nearer the surface. In the Leon and Immokalee soils, the organic pan is overlain by a light-gray, leached layer, which does not occur in the Ona soil. The Plummer and Rutlege soils occur in wetter areas than the Ona soil.

The natural vegetation consists of pines, saw-palmettos, gallberry bushes, myrtle bushes, and other shrubs and grasses.

Profile description :

- 0 to 9 inches, black nearly loose fine sand; contains a large quantity of organic matter.
- 9 to 15 inches, dark-brown fine sand, an organic-stained layer.
- 15 to 20 inches, light yellowish-brown loose fine sand.
- 20 to 42 inches +, light-gray loose fine sand; contains a few yellow streaks.

The surface layer ranges from black to dark gray in color and from 6 to 12 inches in thickness. The organic-stained layer ranges from very dark grayish brown to brown. The underlying sandy layers grade gradually to lighter colors with increasing depth.

This soil is strongly acid throughout. It is somewhat poorly drained to poorly drained. Surface runoff is slow, and internal drainage is rapid if not retarded by the high water table.

Use and management.—The large areas of this soil near Plant City, Keysville, Dover, Sydney, and Turkey Creek are used to grow vegetables and strawberries. Applications of mixed fertilizer are needed each year, and lime is required every second or third year. Most of the farmers have irrigation facilities so that the crops can be irrigated during dry seasons. Yields are good under a good system of management.

In the eastern part of the county, a few areas are in citrus groves. Under a high level of management, fair yields are obtained, but the soil is too wet to be well suited to citrus fruits. If citrus trees are planted on small acreages, sour-orange rootstock should be used rather than rough-lemon rootstock, because the sour-orange rootstock is better adapted to wet soils.

Many areas are in range pastures. The natural

vegetation provides a fair amount of forage. The carrying capacity is about 1 cow on 10 to 20 acres. Some areas have been cleared, limed and fertilized, and seeded to improved pasture grasses. The resulting pasture provides approximately four times as much forage as the natural vegetation.

Pine trees grow rapidly on this soil. Forestry is profitable if good management is used.

This soil is in capability unit IIs-1 and in the soil association of Somewhat Poorly Drained, Dark-Colored Sands.

Ona fine sand, light-colored surface phase (Ob).—A light-colored surface layer distinguishes this somewhat poorly drained soil from typical Ona fine sand. Most of the soil is level or nearly level, but a few areas near streams or ponds are on slopes of 2 to 5 percent. This soil occurs principally in the southern half of the county and in the eastern and northwestern parts.

Associated with this soil are members of the Leon, Blanton, Scranton, Plummer, and Rutlege series. This soil differs from the Leon soils in having the brown-stained layer within 14 inches of the surface. The Blanton soils have better drainage; they generally lack the brown-stained layer and have more yellow and pale yellow in their lower layers. The surface layer is not so dark colored nor so thick as that of the Scranton soil, which does not have the brown-stained layer. The Plummer and Rutlege soils occupy wetter areas.

The natural vegetation consists of pines, runner oaks, a few bluejack oaks, live oaks, saw-palmettos, and wiregrass and other grasses.

The surface layer ranges from light gray to gray. The brown or dark grayish-brown organic-stained layer occurs at depths between 9 and 14 inches.

Use and management.—Practically all of this soil is in range pasture. The natural vegetation provides a fair amount of forage. Some areas have been cleared, limed and fertilized, and seeded to improved pasture grasses. The initial cost of establishing these pastures is high, but they provide good forage.

A few areas are included with other soils in fields used to grow vegetables, strawberries, or citrus fruits. Under a high level of management, fair to good yields of vegetables and strawberries are obtained. Management requirements include water control and liberal use of fertilizer and lime. Because of the fluctuating high water table, this soil is poorly suited to citrus trees. Some of the higher lying areas, however, can be used for that purpose, and the trees yield well if water is controlled and if large quantities of fertilizer and lime are applied.

Pine trees grow well on this soil. If good forestry management is practiced, forested areas yield good returns.

This soil is in capability unit IIIs-2 and in the soil association of Somewhat Poorly Drained, Dark-Colored Sands.

Orlando fine sand (Oc).—The parent material of this soil consisted of moderately thick beds of sand. The soil generally occurs on nearly level relief, but a few areas near streams and sinkholes are on slopes of 2 to 5 percent. The soil occurs in the central and east-

central parts of the county. Fairly large areas are located near Brandon, Mango, Plant City, and Boyette, east of Wimauma and northwest of Springhead School.

This soil is associated with the Lakeland, Blanton, and Scranton soils. It has a darker colored, thicker surface layer than the Lakeland and Blanton soils. It is better drained than the Scranton soil.

The natural vegetation consists of turkey oak, bluejack oak, live oak, pine, and various grasses.

Profile description:

0 to 12 inches, very dark gray nearly loose fine sand; contains considerable organic matter.

12 to 24 inches, dark grayish-brown nearly loose fine sand.

24 to 42 inches +, yellowish-brown or light yellowish-brown loose fine sand.

The surface layer ranges from nearly black to dark grayish brown in color and from 9 to 15 inches in thickness. The color of the horizon immediately below the surface layer ranges from very dark grayish brown to grayish brown. The 24- to 42-inch layer is pale brown or light gray in places.

This soil is strongly acid throughout. It is well drained. Surface runoff is slow.

Use and management.—This soil is used to grow citrus fruits, vegetables, and general field crops. Under a high level of management, fairly high yields are obtained. The soil is somewhat droughty and needs irrigation during dry seasons. Lime is needed every second or third year, and liberal amounts of fertilizers should be applied during the growing seasons. Corn, cowpeas, and other general crops are not irrigated, as a rule. During dry seasons these crops may be damaged by lack of moisture.

The pines on areas that have not been cleared grow rapidly. Under good forestry management, they yield profitable returns.

This soil is in capability unit IIIs-1 and in the soil association of Well-Drained Deep Sands.

Pamlico muck (Pa).—This organic soil has developed over sand from the remains of sedges, grasses, lilies, arrowheads, and bonnets. The organic materials are fairly well decomposed. Some mineral matter is mixed with the organic materials. This soil occupies depressions or shallow ponds. Most of it occurs in the central part of the county.

The natural vegetation consists of sedges, lilies, arrowheads, pickerelweeds, and grasses.

Profile description:

0 to 12 inches, black muck; a small quantity of mineral matter is mixed with the decomposed organic materials.

12 to 36 inches, black muck or mucky fine sand; upper part contains a small amount of mineral matter; lower part has a few lenses of gray fine sand between layers of organic materials.

36 to 48 inches +, dark-gray or gray fine sand that grades to light gray with increasing depth.

The muck layer ranges from 12 to 15 inches in thickness. In most places the muck layer is underlain by black mucky fine sand or fine sand that contains a considerable amount of organic matter. In some places the muck overlies dark-gray fine sand.

Use and management.—All of this soil is used as range pasture. When the areas are not covered too

deeply by water, the natural vegetation provides a fair amount of forage.

This soil is in capability unit IIIs-4 and in the soil association of Very Poorly Drained Organic Soils.

Parkwood fine sand (Pb).—This soil consists of very thin beds of sand over marl. It occupies areas of level or nearly level relief. Individual areas are small and generally occur near the coast between Sun City and the Pinellas County line along the northwestern boundary of the county.

The soil is associated with the Broward, Keri, Bradenton, Ruskin, Adamsville, Pompano, and Delray soils. It differs from the Broward soil in having marl in the lower part of its profile, at the place where limestone occurs in the Broward soil. The Keri soil has a 6- to 12-inch layer of marl in its profile, but unlike the Parkwood soil, its marl layer is underlain by fine sands. This Parkwood soil does not have the fine sandy clay or fine sandy clay loam horizon, immediately above the marl, that is typical of the Bradenton and Ruskin soils. It is better drained than the Pompano and Delray soils.

The natural vegetation is cabbage palmetto; water oak, live oak, and other hardwoods; and pines, vines, bamboo briers, and a few large saw-palmettos.

Profile description:

- 0 to 6 inches, dark-gray or grayish-brown nearly loose fine sand; contains a moderate amount of organic matter; slightly acid to neutral.
- 6 to 18 inches, gray to light brownish-gray nearly loose fine sand; neutral to mildly alkaline.
- 18 to 42 inches +, light-gray marl that has a fine sandy clay loam texture; a few calcareous concretions or limestone rock fragments in lower part; mildly alkaline.

The surface layer ranges from 4 to 8 inches in thickness and in places is very dark gray. The marl generally underlies 18 to 24 inches of sandy materials, but in a few areas the sandy materials are only about 12 inches thick. The texture of the marl in most places is fine sandy clay loam or fine sandy clay.

This soil ranges from slightly acid in the surface layer to mildly alkaline in the marl in the lower part of the profile. Drainage is somewhat poor to poor. Surface runoff is slow, and internal drainage is medium to slow.

Use and management.—Near Ruskin a small acreage of this soil has been included in fields used to grow vegetables. Fair to good yields are obtained under good management. Management requirements include water control and liberal fertilization. Most of the soil is used as range pasture. The natural vegetation provides a fair amount of forage. Pines grow well on this soil.

This soil is in capability unit IIIs-2 and in the soil association of Somewhat Poorly Drained Sands Over a Calcareous Substratum.

Peace River soils (Pc).—These extensive soils have developed from sediments, most of which were deposited by floodwaters from nearby streams. The surface textures are so variable within short distances, the soil materials so intricately mixed, and the areas so wet and so densely vegetated that it is impractical to map the soils separately. They occur on level or nearly level bottom lands in the northern part of the county, mainly along the Hillsborough River and

Blackwater Creek. The areas that were mapped occur at such low elevations that they are frequently flooded. Slight depressions or sloughs occur in the areas.

A dense growth of hammock vegetation covers most of these soils. The vegetation consists of gum, maple, live oak, water oak, ironwood, hickory, cypress, cabbage palmetto, and vines, shrubs and a few grasses.

Typical profile of one of the Peace River soils:

- 0 to 8 inches, black loamy fine sand; contains a large amount of organic matter.
- 8 to 18 inches, very dark gray or very dark grayish-brown loamy fine sand.
- 18 to 26 inches, dark-gray fine sandy clay with a few streaks of yellowish brown; sticky and plastic when wet and very hard when dry.
- 26 to 40 inches +, mottled gray, light-gray, and yellowish-brown fine sandy clay.

The texture of the surface layer ranges from loamy fine sand to fine sandy clay loam within short distances. The depth to the clayey material ranges from 10 to 30 inches. In places the clayey material is underlain by marl or limestone at shallow depths.

The upper part of the profile is slightly acid to neutral, and the underlying clayey materials are neutral or alkaline. These soils are poorly drained. They are covered by water during many months of the year. The water usually disappears during the dry winter season or early spring, however, before the beginning of the summer rains.

Use and management.—Practically all of these soils are covered by the thick natural vegetation. When water does not cover them too deeply, the vegetation provides a fair amount of forage. Except where it is economically feasible to improve the soils for pasture, they should be left under forest. Areas that could be cleared at reasonable cost would provide excellent pasture if they were improved.

These soils are not classified according to capability. They are in the soil association of miscellaneous land types of Bottom Lands, Swamps, and Ponds.

Plummer fine sand (Pd).—This poorly drained soil has developed from moderately thick beds of sands. It occupies nearly level or slightly depressed areas in the flatwoods throughout the county. A few areas near streams are on slopes of 2 to 5 percent.

The soil is associated with soils of the Leon, Immokalee, Ona, and Rutlege series. As a rule it lacks the organic pan that is characteristic of the Leon and Immokalee soils. Its surface layer is not so dark colored nor so thick as the surface layer of the Rutlege soils. In contrast to the Pompano soils, which are slightly acid to alkaline, this soil is strongly acid throughout.

The natural vegetation consists of various short grasses, a few clumps of saw-palmettos and other shrubs, and a few pine trees.

Profile description:

- 0 to 5 inches, dark-gray or gray nearly loose fine sand; contains a small to moderate amount of organic matter, which gives it a salt-and-pepper appearance.
- 5 to 14 inches, light brownish-gray loose fine sand.
- 14 to 48 inches +, light gray or very pale brown loose fine sand.

The surface layer ranges from 4 to 8 inches in thickness and from very dark gray to grayish brown in color. In a few areas the surface layer is light gray and 2 to 3 inches thick, and it is underlain by light-gray or nearly white fine sands. The lower part of the 14- to 48-inch layer ranges from nearly white to grayish brown. The grayish-brown material resembles an organic-stained layer. This layer, in places, is faintly mottled with brownish yellow and gray.

This soil is poorly drained. Surface runoff is very slow, and internal drainage is rapid when not retarded by the high water table. During part of the year the soil may be covered by water.

Use and Management.—Practically all of this soil is in range pasture. The natural vegetation provides a fair amount of forage. Small areas are in improved pastures and in fields used for crops. Under good management the grazing is fair to good on the improved pastures, and fair yields of crops are obtained. Water control and fertilization are needed to make these soils productive.

Pine trees generally do not grow to large size on this soil.

This soil is in capability unit IVs-3 and in the soil association of Poorly Drained Acid Sands.

Plummer fine sand, shallow phase (Pe).—This soil occupies level areas or slight depressions, mainly in the southern and northeastern parts of the county. Most of it is under water part of the year.

Except that fine sandy clay loam or fine sandy clay occurs at depths between 30 and 42 inches, this soil resembles typical Plummer fine sand. It resembles the associated Rains soil also, except that in the Rains soil the clayey materials occur within 30 inches of the surface. The clayey materials in Plummer fine sand, shallow phase, are light brownish gray or light gray, mottled with yellowish brown.

The natural vegetation consists of various grasses, shrubs, and a few pines.

Use and management.—Most of this soil is in range pastures. The natural vegetation provides grazing of fair quality.

This soil is in capability unit IVs-3 and in the soil association of Poorly Drained Acid Sands.

Pomello fine sand (Pf).—This extensive soil has developed from thick beds of sand. Most of it occurs on nearly level areas, but a few acres are on slopes of 2 to 5 percent. The soil occupies low ridges in the flatwoods throughout the county.

Associated with this soil are soils of the Leon, St. Lucie, and Blanton series. Some areas are surrounded by areas of Leon soils or lie between areas of Leon soils and areas occupied by St. Lucie or Blanton soils.

This soil lacks the organic pan that is typical of the Leon soils, it occupies slightly higher positions than the Leon soils, and has a lighter colored surface layer. It occurs on areas of smoother relief than those occupied by the St. Lucie soils, and it retains moisture better. Its lower layers are nearly white, and the lower horizons of the Blanton soil are pale yellow or light gray and pale yellow.

The natural vegetation consists of saw-palmetto, runner oak, pine trees, a few scrub live oaks and bluejack oaks, and a few grasses.

Profile description:

- 0 to 4 inches, gray or dark-gray loose fine sand; contains a small quantity of partly decayed organic matter.
- 4 to 12 inches, light-gray loose fine sand.
- 12 to 50 inches, white loose fine sand.
- 50 to 60 inches +, grayish-brown loose fine sand, an organic-stained layer.

The surface layer ranges from 3 to 6 inches in thickness, and in places it is light gray. In places the second horizon of light-gray loose fine sand is absent, and in these the surface layer directly overlies the white loose fine sand. In places the organic-stained layer occurs at depths of 42 inches. In a few areas, located a few miles southeast of Riverview, the soil consists largely of medium sand, which is mixed with some fine sand.

Pomello fine sand is strongly acid throughout. It is moderately well drained to somewhat poorly drained. Surface runoff is slow to medium, and internal drainage is rapid.

Use and management.—Most of this soil is used for range pastures. The natural vegetation provides poor to fair grazing. Some areas have been cleared and fertilized and seeded to improved pasture grasses. Forage on the improved pastures is fair to good. A few areas near Sun City are used to grow gladiolus, which make fair to good growth on this soil. Some areas are building sites.

This soil is in capability unit Vs-1 and in the soil association of Excessively Drained or Well Drained Deep Sands.

Pompano fine sand (Pg).—This poorly drained soil consists of moderately thick beds of sand over calcareous materials. It occupies level or nearly level areas or slight depressions. It is mainly in fairly large areas near the coast that occur from Sun City to the northwestern border of the county. The areas are within or next to areas of somewhat poorly drained Adamsville, Ruskin, Keri, and Broward soils.

This soil is also associated with Felda, Charlotte, Manatee, and Delray soils. Its profile consists entirely of fine sand, in contrast to that of the Felda soil, which has clayey materials within 30 inches of the surface. The surface layer is not so dark colored nor so thick as that of the Manatee and Delray soils. The Charlotte soil has brownish-yellow or yellow fine sand beginning at depths between 12 and 24 inches.

The natural vegetation consists of various grasses, a few pine trees, and cabbage palmettos, saw-palmettos, and other shrubs.

Profile description:

- 0 to 6 inches, dark-gray or dark grayish-brown loose fine sand; contains a small amount of organic matter, which gives it a salt-and-pepper appearance; slightly acid to neutral.
- 6 to 18 inches, grayish-brown loose fine sand; slightly acid to neutral.
- 18 to 42 inches +, light brownish-gray or light-gray loose fine sand; neutral to alkaline.

The surface layer ranges from very dark gray to gray in color and from 4 to 8 inches in thickness. In places the 18- to 42-inch layer is streaked with brownish yellow and brown. The soil, in places, is underlain by limestone or marl at depths below 48 inches.

To a depth of about 18 inches, this soil is slightly

acid to neutral. Below that it is neutral to alkaline. Drainage is poor. Surface runoff is slow, and internal drainage is rapid when not retarded by the high water table. During the rainy season, the soil may be covered by water for several months.

Use and management.—A large part of this soil is in range pasture. The carrying capacity of the natural vegetation, which covers most of the soil, is about 1 cow to 10 to 20 acres. A few areas are in improved pastures, which have been fertilized. The carrying capacity of these pastures is 1 cow to 2 or 3 acres.

Some small areas near Ruskin are included in fields used to grow vegetables and truck crops. These crops yield well under good management. Water control and fertilization are needed.

This soil is in capability unit IVs-3 and in the soil association of Poorly Drained Neutral to Alkaline Sands and Sandy Clays.

Pompano fine sand, shallow phase (Ph).—Except that clayey materials occur at depths of 30 to 42 inches, this soil resembles typical Pompano fine sand. The clayey materials consist of grayish-brown to light-gray fine sandy clay loam or fine sandy clay, mottled with yellowish brown and yellow.

The soil occupies level areas or slight depressions, within or next to areas of Ruskin and Adamsville soils. The individual areas are generally small and occur near the coast between Sun City and the Pinellas County line.

This soil is poorly drained. Surface runoff is slow. Internal drainage is rapid to medium when not retarded by the high water table. During the rainy season, the soil is often covered by water.

Use and management.—Most of this soil is used for range pastures. The natural vegetation provides a fair amount of forage. A few areas near Ruskin are included in cultivated fields. If management is good and water is controlled, vegetable yields are good.

This soil is in capability unit IVs-3 and in the soil association of Poorly Drained Neutral to Alkaline Sands and Sandy Clays.

Portsmouth fine sand (Pk).—This strongly acid soil consists of thin beds of sand over sandy clay. The fine-textured materials occur within 30 inches of the surface. This soil occupies level areas or slight depressions in the flatwoods in the southern and northeastern parts of the county.

This soil is associated with soils of the Plummer, Rains, and Rutlege series. Its surface layer is darker colored than that of the Plummer soils, and the Plummer and Rutlege soils do not have clayey materials at depths within 30 inches of the surface. Its surface layer is darker colored than that of the Rains soil.

The natural vegetation consists of various grasses, shrubs, pine trees, and a few cypress and hardwood trees.

Profile description:

- 0 to 10 inches, black to very dark gray fine sand; contains a large amount of organic matter.
- 10 to 24 inches, gray to light-gray fine sand.
- 24 to 42 inches +, mottled light-gray, yellowish-brown, and yellow fine sandy clay loam.

The surface layer ranges from black to dark gray in color and from 10 to 15 inches in thickness. In

places a few streaks of grayish brown and yellowish brown occur in the lower part of the 10- to 24-inch layer. Depth to fine sandy clay loam ranges from 18 to 30 inches. Some areas are underlain by alkaline materials at depths of 50 to 60 inches.

This soil is strongly acid throughout. It is poorly to very poorly drained. Surface runoff is very slow, and the areas are under water during many months of the year.

Use and management.—All of this soil is used for range pasture. When water is not too deep, the natural vegetation provides good grazing.

Trees of merchantable size grow in many places on this soil, and some are being harvested.

This soil is in capability unit IVs-3 and in the soil association of Poorly Drained Acid Sands.

Portsmouth mucky fine sand (Pl).—Considerably more organic matter occurs in the surface layer of this soil than in that of typical Portsmouth fine sand. The mucky fine sand surface layer ranges from 8 to 15 inches in thickness. Immediately below it is a horizon of very dark gray or black fine sand. This is underlain, at depths of 20 to 30 inches, by gray and yellowish-brown mottled fine sandy clay or fine sandy clay loam.

The natural vegetation in most areas consists of various grasses and a few shrubs. Hardwoods, vines, and shrubs grow on some small areas.

The soil is strongly acid to a depth of 42 inches. In a few places the soil materials below 42 inches are neutral to alkaline. The soil is poorly to very poorly drained. It is covered by several inches of water during part of the year.

Use and management.—All of this soil is in range pasture. When the water is not too deep, the natural grasses provide good grazing.

This soil is in capability unit IVs-3 and in the soil association of Poorly Drained Acid Sands.

Rains fine sand (Ra).—This inextensive soil has developed from thin beds of sand overlying sandy clay loam. It occupies level areas or slight depressions in the flatwoods in the northeastern part of the county.

The soil is associated with the Leon, Ona, Plummer, and Portsmouth soils. It does not have the organic pan that is typical of the Leon soils. Clayey materials occur within 30 inches of the surface. In contrast, Plummer fine sand, shallow phase, has clayey materials at depths of 30 to 42 inches, and typical Plummer fine sand consists of fine sand to depths of more than 42 inches. The surface layer of the Portsmouth soils is darker colored and thicker than that of the Rains soil.

The natural vegetation consists mainly of carpet-grass, broomsedge, and other grasses, and a few shrubs. A few pines grow on some areas.

Profile description:

- 0 to 6 inches, dark-gray or gray nearly loose fine sand; contains a small amount of partly decayed organic matter, which gives it a salt-and-pepper appearance.
- 6 to 20 inches, light-gray or light brownish-gray loose fine sand.
- 20 to 28 inches, gray or grayish-brown fine sandy clay loam, streaked with strong brown and yellow.
- 28 to 48 inches +, light brownish-gray fine sandy clay loam, mottled with yellow and brown.

The surface layer ranges from very dark gray to grayish brown in color and from 4 to 8 inches in thickness. In places a thin layer of pale-brown or grayish-brown fine sand occurs immediately above the clayey materials.

This soil is strongly acid throughout. It is poorly drained. Surface runoff is very slow, and internal drainage is medium when not retarded by the high water table.

Use and management.—All of this soil is included in range pastures. The natural vegetation on these pastures provides fair to good grazing.

This soil is in capability unit IVs-3 and in the soil association of Poorly Drained Acid Sands.

Ruskin fine sand (Rb).—This somewhat poorly drained soil has developed from thin beds of fine sand that overlie clayey materials and shell marl. It occupies level or nearly level areas near the coast, between the southern boundary of the county and Sixmile Creek.

This soil is associated with soils of the Bradenton, Adamsville, Leon, Immokalee, Felda, Pompano, Delray, and Manatee series. It differs from the Bradenton soils mainly in having clayey materials that are more yellowish and more friable than those in the Bradenton soils. The Adamsville soil, in contrast to this soil, does not have the fine-textured material and shell marl within its profile. This Ruskin soil does not have the organic pan that is typical of the Leon and Immokalee soils, and the Leon and Immokalee soils generally do not have clayey materials and marl in their profiles. This Ruskin soil is better drained than the Felda, Pompano, Delray, and Manatee soils.

The natural vegetation consists of pines, an occasional cabbage palmetto, and a rank growth of sawpalmettos, runner oaks, other shrubs, and grasses.

Profile description:

- 0 to 6 inches, dark-gray nearly loose fine sand; contains a small to moderate amount of organic matter, which gives it a salt-and-pepper appearance.
- 6 to 24 inches, light-gray loose fine sand.
- 24 to 36 inches, brownish-yellow or yellowish-brown fine sandy clay loam mottled with light gray.
- 36 to 42 inches +, white and pale-yellow shell marl.



Figure 9.—Tomatoes on Ruskin fine sand. The plants have been staked to facilitate cultivating, spraying, and fertilizing. In left background a specially built sprayer is being used to apply fungicide.

The surface layer ranges from gray to very dark gray in color and from 4 to 9 inches in thickness. In places, the second layer is very pale brown, light brownish gray, or light yellowish brown. Depth to the fine sandy clay loam ranges from 18 to 30 inches, and depth to the shell marl ranges from 24 to 42 inches. Several areas near Sun City and Ruskin and in the northwestern part of the county have, above the clayey materials, a layer that is stained dark brown to nearly black by organic matter. In these places the fine-textured materials begin at depths of 30 to 40 inches.

This soil becomes less acid with increasing depth. The surface layer is medium acid and is underlain by medium to slightly acid material. The horizons below are slightly acid to neutral. Drainage is somewhat poor. Surface runoff is slow, and internal drainage is medium when not retarded by the high water table.

Small areas of Adamsville fine sand, in which an organic-stained layer occurs at depths of 24 to 30 inches, are included in this mapping unit because the areas are too small to be shown separately on the soil map.

Use and management.—Near Ruskin, Sun City, and Gibsonton, a large acreage of this soil is used for vegetables (figs. 9 and 10) and truck crops (fig. 11), which are grown from October to May. Yields are good under a high level of management, but liberal applications of fertilizer containing the minor elements must be used.

Crops grown on this soil benefit from water control. Ditches along the edges of the fields and furrows within the fields help to remove excess surface water during wet seasons. More dams and locks are needed



Figure 10.—Head lettuce on Ruskin fine sand. The field will be planted to tomatoes or sweet corn after the lettuce has been harvested.



Figure 11.—Spraying sweet corn on Ruskin fine sand. Most of the crop will be packaged and shipped to northern markets.

to regulate the rate of runoff and to help control the water table in nearby soils.

During the dry winter and spring months, crops are irrigated mainly from flowing artesian wells. After these wells have been used for a time, the water no longer flows freely but must be pumped. The water flows into furrows, which are spaced 43 to 47 feet apart across the fields, and from the furrows it seeps into the soil. This system is adequate for fields of the present size, but if much larger acreages were cropped, more efficient methods of irrigation would be needed to conserve water.

To replenish and increase the comparatively low content of organic matter, cover crops and the natural vegetation are plowed under. After the crops are harvested, sesbania is planted (fig. 12), or the natural vegetation is allowed to grow during the summer months. This vegetative cover is plowed under a few weeks before crops are planted in the fall.

A few areas of this soil are used for range pastures. Other areas have been seeded to improved pasture grasses. The natural vegetation on the range pastures provides poor to fair grazing. The improved pastures, which are limed when necessary and fertilized annually, have a carrying capacity of 1 cow to each 2 or 3 acres. Pines make fair to good growth on this soil.

This soil is in capability unit IIIs-2 and in the soil association of Somewhat Poorly Drained Sands Over a Calcareous Substratum.

Rutlege fine sand (Rc).—This extensive soil has developed from moderately thick beds of acid sands. Most of it occurs on level or nearly level relief or in slight depressions in the wet areas throughout the flatwoods. Several areas, which receive seepage from higher lying soils, are on slopes of 2 to 8 percent.

This soil is associated with soils of the Leon, Immokalee, Ona, and Plummer series. It does not have the organic pan that is typical of the Leon and Immokalee soils. It occurs in wetter areas than the Ona soils, and in most places it lacks the brown-stained layer that occurs within 14 inches of the surface in the Ona soils. The surface layer is darker colored and thicker than that of the Plummer soils.

The natural vegetation consists mainly of short

grasses and shrubs, but on some areas it includes pines, hardwoods, and a few cypress trees.

Profile description:

0 to 12 inches, black fine sand; contains a large amount of organic matter.

12 to 20 inches, very dark gray to dark gray loose fine sand.

20 to 30 inches, light-gray or light brownish-gray loose fine sand.

30 to 42 inches +, mottled light-gray, pale-yellow, and brownish-yellow loose fine sand.

The surface layer is dark gray in places. It ranges from 9 to 15 inches in thickness. Most areas where the surface layer is less than 12 inches thick do not have a distinct very dark gray or dark gray horizon between depths of 12 and 20 inches; instead, the surface layer grades to the light-gray or light brownish-gray fine sand. In places a grayish-brown layer occurs at depths of 30 to 42 inches. Areas in the southeastern part of the county are underlain in places by calcareous materials. These materials occur slightly below the 42-inch depth and do not affect the typical profile.

This soil is strongly acid throughout. It is poorly drained to very poorly drained. During part of the year, the areas are covered by several inches of water.

Use and management.—Most of this soil is under the natural vegetation, which provides fair to good grazing. Some areas have been cleared, fertilized, and seeded to improved pasture grasses and legumes. The carrying capacity of these pastures is 1 cow to 2 or 3 acres.

A large acreage is included in fields of Scranton, Ona, or Leon soils that are used to grow vegetables and strawberries. High yields are obtained under good management. Management requirements include water control and the use of lime and fertilizer.

Ditches and canals are used to drain excess water from many areas. It may become necessary to install dams or locks in the ditches to control the ground-water level in nearby higher lying soils and to prevent overdraining.

This soil is in capability unit IIIs-3 and in the soil association of Poorly Drained Acid Sands.

Rutlege fine sand, shallow phase (Rd).—This soil occurs mainly in the northeastern part of the county. It differs from typical Rutlege fine sand mainly in having clayey materials at depths of 30 to 42 inches.



Figure 12.—Chopping sesbania, which has been used as a cover crop on Ruskin fine sand in the southwestern part of the county. This will be plowed under a few weeks before the next crop is planted.

The fine-textured materials consist of mottled grayish-brown, light olive-brown, and yellowish-brown fine sandy clay loam.

The natural vegetation consists of various grasses, shrubs, and a few pines, cypresses, and hardwood trees.

This soil is poorly drained or very poorly drained. The areas are covered by water during many months of the year.

Use and management.—The natural vegetation on this soil provides fair to good grazing when the water is not too deep. Areas that have been fertilized and seeded to improved pasture grasses have a carrying capacity of 1 cow to 2 or 3 acres.

This soil is in capability unit IIIs-3 and in the soil association of Poorly Drained Acid Sands.

Rutlege mucky fine sand (Re).—Except that it has considerably more organic matter in its surface layer, this wet soil is similar to Rutlege fine sand. Most of it occupies low, level areas or slight depressions in the flatwoods throughout the county. A few areas are on slopes of 2 to 5 percent. These steeper areas generally receive seepage from higher lying areas next to streams or swamps.

The natural vegetation consists of various grasses, shrubs, and some cypress and hardwood trees.

The mucky fine sand surface layer ranges from 6 to 15 inches in thickness. Immediately below the surface layer is a layer of black or very dark gray fine sand that ranges from 6 to 12 inches in thickness. The underlying layers grade, with increasing depth, from black or very dark gray to gray and light gray. In some places the lower part of the 42-inch profile is dark grayish brown and resembles an organic-stained layer.

Rutlege mucky fine sand is strongly acid throughout. It is poorly drained to very poorly drained. In many years it is covered by several inches of water for many months.

Use and management.—On range pastures, the native grasses on this soil provide fair to good grazing. The soil is suitable for seeding with improved pasture grasses if fertilizer is added and the water is controlled. Improved pasture grasses would provide good forage.

This soil is in capability unit IIIs-3 and in the soil association of Poorly Drained Acid Sands.

St. Lucie fine sand (Sd).—This soil is commonly called "scrubland" because of its natural cover of live oak and sand pine and the scattered undergrowth of rosemary, saw-palmetto, pricklypear cactus, and grasses. It has developed over thick beds of very loose fine sand. It occupies low ridges and slight knolls that generally have slopes of less than 2 percent. It occurs in fairly large areas throughout the county.

This soil is associated with the Blanton, Pomello, Lakewood, and Leon soils. It differs from the Blanton soils in having white or light-gray fine sands that extend to depths of more than 42 inches. In contrast, the Blanton soils have very pale brown or light gray fine sand splotched with pale yellow within the 42-inch profile and extending downward. The St. Lucie soil differs from the Pomello soil in occupying slightly higher positions and slightly stronger slopes. It does

not have the layer of yellow or brownish-yellow fine sand beginning at depths between 12 and 24 inches that is typical of the Lakewood soil. The St. Lucie soil is better drained than the Leon soils and does not have the organic pan that is typical of the Leon soils.

Profile description:

0 to 2 inches, light-gray or gray, loose, noncoherent fine sand; contains a small quantity of partly decayed organic matter.

2 to 5 inches, light-gray, loose, noncoherent fine sand.

5 to 42 inches +, white, loose, noncoherent fine sand that shows a few light brownish-gray spots around old root channels.

On the outer borders of some areas, a layer that is stained by organic matter occurs at depths of 48 to 60 inches.

This soil is extremely low in organic matter and mineral nutrients and is strongly acid. It is excessively drained. Even during the rainy season, it contains little moisture.

Included with this soil are small areas of Lakewood fine sand and Pomello fine sand that are too small to delineate separately on the soil map.

Use and management.—Nearly all of this soil is covered by natural vegetation and is used for range pasture. The vegetation provides only poor grazing. Some of the soil is in building sites, and some is used for wildlife refuges.

This soil is in capability unit VIIs-1 and in the soil association of Excessively Drained or Well Drained Deep Sands.

Sandy local alluvium (Sa).—This inextensive soil has developed from local alluvium derived from nearby areas of Lakeland, Blanton, or Eustis soils. It occupies small depressions or sinkholes at the bases of slopes within areas of Lakeland, Blanton, or Eustis soils. It occurs mainly in small areas north and northeast of Tampa, and near Brandon, Mango, Seffner, and Bloomingdale.

The natural vegetation consists of bluejack, live, and turkey oaks; pines; and a few shrubs and grasses.

Profile description:

0 to 9 inches, very dark gray nearly loose fine sand; moderate to high content of organic matter.

9 to 20 inches, gray loose fine sand.

20 to 42 inches +, very pale brown loose fine sand, mottled or streaked with yellow and brownish yellow.

The surface layer ranges from 6 to 12 inches in thickness and in places is grayish brown. The color of the layer immediately below ranges from gray through grayish brown to light brownish gray. In places the 20- to 42-inch layer is yellowish brown or light yellowish brown.

This soil is strongly acid. It is moderately well drained to somewhat poorly drained. Surface drainage is moderate to slow, and internal drainage is rapid.

Use and management.—Many areas of this soil are included in fields of other soils that are used to grow general crops. Fair to good yields are obtained if the soil is liberally fertilized and otherwise well managed. A few areas are included in citrus groves, but the trees do not do well on this soil. Apparently they do not do well because air drainage is poor and, as a result, freezing temperatures are common.

This soil is in capability unit IIw-1 and in the soil association of Well-Drained Deep Sands.

Scranton fine sand (Sb).—This extensive soil has developed from moderately thick beds of marine sand. It occurs mainly in the eastern part of the county. A large part occurs within 12 miles of Plant City. The soil generally occupies level or nearly level areas. A few areas near streams and ponds are on slopes of 2 to 5 percent.

The soil is associated with soils of the Orlando, Blanton, Ona, Leon, and Rutlege series. It occupies wetter areas and retains moisture better than the Orlando and Blanton soils, and its surface layer is darker colored and thicker than that of the Blanton soils. It is somewhat similar to the Ona soils but does not have the brown-stained layer within 14 inches of the surface that is typical of the Ona soils. It does not have the organic pan that occurs in the Leon soils, and it is better drained than the Rutlege soils.

The natural vegetation consists of second-growth pines, a few saw-palmettos, shrubs, and carpetgrass and other grasses.

Profile description :

0 to 12 inches, black nearly loose fine sand; contains a large amount of organic matter.

12 to 20 inches, dark grayish-brown nearly loose fine sand.
20 to 36 inches, pale brown or very pale brown loose fine sand.

36 to 48 inches +, mottled pale yellow, very pale brown, and brownish-yellow loose fine sand.

The surface layer ranges from black to very dark gray in color and from 9 to 15 inches in thickness. In some areas the dark grayish-brown horizon is absent. In places the very pale brown soil material extends to depths of more than 42 inches. Near Coronet a few areas have mottled gray and yellowish-brown fine sandy clay loam at depths below 36 inches.

This soil is high in organic matter. It is strongly acid. Though drainage is somewhat poor, moisture conditions are generally favorable for growing many kinds of truck crops during the winter and spring. Surface runoff is slow, and internal drainage is medium if not retarded by the high water table. In some areas



Figure 13.—Peppers on Scranton fine sand near Plant City. Both stationary and portable sprinkling systems are used to irrigate the crop.



Figure 14.—Summer crookneck squash on Scranton fine sand near Coronet. The field will be planted to peppers or tomatoes after the squash has been harvested.

a few ditches have been dug to remove excess water during the wet seasons. During dry seasons many farmers irrigate the crops by using portable or stationary sprinkling systems.

Use and management.—Areas of this soil near Plant City are used intensively from October to May to grow vegetables and strawberries (figs. 13, 14, and 15). Citrus groves have been planted on some areas.

A cover crop of crotalaria, sesbania, hairy indigo, velvetbeans, or cowpeas is planted between the rows in citrus groves or on cultivated areas during the summer after the crops are harvested. Beggarweed and other natural vegetation may be allowed to grow in place of a cover crop. The cover crops or weeds are plowed under once a year. If management is good, crops yield well. Lime is needed, however, to correct acidity and to supply calcium, and liberal amounts of a good mixed fertilizer should be applied.



Figure 15.—Picking strawberries on a field of Scranton fine sand near Plant City. After the crop has been harvested, the plants will be removed and peppers, tomatoes, or some other vegetable planted.

Pines, shrubs, and grasses grow on a small acreage. These areas are used for range pasture and provide fair to good grazing. The pine trees grow rapidly on this soil. Under a good system of forestry management they can be grown profitably.

This soil is in capability unit IIs-1 and in the soil association of Somewhat Poorly Drained Dark-Colored Sands.

Shallow ponds with grass (Sc).—This land type consists of shallow ponds and a few marshes that are covered most of the year by water that is from a few inches to more than 36 inches deep. It occurs throughout the county, mainly in the flatwoods. Soils of the Plummer, Rutlege, Portsmouth, Pompano, Delray, Felda, Manatee, Pamlico, and Brighton series are included in this mapping unit, and Brighton peat and Brighton mucky peat occur in some of the larger areas. Because these soils occur in such intricate patterns and are so wet, it was impractical to map them separately.

The thick growth of natural vegetation consists of water-tolerant plants, including pickerelweeds, arrowheads, waterlilies, bonnets, cattails, sedges, and a few grasses.

These soils vary within short distances in color, texture, and thickness of the various layers. Around the outer rims of the areas, the surface layer generally ranges from gray to very dark gray fine sand and is 3 to 10 inches thick. In the center of the areas, the surface layer ranges from black to dark gray in color and from fine sand or mucky fine sand to mucky peat or peat. In most places the soils are underlain by light-gray or gray fine sand. In some areas the texture of the lower layers is sandy clay.

The surface layer is strongly acid. The lower layers range from strongly acid to alkaline.

Use and management.—When the water is not too deep, the natural vegetation on this mapping unit provides some forage for animals. The areas serve as reservoirs of ground water for adjacent higher lying soils. Ditches and canals have been dug in some areas to drain the water. It may become necessary to build dams and locks in some of the ditches and canals to control the flow of water from the ponds and to prevent the higher lying soils from becoming too dry.

This mapping unit has practically no agricultural value so it has not been given a capability classification. It is in the soil association of Bottom Lands, Swamps, and Ponds.

Sunniland fine sand, moderately shallow over marl (Se).—This somewhat poorly drained soil has developed from thin beds of marine sand overlying alkaline clayey materials that, in many places, contain calcareous concretions or fragments of limestone. The soil occupies level or nearly level areas near Hillsborough River and Blackwater Creek in the northern and northeastern parts of the county. Some areas occur near the southern boundary of the county, south of Picnic.

This soil is associated with soils of the Felda, Manatee, Bradenton, Ruskin, Broward, Immokalee, and Leon series. It is better drained and has brighter colors in its profile than the Felda and Manatee soils. Its clayey materials contain more yellow or yellowish

brown than the clayey materials in the Bradenton soils. It does not have the organic pan that is typical of the Immokalee and Leon soils. The Broward soil does not contain the clayey materials that are typical of this Sunniland soil, and the Broward soil overlies limestone instead of marl.

The natural vegetation consists of second-growth pine, cabbage palmettos, and a rank growth of saw-palmettos, runner oaks, a few bluejack and live oaks, waxmyrtle bushes, and grasses.

Profile description:

0 to 4 inches, dark-gray nearly loose fine sand; contains a small amount of organic matter; has a salt-and-pepper appearance; strongly acid.

4 to 20 inches, light-gray loose fine sand, streaked with yellow in lower part; strongly acid.

20 to 40 inches, mottled yellowish-brown, strong-brown, and light-gray fine sandy clay or fine sandy clay loam; slightly acid in upper part; neutral to mildly alkaline in lower part.

40 to 48 inches +, white marl, which has a sandy clay loam or sandy clay texture; contains a few lime concretions.

The surface layer ranges from gray to very dark gray in color and from 3 to 8 inches in thickness. Depth to the clayey material ranges from 18 to 30 inches. In many places a grayish-brown or pale-brown fine sand layer, 3 to 9 inches thick, overlies the clayey materials. In some areas no lime concretions or marl occur within the 48-inch profile.

This soil is somewhat poorly drained. Surface runoff is slow, and internal drainage is medium to slow through the sandy clay loam layer.

Use and management.—Practically all of this soil is used as range pasture, which provides fair grazing. Some areas have been cleared, fertilized, and seeded to improved pasture grasses. The carrying capacity of these pastures is about 1 cow to 2 or 3 acres. Many kinds of vegetables and truck crops could be grown on this soil if liberal applications of fertilizer were used and the water controlled.

Pine trees grow rapidly on this soil, and under a good system of forestry management, they should be profitable.

A part of the Hillsborough River State Park is located on this soil.

This soil is in capability unit IIIs-2 and in the soil association of Somewhat Poorly Drained Sands Over a Calcareous Substratum.

Sunniland fine sand, shallow over marl (Sf).—This somewhat poorly drained soil is similar to Sunniland fine sand, moderately shallow over marl. The clayey materials occur within 18 inches of the surface, however, and the soil is underlain by marl at depths of 20 to 30 inches. Some of this soil occupies level or nearly level areas near the bottom lands along the Hillsborough River. Other areas occur near some of the small streams, ponds, and swamps in the northern part of the county. Most of the small ponded areas next to this soil consist of Manatee fine sandy clay, heavy variant, or of Felda fine sand.

The natural vegetation on this soil consists of pines; a few live oaks and bluejack oaks; cabbage palmettos and a rank growth of saw-palmettos; runner oaks; gallberry, waxmyrtle, and other shrubs; and grasses.

Profile description:

- 0 to 4 inches, dark-gray nearly loose fine sand; contains a small amount of organic matter; has a salt-and-pepper appearance; strongly acid.
- 4 to 8 inches, light-gray fine sand; strongly acid.
- 8 to 14 inches, brown loose fine sand, stained by organic matter; medium acid.
- 14 to 22 inches, brownish-yellow and yellowish-brown fine sandy clay with a few mottlings of light gray; slightly sticky and plastic when wet and hard when dry; slightly acid to neutral.
- 22 to 40 inches +, white marl streaked with yellow; fine sandy clay texture; contains a few lime concretions.

The surface layer ranges from very dark gray to grayish brown. The 8- to 14-inch layer ranges from brown to very pale brown, and in some places this layer is lacking. A few areas north of the Hillsborough River and along Blackwater Creek occupy terracelike positions.

This soil ranges from strongly acid to neutral; it becomes less acid with increasing depth. It is somewhat poorly drained.

Use and management.—Almost all of this soil is used as range pasture. The natural vegetation provides fair grazing. About four times as much forage would be produced, however, if the areas were cleared, fertilized, and seeded to improved pasture grasses.

Pine trees grow rapidly on this soil. Forested areas would be profitable if a good system of forestry management were practiced.

This soil is in capability unit IIIs-2 and in the soil association of Somewhat Poorly Drained Sands Over a Calcareous Substratum.

Terra Ceia peaty muck (Ta).—This very poorly drained organic soil has developed over calcareous clayey or sandy materials from the remains of water-tolerant grasses, sedges, lilies, sawgrass, and other aquatic plants. It occurs in the area known locally as Harney Flats, near the intersection of United States Highways 92 and 301. It occupies level or slightly depressed marshes or sloughs, next to areas of Felda, Manatee, Delray, and Bradenton soils. Some of the associated Manatee soils appear to have once been Terra Ceia peaty muck, but the surface layer was destroyed by fire or by oxidation, leaving only the dark-colored fine sandy loam.

Profile description:

- 0 to 12 inches, black peaty muck; contains a small amount of mineral matter; slightly acid to neutral.
- 12 to 20 inches, black or very dark brown muck; contains some fibrous organic materials; contains a small quantity of mineral matter; slightly acid to neutral.
- 20 to 36 inches, dark gray or very dark gray fine sandy clay loam; contains many small white shells; neutral or mildly alkaline.
- 36 to 48 inches, light-gray calcareous fine sandy clay.

The surface layer ranges from 10 to 15 inches in thickness. In some areas the layer of black or very dark brown muck containing fibrous organic materials is lacking, and in these places the mucky surface layer immediately overlies the very dark gray or dark gray clayey materials. In a few places the fine sandy clay loam grades to fine sand with increasing depth. In several areas fires have destroyed some of the mucky materials.

Use and management.—Various water-tolerant

grasses, sedges, and a few shrubs cover most of this soil. Willows and myrtle bushes or cypress trees grow on a few areas. When the areas are not covered too deeply by water, the natural vegetation provides good grazing. Some areas were once used to grow vegetables but are now covered by grasses, willows, and myrtle bushes. Under a high level of management, the soil would produce high yields of vegetables and improved pasture grasses. Management requirements include water control and fertilization. Large drainage canals extend through some areas of this soil.

This soil is in capability unit IIIs-4 and in the soil association of Very Poorly Drained Organic soils.

Tidal marsh (unclassified soils) (Tb).—This land type occupies level or nearly level areas that are only a few feet above sea level. It occurs along the coast in the southwestern part of the county, mostly in a narrow zone between the tidal swamps and the flatwoods. Most Tidal marsh (unclassified soils) is covered or affected by salt water or brackish water when tides are high.

The natural vegetation consists of salt-tolerant grasses, such as saltgrass, big cordgrass, switchgrass, and needlegrass.

The surface layer ranges from nearly black mucky fine sand to dark-gray fine sand, and it is 3 to 8 inches thick. Immediately below it is light-gray or gray fine sand, mixed with broken and whole shells.

All of this land is covered by natural vegetation. It provides food and breeding areas for birds and other wildlife. It has no agricultural use and was not given a capability classification.

Tidal swamp (unclassified soils) (Tc).—This land occurs in the southwestern part of the county, along the eastern and northeastern shores of Tampa Bay, Hillsboro Bay, and Old Tampa Bay. It occupies low areas that are covered by salt water when tides are high. Some areas are under water even when tides are low.

The natural vegetation consists of a dense growth of mangrove trees, which are generally less than 15 feet in height. Some small areas are covered by salt-tolerant grasses or tidal marshes.

The soils making up this land type vary in color, texture, composition, and thickness of the various layers. The surface layer generally consists of sand mixed with mucky or peaty materials that have accumulated from the decaying leaves, limbs, and roots of dead mangrove trees. Immediately below the surface layer is light-gray or gray fine sand or sandy clay loam. In a few places moderately hard limestone occurs within 30 inches of the surface.

All of this land is covered by the natural vegetation. It provides food and breeding areas for birds and other wildlife. It has no agricultural use and was not given a capability classification.

Management

This section consists of four parts. In the first the kinds of soils mapped in the county are grouped into capability units, which consist of soils similar in their management requirements. Use suitability and man-

agement requirements are discussed in this part for each capability unit.

The second part gives some suggestions that apply to any soil that is used for crops or pasture. A third part discusses the forests in the county. The fourth gives estimates of yields for suitable crops on each soil under two levels of management.

Capability Classification³

The capability classification is a means of showing the comparative suitability of different soils for agricultural uses. The classification of a particular soil depends on the variety of uses to which it is suited, its susceptibility to erosion or other damage when it is used, and the intensity or degree of management it needs for prolonged use with moderate to high production of adapted crops.

Capability classes.—Eight general capability classes are recognized. In classes I, II, and III are soils that are suitable for annual or periodic cultivation. Class I soils are those that have the widest range of use and the least risk of damage. They are level or nearly level, productive, well drained, and easy to work. They can be cultivated continuously with practically no risk of erosion and will remain productive if managed with normal care. Class II soils can be cultivated regularly but do not have quite so wide a range of suitability as class I soils. Some class II soils are gently sloping and consequently need moderate care to prevent erosion; others may be slightly droughty or slightly wet, or somewhat limited in depth. Class III soils can be cropped regularly but have a narrower range of use and need still more careful management.

In class IV are soils that should be cultivated only occasionally or only under very careful management.

In classes V, VI, and VII are soils that should not be cultivated but that can be used for pasture, for range, or for forest. Class V soils are level but are droughty, wet, low in fertility, or otherwise unsuitable for cultivation. Class VI soils are not suitable for crops because they are steep or droughty or otherwise limited, but they give fair yields of forage or forest products. Some soils in class VI can, without damage, be cultivated enough so that fruit trees or forest trees can be set out or pasture plants seeded. Class VII soils provide only poor to fair yields of forage or forest products.

In class VIII are soils that have practically no agricultural use. They produce little useful vegetation, but they may constitute attractive scenery; they may form parts of watersheds; or they may provide shelter for wildlife. Some areas have been developed as recreational sites. Beaches and sand dunes are examples of class VIII land.

Capability subclasses.—The soils in any one capability class are limited to the same degree, but they may be limited for different reasons. To show the main kind of limiting factor, any one of classes II through VIII may be divided into from one to four subclasses, each identified by a letter following the

capability class number. The letter "e" indicates that the risk of erosion is the major limitation to the use of the soil; the letter "w" is used if the soil is too wet for general use without water control; and the letter "s" shows that the soil itself has major limitation because it is shallow, droughty, or unusually low in fertility.

Capability units.—Any subclass may be further divided into capability units. A capability unit is composed of similar soils that are limited in use to the same degree and for the same reason, and that require about the same kind of management to offset their limitations.

Capability Classification of Hillsborough County Soils

The capability classes, subclasses, and units in which the soils of Hillsborough County are classified are defined below, and the use suitabilities and management requirements of the 15 capability units are discussed. None of the soils of the county are in classes I, VI, or VIII.

Class II.—Soils suitable for regular cultivation; moderate limitations or risks of damage.

IIe: Soils that have moderate risks of erosion.

IIe-1: Moderately dark to dark, gently undulating soils.

IIw: Soils affected by excess water that restricts their suitability for some crops.

IIw-1: Dark sandy soils, subject to overflow from adjacent areas; water stands on surface only a short time.

IIs: Soils that have minor limitations because of droughtiness or low fertility.

IIs-1: Dark sandy soils underlain by porous sands.

IIs-2: Dark to moderately dark sandy soils that have moderate water-holding capacity.

Class III.—Soils suitable for regular cultivation; moderately severe limitations or risks of damage.

IIIs: Soils limited by low fertility or poor moisture-supplying capacity during droughts.

IIIs-1: Porous sandy soils.

IIIs-2: Porous sandy soils of low fertility.

IIIs-3: Sandy soils underlain by fine sandy clay, marl, shells, or limestone.

IIIs-4: Peat or muck soils, 12 inches or more thick over sandy or clayey materials.

Class IV.—Severely limited soils, suitable for only occasional cultivation or for some kind of limited cultivation under special management.

IVs: Soils severely limited by low fertility or low moisture-supplying capacity.

IVs-1: Deep, light-colored, sandy soils.

IVs-2: Sandy somewhat poorly drained soils.

IVs-3: Porous sandy soils of low fertility.

IVs-4: Woody peat soils, 12 to 36 inches thick over sand.

Class V.—Soils not suited to cultivation because of wetness, overflows, droughtiness, low fertility, or other limitations. Few limitations for grazing or forestry.

³ By D. P. Powell, Soil Conservation Service.

Vw: Soils too wet for cultivation.

Vw-1: Alluvial land.

Vs: Soils of low fertility or low moisture-supplying capacity.

Vs-1: Droughty sands underlain by an organic pan at depths of 18 to 60 inches.

Class VII.—Soils too wet, too droughty, too steep, or otherwise unsuitable for cultivation and severely limited for grazing or forestry.

VIIIs: Soils very severely limited by low available moisture-supplying capacity and fertility.

VIIIs-1: White sandy soils.

Management of Capability Units

The use suitabilities and management requirements of the 15 capability units of soils in Hillsborough County are discussed in the following pages.

Capability unit Iie-1.—This capability unit consists of well drained to moderately well drained soils that are dominantly gently undulating. The soils have a moderately dark to dark, sandy surface layer and a fine-textured subsoil that is at depths within 30 inches of the surface. The fine-textured subsoil restricts the internal movement of water but gives the soils a moderately high moisture-holding capacity. The following soils are in capability unit Iie-1:

Blichton fine sand.

Fellowship loamy fine sand.

These soils are suitable for tilled crops and improved pasture. Unless they are protected, runoff on sloping areas causes a minor erosion hazard after heavy rains. Soluble plant nutrients leach out rapidly through the sandy surface layer, and organic matter oxidizes rapidly. Good management will include using soil-building crops in the rotation and adding liberal applications of lime and fertilizer.

Capability unit Iiw-1.—In this unit are soils that occur at the bases of slopes and in depressions. These soils have formed from materials washed or sloughed from areas of adjacent well-drained soils. Because of their position, they are occasionally flooded after heavy rains by water from adjacent areas.

Most of the excess water drains rapidly downward through the porous soils. Only a little runs off through surface drainageways. Since the water stands on the surface for only short periods, it constitutes only a minor limitation. Otherwise, the soils are suitable for cultivation and will give sustained high yields if simple conservation methods are practiced.

The following soils are in this capability unit:

Alachua loamy fine sand.

Sandy local alluvium.

These soils are well suited to tilled crops and to improved pasture. They are limited to minor extent by occasional floods.

Capability unit IIs-1.—This capability unit consists of dark sandy soils underlain by porous sands. The somewhat poorly drained soils occupy nearly level areas. They are suitable for cultivation or for other agricultural uses and have only minor defects that limit their suitability for intensive use. The soils are

deep, porous, acid, fine sands. A high content of organic matter in the surface layer and a rather shallow fluctuating water table help to make them among the most productive soils in the county.

The following soils are in capability unit IIs-1:

Ona fine sand.

Scranton fine sand.

The soils of this group are well suited to many different truck crops and to improved pasture grasses. Water control is desirable if crops are to be grown or pastures improved. Because of the nearly level relief, the porous sandy subsurface layer, and the fairly high water table, a water-control system that combines subirrigation and drainage is well suited to these soils. Shallow ditches with simple devices to control the water will serve the purpose. Cropland requires more intensive water-control practices than are needed for improved pasture.

Intensive cultivation can be carried on without damage to the soil if cover crops are used in the rotation to help maintain organic matter. Lime and fertilizer must also be applied.

These soils can be used to grow citrus fruits if water is controlled carefully. The soils are well suited to forest, and pines make good growth. The areas also provide excellent wildlife habitats.

Capability unit IIs-2.—This capability unit consists of porous, well-drained, moderately dark to dark, sandy soils. The soils are rapidly permeable to water and air. They have only a moderate moisture-holding capacity. Relief is generally nearly level to undulating, but a few slopes are as steep as 15 percent.

The following soils are in capability unit IIs-2:

Fort Meade loamy fine sand, level phase.

Fort Meade loamy fine sand, undulating phase.

Gainesville loamy fine sand, level phase.

Gainesville loamy fine sand, gently undulating phase.

The soils in capability unit IIs-2 are suitable for tillage or for improved pasture. Limitations resulting from inherent characteristics are minor. Erosion is not a serious hazard because water infiltrates rapidly and the slopes are mild. The porous texture of the soils, however, permits soluble plant nutrients to leach out rapidly; consequently, some conservation practices are necessary, particularly on the steeper areas, to maintain high yields of adapted row crops. Rotations should include soil-building crops, and the soils need lime and fertilizer.

The soils in this capability unit are among the best in the county for growing pine trees.

Capability unit IIIs-1.—This capability unit consists of deep, sandy, upland soils that are low in fertility or that are low in moisture-supplying capacity. The soils are moderately well drained to somewhat excessively drained. Although a few short steeper slopes occur near streams, sinkholes, ponds, or lakes, the soils generally occupy nearly level areas or mild slopes and are uneroded or only slightly eroded.

The following soils are in capability unit IIIs-1:

Arredondo fine sand, level phase.

Arredondo fine sand, gently undulating phase.

Blanton fine sand, level phase.

Blanton fine sand, gently undulating phase.

Blanton fine sand, undulating phase.
 Blanton fine sand, brown-layer phase.
 Eustis fine sand, level phase.
 Eustis fine sand, gently undulating phase.
 Kanapaha fine sand.
 Lakeland fine sand, level phase.
 Lakeland fine sand, gently undulating phase.
 Lakeland fine sand, undulating phase.
 Lakeland fine sand, shallow phase.
 Lakeland fine sand, level deep phase.
 Lakeland fine sand, undulating deep phase.
 Orlando fine sand.

These soils are suitable for tilled crops and for improved pasture. They have certain characteristics, however, that limit their use capability. Because of low moisture-supplying capacity, rapid leaching of plant nutrients, and low content of organic matter, the soils are poorly suited to most tilled crops unless soil-building crops are grown intensively, irrigation is used, and liberal applications of fertilizer are added. The soils occupy positions high enough that wetness is not a problem. They are well suited to citrus fruits, but to get highest yields citrus groves should be irrigated, soil-building crops should be planted between the rows, and liberal amounts of fertilizer should be applied. The areas that are on stronger slopes require more intensive management than the level or nearly level areas.

Capability unit IIIs-2.—This capability unit consists of somewhat poorly drained porous sandy soils that are low in fertility. Some have a layer, stained brown by organic matter, between the surface layer and the finer textured material in lower layers. The soils are not eroded. They occupy areas that are nearly level or gently sloping. The natural level of the ground water fluctuates. At times it is 1 or 2 inches below the surface; at other times, it is at a depth of about 4 feet. Most of the time it is about 24 to 30 inches below the surface.

The following soils are in capability unit IIIs-2:

Bradenton fine sand.
 Bradenton fine sand, thin surface phase.
 Ona fine sand, light-colored surface phase.
 Parkwood fine sand.
 Ruskin fine sand.
 Sunniland fine sand, moderately shallow over marl.
 Sunniland fine sand, shallow over marl.

These soils are suitable for tilled crops and improved pasture. They have definite limitations that must be overcome, however, if high yields are to be maintained. Water control is essential if tilled crops are to be grown or high-quality pasture established, although pastures of fair quality can be established under natural water conditions. Because of the nearly level relief, the porous sandy subsurface layer, and the high water table, a water-control system that combines sub-irrigation and drainage is suitable for these soils. Shallow ditches with simple devices to control the water will serve the purpose adequately.

High yields of tilled crops can be maintained only by intensive management. In addition to water control, the soils require intensive use of soil-building crops and applications of lime and fertilizer. Citrus trees on these soils require high bedding and deeper drainage than truck crops. Water control for citrus groves must be planned to provide drainage during

periods of excessive rainfall and irrigation during the droughts.

Pines grow well on most of the soils. The native hammock forest cover on some of the soils includes valuable hardwoods. This natural vegetation provides excellent sites for wildlife habitats.

Capability unit IIIs-3.—The soils in this capability unit occur throughout the county on nearly level broad drainageways or on areas occupied by shallow ponds. They are poorly drained to very poorly drained. The areas are underlain by fine sandy clay, marl, shells, or limestone. The soils underlain by calcareous materials normally have a slightly acid to alkaline surface layer and an alkaline subsoil. The other soils are strongly acid throughout. The natural ground-water table is near the surface, and water several inches deep covers the areas for long periods each year.

The following soils are in capability unit IIIs-3:

Delray fine sand.
 Delray fine sand, shallow phase.
 Felda fine sand.
 Manatee fine sandy loam.
 Manatee loamy fine sand.
 Manatee fine sandy clay, heavy variant.
 Rutlege fine sand.
 Rutlege fine sand, shallow phase.
 Rutlege mucky fine sand.

These soils are suitable for tilled crops and for improved pasture, but water must be controlled if high yields are to be maintained. They are suitable for citrus fruits only if intensive methods are used to control water during long-time extremes of flood or drought. Soil-building cover crops must be grown intensively, and heavy applications of fertilizer are necessary. For pastures, management practices need not be so intensive as those used for cultivated crops.

The soils are not suitable for development as woodland. In their natural state, they provide excellent sites for wildlife habitats.

Capability unit IIIs-4.—This capability unit consists of very poorly drained organic soils. These soils have a surface layer, 12 inches or more thick, of peat or muck. The surface layer is underlain by acid fine sand or by fine-textured calcareous materials.

The following soils are in capability unit IIIs-4:

Brighton peat.
 Brighton mucky peat.
 Pamlico muck.
 Terra Ceia peaty muck.

These soils can be used for tilled crops or for improved pasture if the water is controlled and if fertilizers are applied. The cultivated areas should be flooded each season to retard subsidence caused by oxidation and to help control parasites. Soil-building crops should be grown intensively on the cultivated areas, and large amounts of plant nutrients should be applied. Improved pastures need frequent applications of fertilizer.

The soils are not suitable for growing citrus fruits and are not suited to forests. They provide good habitats for aquatic wildlife.

Capability unit IVs-1.—This capability unit consists of excessively drained, deep, light-colored, sandy soils. Their moisture-holding capacity is very low, and the soils are droughty. Most of the plant nutrients have

been leached out, and the soils are strongly acid throughout.

Only one soil, Lakewood fine sand, is in this capability unit. This soil has very limited use for cultivated crops and is only moderately well suited to pasture because of very low moisture-holding capacity, rapid leaching of plant nutrients, and very low content of organic matter. Excess moisture is not a limitation. If adequate irrigation water is provided, liberal applications of fertilizers are used, and cover crops are grown, it is suitable for citrus fruits. Forests make only fair growth on these soils.

Capability unit IVs-2.—This capability unit consists of somewhat poorly drained sandy soils. Some of these are underlain by calcareous materials, and others have an organic pan. The soils that have an organic pan are strongly acid to very strongly acid throughout. The other soils have a neutral to moderately acid surface layer and a slightly acid to alkaline subsurface layer underlain by calcareous material at depths below about 30 inches. The soils are nearly level or gently sloping. The natural ground-water level fluctuates; at times water is on the surface, and at others, the water table is at depths of about 4 feet. Most of the time the water table is about 24 to 30 inches below the surface.

The following soils are in capability unit IVs-2:

- Adamsville fine sand.
- Broward fine sand.
- Immokalee fine sand.
- Immokalee fine sand, alkaline variant.
- Keri fine sand.
- Leon fine sand.
- Leon fine sand, heavy substratum phase.
- Mixed alluvium, high bottom phase.

Water control is essential for cultivated crops or for high-quality pasture on these soils, though moderately good pastures can be maintained under natural moisture conditions. The nearly level relief, the porous sandy subsurface layers, and the fairly high ground-water table make these soils well suited to subirrigation. A system of shallow ditches equipped with devices to control the water serves the purpose and provides adequate drainage in wet seasons.

Low moisture-holding capacity, sandy texture, rapid leaching, and low content of organic matter restrict the suitability of these soils for cultivated crops. If the soils are cultivated, intensive management is needed to maintain productivity. Rotations should include intensive use of soil-building cover crops. Heavy applications of lime and fertilizer are necessary, and a carefully managed water-control system is essential. The soils are poorly suited to citrus fruits. Improved pastures require less intensive management than tilled crops.

The soils are well suited to forests. Pines grow well. Undeveloped areas provide excellent habitats for quail, turkey, deer, and other wildlife.

Capability unit IVs-3.—The soils in this capability unit occur throughout the county on nearly level drainageways or in areas occupied by shallow ponds. They are poorly drained to very poorly drained and are porous, sandy, and low in fertility. The water table is near the surface, and water several inches deep covers the soils for long periods each year.

Some of the soils are underlain by a finer textured substratum or by calcareous materials. Others consist of acid fine sand to depths of 72 inches or more. Some of the soils are strongly acid throughout, and others are neutral or alkaline. The following soils are in capability unit IVs-3:

- Charlotte fine sand.
- Plummer fine sand.
- Plummer fine sand, shallow phase.
- Pompano fine sand.
- Pompano fine sand, shallow phase.
- Portsmouth fine sand.
- Portsmouth mucky fine sand.
- Rains fine sand.

Water control is essential if tilled crops are grown or if the soils are used for improved pasture. Tilled crops will require more intensive water control and other management than pastures. The water-control system should provide both seepage irrigation and drainage. This can be accomplished by a system of shallow ditches and simple control devices.

Because the soils are sandy and contain little organic matter, the water-holding capacity is very low and plant nutrients leach out rapidly. Rotations should include intensive use of soil-building cover crops or pasture sod. Heavy applications of fertilizer and lime should be used.

The soils are not well suited to citrus fruits and are not suitable for use as woodland. In their natural state, they provide excellent sites for wildlife habitats.

Capability unit IVs-4.—This capability unit consists of very poorly drained strongly acid to very strongly acid organic soils. The surface layer is 12 to 36 inches thick over acid sands.

The following soils are in this capability unit:

- Istokpoga peat.
- Istokpoga mucky peat.

Because of the woody texture of the peat and the strongly acid reaction, the soils are limited in suitability for cultivation or for improved pasture. They are not suited to citrus fruits. If they are to be tilled or used for pasture, water control is essential. The system must include provision for flooding the cultivated areas each season to retard subsidence and to control parasites. Cover crops must be grown intensively, and heavy applications of lime and fertilizer must be used.

Hardwoods common to the swamps grow on these soils. These hardwoods are of limited commercial value.

The undeveloped areas of the soils provide excellent sites for wildlife habitats.

Capability unit Vw-1.—This capability unit consists of soils and miscellaneous land types too wet for cultivated use. During much of the year the areas are covered by water from overflowing streams. Alluvial land is the only land type in this capability unit.

The areas occupied by Alluvial land are not suited to crops, but they provide fair to poor grazing. Most areas are so wet and are covered by such a dense plant growth that clearing them for improved pasture would not be practical.

The areas are suitable for wildlife refuges. Some

timber of commercial value has been cut from the forests.

Capability unit Vs-1.—This capability unit is composed of strongly acid, somewhat poorly drained to somewhat excessively drained sandy soils developed from deep beds of fine sand. The surface layer consists of loose fine sand, almost entirely lacking in finer soil particles and very low in organic matter. A highly leached fine sand layer that has very low moisture-holding capacity underlies the surface layer, and below this, at depths of 18 to 60 inches, is a weakly cemented organic pan.

The soils are nearly level to gently sloping. Normally the water table is within 24 to 60 inches of the surface. Because of the porous sandy texture of the soils, however, very little water rises by capillary action. These soils are droughty during much of the year. They are highly leached, and commercial fertilizers leach through them rapidly.

The following soils are in capability unit Vs-1:

Leon fine sand, light-colored surface phase.
Pomello fine sand.

Because of droughtiness, deficiency of organic matter and plant nutrients, high acidity, and rapid leaching, cultivation is generally not feasible. Improved pastures of fair to good quality can be maintained by seeding drought-tolerant grasses and using liberal applications of lime and fertilizer.

The soils are generally not suitable for citrus fruits. In some of the better drained areas, however, overhead irrigation facilities have been installed and citrus trees have been grown successfully under intensive management.

The soils are not well suited to forests. The scrubby natural vegetation provides good shelter for wildlife but little food.

Capability unit VIIs-1.—This capability unit consists of excessively drained, very droughty, white, sandy soils that occur at high enough elevations to be free of a high water table. They consist of thick beds of white fine sand that is low in organic matter. The moisture-holding capacity is very low. Air and moisture move freely through the soils and cause rapid oxidation and leaching. Most of the plant nutrients have leached out.

Only one soil, St. Lucie fine sand, is in this capability unit. This soil is not suited to cultivation and has only limited suitability for pasture or forests.

Unclassified mapping units.—Several miscellaneous land types that are of little or no use for agriculture were mapped in Hillsborough County. These mapping units were not classified according to capability.

The unclassified mapping units are:

Fresh water swamp (unclassified soils).
Made land.
Mines, pits, and dumps.
Peace River soils.
Shallow ponds with grass.
Tidal marsh (unclassified soils).
Tidal swamp (unclassified soils).

Common Use and Management

Use and management practices that are commonly followed in Hillsborough County are described in the following pages.

Water control

Many of the soils of Hillsborough County are unsuitable for crops or for improved pasture unless a system of water control is used. The same soils may need drainage during the wet part of the year and irrigation when the dry season comes.

Drainage

According to the Federal census, 84,463 acres was drained in Hillsborough County in 1950. Of this total, 81,307 acres was drained for the purpose of reclaiming or improving the soils; on 27,423 acres, drainage was improved to the extent that there was no loss of tilled crops; on 31,762 acres, drainage was fair but there were frequent losses of tilled crops; and 22,122 acres was poorly drained and unfit for cultivation.

Irrigation

About 24.6 percent, or 922 of the farms in Hillsborough County, were irrigated in 1950, according to the Federal census. On these farms 14,739 acres of the land was irrigated. Crops were harvested from 14,135 acres of irrigated land; 180 acres was pastured; and 424 acres was cropland not harvested and not pastured.

To insure production during dry periods, strawberries, most of the vegetables, and some citrus groves are irrigated. Water for irrigation is pumped from shallow ponds, streams, or natural or artificial lakes, if such sources are available. In the central and eastern parts of the county, most of the irrigation water is pumped by gasoline or electric pumps from wells. Some of the wells are shallow, 20 to 50 feet deep, and some are drilled and are 100 to 700 feet deep. There were 1,227 irrigation wells in the county in 1950.

Near the coast, from the southern boundary of the county to the Alafia River, most farmers obtain irrigation water from flowing artesian wells 400 to 600 feet deep. There were 357 of these flowing wells in the county in 1950. Generally, 2 or 3 wells supply enough water for a 20-acre field, but some wells supply only enough water for about 5 acres. After extended use of water, farmers have to use pumps on some of these wells.

Many of the citrus groves are irrigated by means of portable sprinklers, which usually have perforated pipes. In the eastern part of the county, the vegetables and strawberries are irrigated by means of perforated pipes or overhead sprinkling systems.

Where subirrigation is used, the water flows into

furrows or ditches about 600 feet in length and spaced about 43 to 47 feet apart. During the rainy season, excess water drains off through the furrows.

Subirrigation is not the most efficient method of using the available water, and sprinkling systems may be preferable. As more and more artesian wells have been drilled to irrigate larger acreages, the artesian head has been reduced to such an extent that water has to be pumped from wells that once flowed freely. Salt water has seeped into some of the wells after the water has been used extensively, and the salt has made the water unfit for irrigation.

If the acreage in crops is increased, it may become necessary to use more efficient methods of irrigation. Dams and locks to control the flow of water in the drainage ditches and canals would help to control the water level in soils near the irrigated areas.

Rotations

Crop rotations, in the usual sense, are not used in Hillsborough County. The same vegetable crop may be grown for a number of years in succession on the same soil. The land is occasionally left idle for 1 or 2 years to control plant diseases and to maintain the quality of the crops.

If a rotation is used, the crops that would constitute a 3-year rotation farther north may all be grown in 1 year. For example, strawberries, then tomatoes, then a cover crop may be grown in succession in the same year. On the citrus groves, most farmers grow a cover crop or tilled crop between the trees during the summer months, or they allow the natural vegetation to grow.

Soil amendments

Frequent applications of fertilizer are needed because most of the soils in the county are so porous that plant nutrients leach out rapidly. For vegetables and truck crops, 1,200 to 2,500 pounds per acre of a mixed fertilizer is generally applied. This fertilizer commonly contains from 25 to 40 percent nitrogen from organic sources and enough of the minor elements, such as manganese, copper, zinc, and boron, for good plant growth.

Part of the fertilizer is applied at planting time, and part as a sidedressing. Nitrate of soda, ammonium nitrate, and nitrate of soda-potash are applied to some crops as a topdressing when the crops begin to bear fruit. Castor pomace, cottonseed meal, or other organic fertilizers are often used before strawberries, peppers, or tomatoes are set out.

Fruit trees receive from 15 to 40 pounds per tree of a good mixed fertilizer. The rate depends upon the size of the tree.

Many of the cultivated soils are strongly acid. Therefore, lime must be added to correct soil acidity and to supply calcium. Before lime is applied, the soils should be tested to determine how much is needed. From 1,000 to 2,000 pounds of lime an acre is generally applied every second or third year to the

acid soils that are used for crops, and about 1,000 pounds an acre on improved pasture. Lime is applied to citrus trees as needed.

Crops

Vegetables and truck crops are grown extensively in Hillsborough County for winter markets. Citrus fruits are also important. General field crops are not grown extensively, but cover crops are commonly planted to help build up the soils.

Vegetables and truck crops.—Most of the vegetables and other truck crops are grown during the winter within 12 miles of Plant City or near Ruskin. Near Plant City the crops are grown mainly on the Scranton and Ona soils and on small areas of Blanton, Fort Meade, Leon, Orlando, and Rutlege soils. The principal truck crops grown near Plant City are strawberries, green peppers, tomatoes, snapbeans, squash, sweet corn, cucumbers, Irish potatoes, sweetpotatoes, cabbage, eggplants, crowder peas, and watermelons.

Near Ruskin the vegetables and truck crops are grown mainly on the Ruskin and Adamsville soils and on small areas of Bradenton, Delray, Felda, Keri, Leon, Manatee, Parkwood, and Pompano soils. Most of these tilled areas are near the coast. Therefore, the crops are protected somewhat from the damaging frosts, as the cold winds that blow occasionally from the northwest are warmed as they pass over the waters of Tampa Bay. The principal crops in this area are tomatoes, sweet corn, cucumbers, eggplant, polebeans, lettuce, cabbage, broccoli, cauliflower, and brussels sprouts. These are harvested from October to June.

After the vegetables are harvested, they are washed, graded, and packed in containers at packinghouses owned by farmer cooperatives or by private companies. They are then shipped by truck or rail to the northern markets.

A few vegetables and other truck crops are grown on the Arredondo, Eustis, Lakeland, and Gainesville soils, which occur mainly in the central and northwestern parts of the county. Corn, watermelons, cowpeas, and sweetpotatoes are the principal truck crops in these areas.

The soils used for vegetables and truck crops are usually divided into 10-acre fields. A roadway and a row of Australian pines generally border each field. The trees help to protect the tender growing crops from strong winds and blowing sands. Furrows are run lengthwise across the fields. During the wet season excess water drains off through these furrows; during the dry season irrigation water flows into them and seeps into the soil.

Strawberries are grown extensively in the eastern part of the county. The parent plants are set in beds in March. During the summer they grow runners or new plants, which are transplanted to the fields between late September and November (1). A cover crop should be grown on soils used for strawberries, but it should be disked under several weeks before the strawberry plants are set out.

Citrus fruits.—Citrus fruits are grown extensively on the moderately well drained to somewhat excessively drained soils of the Arredondo, Blanton, Eustis, Fort Meade, Gainesville, Lakeland, and Orlando series and on the somewhat poorly drained Scranton soil. Many of the groves are near lakes or other bodies of water, which help to warm the freezing winds that occasionally blow during the winter.

Good air drainage is essential to citrus fruits. Consequently, some areas of well-drained soils are not well suited to citrus fruits because cold air settles on low, level areas and damages the foliage and occasionally the fruit. A "cold" area of this kind extends from Lutz to south of Brandon.

In some groves somewhat poorly drained or poorly drained soils, such as the Leon, are included with the better drained soils. Trees do not grow well on the poorly drained soils because of the fluctuating high water table. By using artificial drainage and by placing the trees on mounds, it is possible to grow a few trees on the wetter soils, but these practices are too expensive for most growers.

Cover crops.—Cover crops are frequently planted on cultivated fields after the vegetables or field crops have been harvested, or between the trees in citrus groves. Some farmers permit the natural vegetation, such as beggarweeds, to cover the soils during the summer. The cover crops most commonly grown are hairy indigo, crotalaria, velvetbeans, and sesbania. The hairy indigo, crotalaria, and velvetbeans grow well on the well-drained soils and on some of the somewhat poorly drained soils. Sesbania is best suited to the somewhat poorly drained or poorly drained soils.

The cover crop or natural plant cover is disked into the soil a few weeks before the tilled crop is planted. In the groves it is mowed or disked into the soil about once a year. The vegetation increases the humus and thus increases the moisture-holding capacity of the soil. The legumes collect nitrogen from the air through bacteria that grow on nodules on their roots, and they store it in the soil in a form available for plants.

Sesbania is not a desirable crop if strawberries are to follow because it harbors root-knot nematodes, which feed on the strawberry plants and injure them. Some farmers use chemicals to kill the nematodes. It is possible to eliminate most of them, however, by selecting resistant cover crops and by cultivating the crops as late in the season as feasible.

Pastures

Most of the beef and dairy cattle in Hillsborough County are fed exclusively on pastures. Many of the animals are kept on range, or unimproved pasture.

The native forage on the range pastures varies considerably in kind, quantity, and quality. The forage on the flat pinelands consists mainly of wiregrass but includes some carpetgrass and other broadleaf grasses. On the wet prairies, the pasture consists of maidencane, carpetgrass, switchgrass, sedges, hyacinths, and various aquatic plants. On the undulating pinelands and scrub ridges, the forage consists primarily of

wiregrass but includes a few other grasses, sedges, and legumes. On the hammock lands, the forage consists of broadleaf grasses, sedges, Spanish-moss, and buds and tender shoots of various shrubs and trees.

The estimated carrying capacities of the different types of range land are as follows: Flat pinelands, 1 cow on 15 to 25 acres; wet prairies, 1 cow on 10 to 20 acres; the better areas of undulating pineland and oak ridges, 1 cow on 15 to 25 acres; the poorer scrub ridges, 1 cow on 25 to 40 acres; and the hammock lands, 1 cow on 10 to 20 acres.

The hammock lands and wet prairies provide fairly good grazing most of the year. They are seldom burned over, for burning does not improve the quality of the forage. The flat pinelands, the undulating pinelands and oak ridges, and the scrub ridges are burned over annually or every second or third year to improve the quality of the wiregrass and other grasses. After the areas are burned over, usually in February, the new growth of wiregrass is very palatable and highly nutritious for about 90 days.

Burning tends to destroy the broadleaf grasses, but on ranges where wiregrass is predominant, controlled rotational burning seems to be beneficial (2). A comparison of burned and unburned flatwood ranges was made. Steers on areas that had been burned over annually gained approximately twice as much weight as those on the unburned areas gained during a comparable period (7). If good returns from forest products are sought, however, the ranges should not be burned over.

A few areas formerly planted to vegetables and other crops have been allowed to revert to pasture and are now covered by a good growth of bermudagrass, carpetgrass, and other broadleaf grasses. Hairy indigo, cowpeas, and velvetbeans grown for cover crops during the summer are grazed.

Recently, considerable attention has been given to improving range pastures. Research⁴ conducted at the Range Cattle Experiment Station, Ona, Fla., shows that Pangolagrass, common and Pensacola Bahia-grasses, and the Coastal and Suwannee bermudagrasses grow well on the flatwood soils of central and southern Florida and are adapted to many of the soils of Hillsborough County. Torpedograss grows well, but this grass is a serious pest and should not be planted near areas intended for crops or groves. Paragrass grows on wet areas and will withstand a shallow covering of water for a few weeks. Pasture legumes that appear to be adapted to some of the soils in the county are Louisiana whiteclover, black medic, Persian clover, Hubam clover, alyceclover, and hairy indigo.

It is not necessary that all of the pasturelands on a farm or ranch be seeded to improved grasses. According to officials at the Range Cattle Experiment Station, a 400-acre pasture on the flatwoods soils will graze 70 head of cattle all year, provided 80 acres of it is fertilized and seeded to a good grass mixture.

This method of improving the forage on the pastures appears to be practical because it reduces the expense

⁴ Information on improvement of pastures obtained from W. G. Kirk, Vice Director, in charge, Range Cattle Experiment Station, Ona, Fla.

of pasture improvement. In 1950 the initial cost of establishing a good improved pasture on the flatwood soils ranged from \$50 to \$100 an acre. Between one-fourth to one-third of the cost was for removal of the palmettos and other vegetation and preparation of the seedbed. The rest is for the seeding and the initial fertilizing and liming. Pastures that have been improved yield approximately four times as much forage as the native range pastures.

The number of improved pastures is increasing in the county. They seem well worth the time and expense necessary to establish them. Fertilization is important. There is no advantage in clearing the land of palmettos and trees and planting grasses if fertilizer is not applied. Most of the soils need an initial application of about 1 ton of lime an acre. The lime is worked into the soil about 3 weeks before planting the seeds or grass sprigs. A complete fertilizer should be applied at the time of seeding. Because many of the soils are low in the minor elements, the fertilizer should contain copper, manganese, zinc, and boron in quantities adequate for good plant growth.

The improvement of pastures includes: (1) Removing most of the pine trees; (2) chopping and removing the wiregrass, palmettos, and other plants and preparing the seedbed; (3) planting and fertilizing; and (4) maintaining the pasture.

The palmettos and shrubs are destroyed by running a heavy tandem chopper twice over the land and then disking twice. There is a 2- or 3-week interval between the first and second chopping and the first and second disking. After disking, the seedbed is usually in condition for planting grass seed or sprigs. For most satisfactory results, seeding should be completed during the rainy season in summer.

Grass seed is sown and then covered and the soil compacted by a cultipacker. When living sprigs of grass are used, they are scattered on the land at intervals of about 30 inches. They are covered by a light disking; then the soil is compacted by a cultipacker. To permit the newly planted grasses to establish good root systems, they should not be grazed for at least 60 days.

Improved pastures on mineral soils need several hundred pounds annually of a complete fertilizer that includes such minor elements as copper, zinc, and manganese. Most soils need about 2,000 pounds of lime an acre every 5 to 7 years. If gallberry bushes, saw-palmettos, and weeds begin to grow in the pastures, a chopper or mower should be run over them.

Legumes planted with the grasses improve the quality and quantity of the forage. They should be planted on a small acreage at first to see if they are adapted to the land. A mixture of Louisiana whiteclover, black medic, and Hubam clover seems to be adapted to the moist soils of the flatwoods. These are all winter legumes. Hairy indigo and alyceclover are summer legumes. Hairy indigo grows fairly well on flatwood soils that have been bedded to hasten surface runoff, but it does best on well-drained soils. Alyceclover is adapted to the well-drained soils.

The clovers are usually seeded early in fall on a closely grazed grass sod. The acre rate of seeding is 3 pounds of Louisiana whiteclover; 3 pounds of black

medic; and 6 pounds of Hubam clover. Before planting, the clover seeds should be heavily inoculated with the proper root-nodule bacteria. Hairy indigo is usually seeded between March and June. The acre rate of seeding is 6 to 10 pounds.

The legume seeds are sown on the lightly disked pasture. Then a cultipacker is used to cover them. A fertilizer containing phosphorus, potassium, copper sulfate, manganese sulfate, zinc sulfate, and borax should be applied at the time of planting. About 2 tons of lime an acre should be applied on the flatwood soils at the time of planting the legumes. Once established, a legume-grass pasture should receive about 2,000 pounds of lime every fourth or fifth year. The pasture should also receive applications of phosphorus and potassium in October of each year.

Forests

In rural areas of Hillsborough County, forests cover large areas. Most of the areas are used as range pasture or as woodland. The pines on some areas have been cut over, and the trees are scattered and generally small. Merchantable cypress, gum, elm, hickory, live oak, water oak, and maple grow on many of the poorly drained sites.

The Lakeland fine sands have a natural cover of longleaf pine, turkey oak and other oaks, and wiregrass. On the Leon fine sands, the natural vegetation is mainly longleaf pine, saw-palmetto, runner oak, and wiregrass. On the Sunniland fine sands, it is slash pine, cabbage palmetto, saw-palmetto, waxmyrtle, sawgrass, and wiregrass. Southern redcedar grows on some of the gently undulating areas of Gainesville loamy fine sand, but this species would not grow well on somewhat poorly drained soils such as the Leon.

On the Lakeland soils the prospects for reseeding are limited in varying degrees. On the Leon soils natural reproduction is generally fair. In some areas, however, selective cutting could be undertaken, with fair prospects that the areas would be reseeded. The trees on the Sunniland soils are adaptable for selective cutting, and the prospects for reseeding are good.

Experiments have been carried on to learn whether native trees will survive and grow on soils different from those on which they originally grew. It was determined that the Sunniland fine sands are the best suited to new plantings of slash pine. The pines made very poor growth on the gently undulating phase of Lakeland fine sand. They grew poorly and many did not survive when planted on the Leon fine sands, although longleaf pines grow well on the Leon soils.

Lumbermen in this county must plan their operations in accordance with the wetness or dryness of the areas to be cut over. During the rainy season, which lasts from June through September, the somewhat poorly drained or poorly drained soils, such as the Leon, Peace River, Ruskin, Rutlege, and Scranton soils, are too wet to permit logging operations. During this period the men work in the forests on areas of well-drained Arredondo, Blanton, Fort Meade, Gainesville, and Lakeland soils. When the dry season comes, the loggers can cut the trees from the wetter soils.

TABLE 5. — *Estimated average acre yields of principal*

[Yields in columns A obtained under common farming practices; those in columns B under

Soil	Tomatoes ¹		Sweet corn		Green peppers		Strawberries		Polebeans		Cucumbers		Squash		Irish potatoes	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	Bu.	Doz.	Doz.	Bu.	Bu.	Pt.	Pt.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
Adamsville fine sand.....	150	250	450	600	200	300			150	225	200	300	80	125		
Alachua loamy fine sand.....			400	500												
Alluvial land.....																
Arredondo fine sand:																
Level phase.....	110	180	400	500					100	160						
Gently undulating phase.....	110	180	400	500					100	160						
Blanton fine sand:																
Level phase.....			350	425												
Gently undulating phase.....			350	425												
Undulating phase.....																
Brown-layer phase.....			350	425												
Blichton fine sand.....	125	200	400	500	140	230			110	170			80	125		
Bradenton fine sand.....	150	250	450	600					150	225	200	300				
Thin surface phase.....	150	250	450	600					150	225	200	300				
Brighton peat.....																
Brighton mucky peat.....																
Broward fine sand.....	125	200	425	550					130	200	175	275	75	110		
Charlotte fine sand.....	150	250	425	550	175	275			150	225	200	300	80	125		
Delray fine sand.....	150	250	450	600	175	275			150	225	200	300	80	125		
Shallow phase.....	150	250	450	600	175	275			150	225	200	300	80	125		
Eustis fine sand:																
Level phase.....																
Gently undulating phase.....																
Felda fine sand.....	150	250	450	600	175	275			150	225	200	300	80	125		
Fellowship loamy fine sand.....	150	250	450	600	175	275			150	225	200	300	80	125		
Fort Meade loamy fine sand:																
Level phase.....	110	180	400	500	140	230			110	170			75	110		
Undulating phase.....	110	180	400	500	140	230			110	170			75	110		
Fresh water swamp (unclassified soils).....																
Gainesville loamy fine sand:																
Level phase.....	110	180	400	500	140	230			110	170			70	100		
Gently undulating phase.....	110	180	400	500	140	230			110	170			70	100		
Immokalee fine sand.....	125	200	425	550	160	250	2,500	3,600	130	200	160	250	60	90		
Alkaline variant.....	125	200	425	550	160	250	2,500	3,600	130	200	160	250	60	90		
Istokpoga peat.....																
Istokpoga mucky peat.....																
Kanapaha fine sand.....	110	180	350	425	140	230			100	160	150	250	70	100		
Keri fine sand.....	150	250	450	600	175	275			150	225	200	300	80	125		
Lakeland fine sand:																
Level phase.....			300	400												
Gently undulating phase.....			300	400												
Undulating phase.....																
Shallow phase.....			300	400												
Level deep phase.....																
Undulating deep phase.....																
Lakewood fine sand.....																
Leon fine sand.....	125	200	425	550	160	250	2,500	3,600	130	200	160	250	60	90		
Heavy substratum phase.....	125	200	425	550	160	250	2,500	3,600	130	200	160	250	60	90		
Light-colored surface phase.....	125	200	350	425	150	230	2,500	3,600	115	180	150	240	60	90		
Made land.....																
Manatee fine sandy loam.....	150	250	450	600	200	300			150	225	200	300	80	125		
Manatee loamy fine sand.....	150	250	450	600	200	300			150	225	200	300	80	125		
Manatee fine sandy clay, heavy variant.....	150	250	450	600	200	300			150	225	200	300	80	125		
Mines, pits, and dumps.....																
Mixed alluvium, high bottom phase.....																
Ona fine sand.....	150	250	450	600	200	300	3,600	4,500	150	225	175	275	80	125	150	225
Light-colored surface phase.....	130	210	425	525	175	275	3,200	4,000	130	200	160	250	75	110	140	200
Orlando fine sand.....	110	180	350	425	140	230			110	170						
Pamlico muck.....																
Parkwood fine sand.....	150	250	450	600	200	300			150	225	200	300	80	125		

See footnote at end of table.

crops under two levels of management

more intensive management. Absence of yield figure indicates crop not commonly grown]

Lettuce		Cabbage		Eggplant		Water-melons		Corn		Crowder peas		Citrus fruit		Principal crops or prevailing use
A	B	A	B	A	B	A	B	A	B	A	B	A	B	
Crates	Crates	Tons	Tons	Bu.	Bu.	No.	No.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	
80	150	6	10	250	400			30	60	125	200	330	500	Vegetables, range and improved pasture, forest. General crops, improved pasture, forest. Forest.
		5	8					30	60					
						275	400	20	40	110	190	330	500	Citrus fruits, watermelons, general crops, improved pasture, forest.
						275	400	20	40	110	190	330	500	Same.
						275	400	15	30			330	500	Same.
						275	400	15	30			330	500	Same.
						275	400	15	30			330	500	Same.
						275	400	30	60	125	200	330	500	Same.
60	100	6	10	250	400									Vegetables, general crops, range and improved pasture, forest.
60	100	6	10	250	400									Same.
60	100	6	10											Range and improved pasture, vegetables.
60	100	6	10											Range and improved pasture, vegetables.
60	100	5	8	225	350			25	50	100	175			Vegetables, range and improved pasture, forest.
80	150	6	10	250	400			25	50					Vegetables, range and improved pasture, forest.
80	150	6	10	250	400			35	70					Vegetables, range and improved pasture, forest.
80	150	6	10	250	400			35	70					Vegetables, range and improved pasture, forest.
						260	350					330	500	Citrus fruits, range and improved pasture, forest.
						260	350					330	500	Citrus fruits, range and improved pasture, forest.
80	150	6	10	250	400			30	60					Vegetables, range and improved pasture, forest.
80	150	6	10	250	400			30	60	130	210	330	500	Vegetables, general crops, improved pasture, forest.
		5	8			290	425	25	50	125	200	330	500	Citrus fruits, vegetables and general crops, improved pasture, forest.
		5	8			290	425	25	50	125	200	330	500	Same.
		5	8			290	425	25	50	110	190	330	500	Forest, range pasture.
		5	8			290	425	25	50	110	190	330	500	Citrus fruits, vegetables and general crops, improved pasture, forest.
50	90	4	7	200	300	200	300							Same.
50	90	4	7	200	300	200	300							Range and improved pasture, forest, vegetables.
						200	300							Range and improved pasture, forest, vegetables.
						200	300							Forest, range pasture.
70	125	5	8	225	350	275	400	20	40	100	175	330	500	Forest, range pasture.
80	150	6	10	250	400			30	60					Vegetables, general crops, citrus fruits, forest, improved pasture.
						275	400	15	30	170	150	330	500	Vegetables, range and improved pasture, forest.
						275	400	15	30	170	150	330	500	Same.
						275	400	15	30	70	150	330	500	Same.
						250	350					330	500	Same.
						250	350					330	500	Same.
50	90	4	7	200	300	200	300							Forest, range pasture.
50	90	4	7	200	300	200	300							Range and improved pasture, forest, vegetables.
50	90	4	7	200	300	200	300							Range and improved pasture, forest, vegetables.
80	150	6	10	250	400			35	70					Range and improved pasture, forest, vegetables.
80	150	6	10	250	400			35	70					Forest, range pasture.
80	150	6	10	250	400			35	70					Vegetables, range and improved pasture, forest.
														Vegetables, range and improved pasture, forest.
														Vegetables, range and improved pasture, forest.
80	150	5	8	250	400	290	425	35	70	125	200	300	440	Forest, range pasture.
						290	425	25	50	100	175	275	400	Vegetables, general crops, range and improved pasture, forest, citrus fruits.
70	125	5	8	225	350	275	400	30	60	100	175	330	500	Same.
		5	8			290	425	25	50	100	175	330	500	Citrus fruits, general crops, vegetables, improved pasture, forest.
														Range pasture.
80	150	6	10	250	400			30	60					Vegetables, range and improved pasture, forest.

TABLE 5. — *Estimated average acre yields of principal*

[Yields in columns A obtained under common farming practices; those in columns B under

Soil	Tomatoes ¹		Sweet corn		Green peppers		Strawberries		Polebeans		Cucumbers		Squash		Irish potatoes	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	Bu.	Doz.	Doz.	Bu.	Bu.	Pt.	Pt.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
Peace River soils.....	120	190	400	500	125	200					160	250	60	90		
Plummer fine sand.....	120	190	400	500	125	200					160	250	60	90		
Shallow phase.....	110	180	350	425	125	200			115	180	150	250	60	90		
Pomello fine sand.....	150	250	425	550	175	275			150	225	200	300	80	125		
Shallow phase.....	150	250	425	550	175	275			150	225	200	300	80	125		
Portsmouth fine sand.....	150	250	450	600	200	300	3,600	4,500	150	225	200	300	80	125		
Portsmouth mucky fine sand.....	150	250	450	600	200	300	3,600	4,500	150	225	200	300	80	125		
Rains fine sand.....	150	250	400	500	200	300			150	225	175	275	80	125		
Ruskin fine sand.....	150	250	450	600	200	300			150	225	200	300	80	125		
Rutlege fine sand.....	150	250	450	600	200	300	3,600	4,500	150	225	175	275	80	125		
Shallow phase.....	150	250	450	600	200	300	3,600	4,500	150	225	175	275	80	125		
Rutlege mucky fine sand.....	150	250	450	600	200	350	3,600	4,500	150	225	150	250	80	125		
St. Lucie fine sand.....																
Sandy local alluvium.....	110	180	350	425	150	250			110	170						
Seranton fine sand.....	150	250	450	600	200	300	3,600	4,500	150	225	175	275	80	125	150	225
Shallow ponds with grass.....																
Sunniland fine sand:																
Moderately shallow over marl.....	140	230	450	600	175	275			150	225	200	300	75	110		
Shallow over marl.....	140	230	450	600	175	275			150	225	200	300	75	110		
Terra Ceia peaty muck.....																
Tidal marsh (unclassified soils).....																
Tidal swamp (unclassified soils).....																

¹ Yields of unstaked tomatoes; staked tomatoes give approximately 50 percent higher yields.

Estimated Yields

In table 5 are given the estimated average acre yields of the principal crops grown on the soils of Hillsborough County under two levels of management.

The yields indicated in columns A were obtained under farming practices commonly used in 1952. These practices included a rather poorly defined plan of crop rotation; moderate fertilization of vegetables, other truck crops, fruit trees, and pasture; and little or no fertilization of corn, small grains, and field peas aside from the residual benefits derived from fertilizer applied to previous crops.

The estimates in columns B indicate average yields that may be obtained if more intensive management practices are used. These practices include using heavier and more frequent applications of fertilizer and lime; selecting and rotating crops carefully; using legumes and cover crops to increase the organic matter and nitrogen content of the soils; providing adequate water control, including artificial drainage and irrigation; and careful tillage.

The estimates in table 5 are based primarily on interviews with farmers, the county agricultural agent, members of the staff of the Agricultural Experiment Station and the College of Agriculture of the University of Florida, and other persons who have had experience with the agriculture in this county.

Formation and Classification of Soils

Soil results from the interaction of soil-forming processes on materials deposited or accumulated by geologic action. The characteristics of the soil at any given point are determined by (1) the type of parent material; (2) the climate under which the soil material has accumulated and existed since it accumulated; (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 development have acted on the soil material (9).

Factors of Soil Formation

Some of the factors of soil formation tend to be uniform throughout Hillsborough County. Kind of parent material and degree of drainage account for the principal differences among the soils.

Parent Materials

Five times during the Pleistocene epoch the sea level rose high enough to cover the area that is now Hillsborough County. During each of these periods, the sea left a mantle of sand over the earlier deposits. Many of the soils of the county were derived mainly

crops under two levels of management—Continued

more intensive management. Absence of yield figure indicates crop not commonly grown]

Lettuce		Cabbage		Eggplant		Water-melons		Corn		Crowder peas		Citrus fruit		Principal crops or prevailing use
A	B	A	B	A	B	A	B	A	B	A	B	A	B	
<i>Crates</i>	<i>Crates</i>	<i>Tons</i>	<i>Tons</i>	<i>Bu.</i>	<i>Bu.</i>	<i>No.</i>	<i>No.</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Bu.</i>	<i>Bu.</i>	
														Forest, range pasture.
														Range and improved pasture, forest, vegetables.
						225	325	15	30			260	350	Range and improved pasture, forest, vegetables.
80	150	6	10	250	400			30	60					Range and improved pasture, forest, vegetables.
80	150	6	10	250	400			30	60					Vegetables, range and improved pasture, forest.
80	150	6	10	250	400			35	70					Vegetables, range and improved pasture, forest.
80	150	6	10	250	400			35	70					Range and improved pasture, forest, vegetables.
80	150	6	10	250	400			30	60					Range and improved pasture, forest, vegetables.
80	150	6	10	250	400			30	60					Vegetables, range and improved pasture, forest.
80	150	6	10	250	400			35	70					Vegetables, range and improved pasture, forest.
80	150	6	10	250	400			35	70					Vegetables, range and improved pasture, forest.
80	150	6	10	250	400			35	70					Vegetables, range and improved pasture, forest.
														Forest, range pasture.
		5	8			275	400	25	50	100	175	330	500	Citrus fruits, general crops, improved pastures, vegetables.
80	150	6	10	250	400	290	425	35	70	125	200	330	500	Vegetables, general crops, citrus fruits, range and improved pasture, forest.
														Range pasture.
75	130	6	10	225	350	275	400	30	60	100	175			Range and improved pasture, forest, vegetables.
75	130	6	10	225	350	275	400	30	60	100	175			Range and improved pasture, forest, vegetables.
														Range pasture.
														No agricultural use.
														No agricultural use.

from these materials (3). In places recent accumulations of organic material have covered the sand.

The combined thickness of the sand layers ranges from a few feet to several hundred feet. The Sunderland terrace, which is considered the oldest exposed formation of the Pleistocene epoch in the county, occurs in the central and eastern parts of the county at elevations of 100 to 170 feet above the present sea level. Some of the soils on the higher knolls were derived mainly from the sandy clay sediments contained in this formation.

Younger formations that are distinguishable in some places are the Wicomico, on terraces at elevations of 70 to 100 feet; the Penholoway, at elevations of 42 to 70 feet; the Talbot, at elevations of 25 to 42 feet; and the Pamlico, which is less than 25 feet above the present sea level. In places some of the formations on these terraces are so thin that they cannot be seen.

The Pamlico formation occurs near the coast in the western part of the county. It consists of thin beds of sand and a few small areas of clay over shell marl. The shell marl is believed to belong to the Caloosahatchee formation of the Pliocene epoch. In places along some of the streams, the shell marl is underlain at depths of only a few feet by Tampa limestone of the Miocene epoch. In some places near Old Tampa Bay and Hillsboro Bay and along some of the streams in the western part of the county, the Tampa limestone is exposed or underlies the sand mantle at shallow depths.

In the eastern part of the county, the sands deposited during the Pleistocene epoch overlies materials of the Bone Valley formation, of the Pliocene epoch. The Bone Valley materials contain brown and gray nodules of phosphate. The overburden of sands ranges from a few feet to many feet in thickness. The phosphatic deposit is from 13 to 50 feet thick. This material, if mined, yields high-quality pebble phosphate. In places where the mantle of sand is very thin, some of the phosphatic materials are mixed with the surface sand. As a result the soils in such places are comparatively high in phosphorus.

Climite

The soils of Hillsborough County have developed under the influence of a humid, subtropical climate. The average annual temperature in the county is 71.5° F. The annual precipitation is about 50 inches. Most of the precipitation falls between June and October, and rainfall is comparatively light during winter and early in spring.

Because of the favorable climate and high rainfall, plants grow and animals are active throughout the year. The high rainfall, however, has leached plant nutrients from the soil. Consequently, the sandy soils have become strongly acid. In some soils the surface layer is acid but is underlain by calcareous clayey material or by marl.

Vegetation

The county was once covered by forests, which were mainly pine but included some hardwoods and cypress trees. The undergrowth in the pine forests consisted mainly of short grasses and many saw-palmettos and other shrubs. A few shrubs and grasses grew with the cypress trees and some aquatic plants in the fresh water swamps. Small areas were covered by short grasses.

Topography

Elevations range from sea level in the western part of the county to about 144 feet near the eastern county line. Except for a few short steeper slopes near lakes, streams, and sinkholes, relief ranges from level to undulating. The coastal areas in the western part of the county, the southern one-third of the county, and large areas in the eastern and northeastern parts are level or nearly level. The gently undulating or undulating areas extend from the northwestern corner southeastward across the county.

On the broad, nearly level plains, the soils are generally somewhat poorly drained or poorly drained. Except for the large streams that flow through these areas, there are no distinct drainageways. The excess surface water passes slowly through the depressed areas and swamps, or through canals and ditches to the larger streams. These are the Hillsborough, Alafia, and Little Manatee Rivers and Rocky, Sweetwater, Sixmile, and Bullfrog Creeks. All of these empty into Tampa Bay.

The undulating uplands are drained by only a few surface streams. Much of the surface water in the uplands seeps through the sands into the numerous lakes, ponds, and sinkholes. As a result these soils are predominantly well drained.

Time

Most of the soils are young. The soil-forming processes have not acted on the parent materials long enough for definite horizons to have developed. Instead, most of the soils consist of layers of sand, some of which overlie clayey materials, bedrock, or marl, generally entirely different in characteristics from the soil above. Only the Leon and Immokalee soils have an organic pan that is equivalent to a B horizon. This organic pan is an accumulation of minerals, organic matter, and other constituents.

Classification of Soils by Higher Categories

The lower categories of soil classification—phases, types, and series—are explained in the section, Soil Survey Methods and Definitions. Briefly, a soil type consists of one or more phases, and a soil series of one or more soil types. Soil types or phases are the units shown on the detailed soil map.

Soil series are classified into the next broader cate-

gory, the great soil groups. Each great soil group is made up of soils that have certain internal characteristics in common (9). The broadest categories of soil classification are the three soil orders—zonal, intrazonal, and azonal—into which all of the great soil groups are classified.

Table 6 classifies the soil series of Hillsborough County by great soil groups and soil orders. Although the county is within the region dominated by the Red-Yellow Podzolic great soil group of the zonal order, no zonal soils occur in the county.

Intrazonal soils

Intrazonal soils have more or less well-developed characteristics that reflect the dominating influence of some local factor of relief or parent material over the normal effects of climate and vegetation (9). The characteristics of the intrazonal soils of Hillsborough County are generally a result of the level relief and have been greatly influenced by the kind of parent material and by the restricted drainage. In this county the intrazonal order is represented by the Ground-Water Podzols, Low-Humic Gley, Humic Gley, and Bog great soil groups.

GROUND-WATER PODZOLS

The Ground-Water Podzols have a thin organic layer that overlies a strongly leached, light-gray sandy layer. This is underlain by a black or dark grayish-brown organic pan. The soils have developed from sandy materials under the influence of a humid climate. They have somewhat poor to poor drainage. The Leon, Immokalee, and Ona soils are classified as Ground-Water Podzols.

LEON SERIES.—The Leon soils have developed from thick beds of unconsolidated sand. They occur on level to gently sloping relief and are somewhat poorly drained.

These soils have a pan layer in which organic matter and minerals have accumulated, and this may be defined as a B horizon. During many months of the year, the water table remains near the level of the pan layer, which occurs at depths of 14 to 30 inches. The black organic pan is very strongly acid; the rest of the profile is strongly acid.

A profile of Leon fine sand, typical of the Ground-Water Podzols in this county, was observed in an excavation in a nearly level, forested area (SE $\frac{1}{4}$, SE $\frac{1}{4}$, sec. 11, T. 30 S., R. 20 E.). Following is a description of the profile:

- A 0 to 5 inches, dark-gray (10YR 4/1)⁵ loose fine sand; contains small amount of partly decayed organic matter, which gives it a salt-and-pepper appearance; contains many fibrous, medium-sized roots; gray (10YR 5/1) when dry.
- A₂₁ 5 to 14 inches, gray (10YR 5/1) loose fine sand; contains several small roots; light gray (10YR 7/1) when dry.

⁵ Symbols express Munsell color notations, which are explained in Soil Survey Manual, U. S. Dept. Agr. Handbook 18. Unless otherwise stated color is of moist soil.

TABLE 6. — *Classification of the soil series, by higher categories, and some of the factors that have contributed to their morphology*

INTRAZONAL SOILS

Great soil group and series	Parent material	Relief	Drainage
Ground-Water Podzol:			
Immokalee.....	Thick beds of unconsolidated sand.....	Level or nearly level.....	Somewhat poor.
Leon.....	Thick beds of unconsolidated sand.....	Level or nearly level.....	Somewhat poor.
Ona.....	Moderately thick beds of sand.....	Level or nearly level.....	Somewhat poor to poor.
Low-Humic Gley:			
Adamsville.....	Moderately thick beds of sand over finer textured calcareous materials.	Nearly level.....	Somewhat poor.
Blichton.....	Thin beds of sand over sandy clay mixed with residuum from phosphatic limestone.	Level to undulating.....	Moderately good to somewhat poor.
Bradenton.....	Thin beds of sand over calcareous clay and marl.....	Level or nearly level.....	Somewhat poor.
Broward.....	Thin beds of sand over limestone.....	Level or nearly level.....	Somewhat poor.
Charlotte.....	Moderately thick beds of fine sand over calcareous materials.	Level or slightly depressed.....	Poor.
Felda.....	Thin beds of fine sand over calcareous clay.....	Level or slightly depressed.....	Poor.
Fellowship.....	Thin beds of loamy sand and sandy clay over phosphatic limestone.	Level to undulating.....	Somewhat poor.
Keri.....	Stratified beds of sand and marl.....	Level or nearly level.....	Somewhat poor.
Parkwood.....	Very thin beds of sand over marl.....	Level or nearly level.....	Somewhat poor to poor.
Plummer.....	Moderately thick beds of acid sand.....	Nearly level or slightly depressed.	Poor.
Pompano.....	Moderately thick beds of sand over calcareous materials.	Same.....	Poor.
Rains.....	Thin beds of sand over acid clay.....	Same.....	Poor.
Ruskin.....	Thin beds of fine sand over calcareous clayey materials and shell marl.	Nearly level.....	Somewhat poor.
Sunniland.....	Thin beds of marine sand over calcareous clay.....	Level or nearly level.....	Somewhat poor.
Humic Gley:			
Delray.....	Moderately thick beds of sand over calcareous materials.	Level or slightly depressed.....	Poor to very poor.
Manatee.....	Thin beds of loamy sand over calcareous clay and marl.	Level or slightly depressed.....	Poor to very poor.
Peace River.....	Sediments mainly from acid soils but partly from phosphatic limestone.	Nearly level flood plains.....	Poor to very poor.
Portsmouth.....	Thin beds of sand over acid clayey materials.....	Nearly level or slightly depressed.	Poor to very poor.
Rutlege.....	Moderately thick beds of acid sand.....	Level or slightly depressed.....	Poor to very poor.
Scranton.....	Moderately thick beds of marine sand.....	Level to gently sloping.....	Somewhat poor.
Bog:			
Brighton.....	Remains of lilies, bonnets, arrowheads, and aquatic plants over acid sand.	Level or depressed.....	Very poor.
Istokpoga.....	Remains of woody plants over acid sands.....	Level or slightly depressed.....	Very poor.
Pamlico.....	Mixture of sand and remains of arrowheads, lilies, grasses, and aquatic plants.	Depressed.....	Very poor.
Terra Ceia.....	Remains of sedges, grasses, and aquatic plants over calcareous materials.	Level or slightly depressed.....	Very poor.

AZONAL SOILS

Regosols:			
Arredondo.....	Moderately thick beds of fine sand over phosphatic limestone.	Level to undulating.....	Good.
Blanton.....	Thick beds of unconsolidated sands.....	Level to undulating.....	Good to moderately good.
Eustis.....	Thick beds of sand.....	Nearly level.....	Good to somewhat excessive.
Fort Meade.....	Moderately thick beds of loamy sand over phosphatic materials.	Nearly level.....	Good.
Gainesville.....	Same.....	Nearly level.....	Good.
Kanapaha.....	Same.....	Nearly level.....	Moderately good to somewhat poor.
Lakeland.....	Moderately thick beds of unconsolidated acid sand.....	Nearly level.....	Good to somewhat excessive.
Lakewood.....	Thick beds of sand.....	Nearly level to gently undulating.	Excessive.
Orlando.....	Moderately thick beds of sand.....	Same.....	Good.
Pomello.....	Thick beds of sand.....	Nearly level.....	Moderately good to somewhat poor.
St. Lucie.....	Thick beds of sand.....	Nearly level to gently undulating.	Excessive.
Alluvial soils:			
Alachua.....	Alluvial-colluvial materials from Arredondo, Fort Meade, and Gainesville soils.	Depressions or bases of slopes.	Good to moderately good.

- A₂₂ 14 to 22 inches, light-gray (10YR 7/1) loose fine sand, streaked in a few places with light brownish gray (10YR 6/2) around partly decayed roots; white (10YR 8/1) when dry.
- B 22 to 26 inches, black (10YR 2/1) fine sand, cemented by organic matter; this is the organic pan; very dark gray (10YR 3/1) when dry.
- B₂ 26 to 32 inches, dark-brown (7.5YR 3/2) fine sand; dark grayish brown (10YR 4/2) when dry.
- C 32 to 48 inches +, light yellowish-brown (10YR 6/4) loose fine sand; very pale brown (10YR 7/3) when dry.

IMMOKALEE SERIES.—Like soils of the Leon series, the Immokalee soils have developed from thick beds of sand. They occur on nearly level to gently sloping relief and are somewhat poorly drained. Except that the organic pan layer is only weakly cemented and occurs at depths of 30 to 42 inches, the profile of Immokalee fine sand resembles closely that of Leon fine sand.

ONA SERIES.—Soils of the Ona series have developed from moderately thick beds of sand. They occupy nearly level areas in association with the Leon and Scranton soils.

Ona fine sand has a comparatively thick black or very dark gray surface layer underlain, at depths within 14 inches, by an organic-stained layer. In contrast the Leon soils have a light-gray or white fine sand subsurface layer over the black or dark-brown organic pan, and the pan occurs at depths of more than 14 inches.

LOW-HUMIC GLEY SOILS

The poorly drained to somewhat poorly drained Low-Humic Gley soils have very thin surface horizons, which are moderately high in organic matter. These overlie gleylike mineral horizons, mottled with gray and brown. Textural differences are not clearly defined in these horizons. The Adamsville, Plummer, Pompano, Charlotte, Felda, Rains, Broward, Keri, Parkwood, Bradenton, Sunniland, Blichton, Fellowship, and Ruskin soils are the Low-Humic Gley soils in Hillsborough County.

ADAMSVILLE SERIES.—Adamsville fine sand, the only soil of the Adamsville series mapped in Hillsborough County, is somewhat poorly drained. It occupies nearly level areas next to areas of Ruskin fine sand or occurs between areas of Ruskin fine sand and areas of Leon and Immokalee soils. The Adamsville soil lacks the fine-textured materials and shell marl that occur within the 42-inch profile of the Ruskin soil.

The dark-gray to gray surface layer is 4 to 6 inches thick. The subsurface layer of light-gray fine sand overlies light yellowish-brown to brownish-yellow fine sand. The surface layer is slightly acid, and the lower part of the profile is neutral or alkaline. In places a brown, organic-stained layer occurs within the profile.

PLUMMER SERIES.—The poorly drained Plummer soils have developed from moderately thick beds of fine sands. The modal profile consists of fine sand to depths of more than 42 inches, but the shallow phase has finer textured materials at depths between 30 and 42 inches. These soils occur on level or nearly level areas or on areas that are slightly depressed. Drainage is poor. During wet seasons the soils are usually

covered by a few inches of water for many days at a time. The Plummer soils are strongly acid throughout.

The following is a description of a profile of Plummer fine sand, observed in a pasture (SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 5, T. 30 S., R. 20 E.):

- 0 to 5 inches, dark-gray (10YR 4/1) loose fine sand; contains a small amount of partly decayed organic matter, which gives it a salt-and-pepper appearance; contains numerous roots; gray (10YR 5/1) when dry.
- 5 to 12 inches, light brownish-gray (10YR 6/2) loose fine sand; contains several small roots; light gray (10YR 7/1) when dry.
- 12 to 42 inches +, very pale brown (10YR 7/3), streaked with brownish yellow (10YR 6/5) and pale brown (10YR 6/3), loose fine sand, which grades to light gray with depth; colors are the same when material is dry.

POMPANO AND CHARLOTTE SERIES.—The Pompano soils differ from the Plummer soils in having a surface layer that is slightly acid to neutral and in being nearly neutral to alkaline at depths below 18 inches.

The Charlotte soil differs from the Plummer soils in having a layer of brownish-yellow or yellowish-brown fine sand at depths between 12 and 30 inches. Also, it is nearly neutral to alkaline below the surface layer instead of strongly acid throughout.

In the Charlotte soil the surface layer is typically grayish brown and is 3 to 8 inches thick, but in places it is dark grayish brown. The brownish-yellow or yellowish-brown layer is 12 to 30 inches thick and is underlain by a layer of pale brown or very pale brown to white loose fine sand, mottled with yellow. The mottles become smaller and fewer in number with increasing depth.

FELDA SERIES.—Felda fine sand, the only member of the Felda series mapped in the county, occupies level or slightly depressed areas. The areas of Felda soil occur within or next to larger areas of Sunniland or Ruskin fine sands. This soil is poorly drained. It has developed from thin beds of sand overlying calcareous clayey materials. In contrast to the Plummer soils, which have sand throughout the profile, the Felda soil has fine sandy clay loam or fine sandy clay within 30 inches of the surface. The clayey materials are generally grayer than in the Sunniland and Ruskin soils.

RAINS SERIES.—Rains fine sand, the only soil of the Rains series mapped in Hillsborough County, resembles the Plummer soils in many ways. It differs mainly in having clayey materials within 30 inches of the surface. In contrast to the Felda soil, which is slightly acid to alkaline, the Rains soil is strongly acid throughout.

BROWARD SERIES.—The soils of the Broward series, represented in Hillsborough County by Broward fine sand, were derived from thin beds of marine sand over limestone. Depth to the limestone ranges from 12 to 36 inches, and in a few places the limestone is exposed. In several areas a thin layer, 2 to 6 inches thick, of mottled gray, yellowish-brown, and brownish-yellow friable fine sandy clay loam or fine sandy clay overlies the limestone. Areas containing mottled material are principally near the coast or next to the bottom lands that border some of the larger streams. The Broward soil is somewhat poorly drained.

A profile of Broward fine sand was observed in an excavation in a forested area (SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 17, T. 29 S., R. 18 E.). Following is a description of the profile observed:

- 0 to 4 inches, dark-gray (10YR 4/1) nearly loose fine sand; contains a small amount of organic matter, which gives it a salt-and-pepper appearance; gray (10YR 5/1) when dry.
- 4 to 10 inches, gray (10YR 5/1) loose fine sand; light gray (10YR 7/1) when dry.
- 10 to 14 inches, grayish-brown (10YR 5/2) loose fine sand, or organic-stained layer; light brownish gray (10YR 6/2) when dry.
- 14 to 26 inches, very pale brown (10YR 8/3) loose fine sand; white (10YR 8/2) when dry.
- 26 to 36 inches +, nearly white limestone, which occurs at various depths.

KERI SERIES.—The Keri series is represented in Hillsborough County by Keri fine sand. This somewhat poorly drained soil has developed from stratified moderately thin beds of marine sand and marl. The surface layer consists of dark-gray or gray nearly loose fine sand that contains a small amount of organic matter. The 5- to 18-inch subsurface layer is light-gray or light brownish-gray loose fine sand. Immediately underlying it is a 2- to 12-inch layer of light-gray marl, which has a fine sandy clay loam texture. The marl is streaked in a few places with yellow.

Immediately below the marl is a light-gray or white layer of loose fine sand, mottled with yellow. This overlies moderately hard limestone, which occurs at depths of 48 to 60 inches or more.

PARKWOOD SERIES.—Only one member of the Parkwood series, Parkwood fine sand, is mapped in Hillsborough County. This somewhat poorly drained to poorly drained soil has developed from thin beds of sand over marl. It resembles the Broward soil, but it overlies a thick layer of marl instead of limestone. It is somewhat similar to the Keri soil, except that it overlies marl instead of having a thin layer of marl between the sand layers.

BRADENTON AND SUNNILAND SERIES.—Soils of the Bradenton and Sunniland series belong to the Low-Humic Gley great soil group. They occur in association with Ruskin fine sand.

The Bradenton soils occupy nearly level areas. They have developed from thin beds of sand that overlie calcareous, clayey materials and marl. As a rule the clayey materials consist of grayish-brown fine sandy clay loam or fine sandy clay. The texture of the underlying marl is fine sandy clay or sandy clay loam. These soils are somewhat poorly drained.

The Sunniland soils have developed from thin beds of sand overlying calcareous clayey materials. In color the soils resemble the associated Ruskin soil. They differ chiefly in having a fine sandy clay or fine sandy clay loam horizon, slightly finer textured than that in the Ruskin soil, immediately above the marl. In addition, they are generally not underlain by shell marl. Concretions of lime or marl occur in places below the fine-textured layer. Drainage is somewhat poor in the Sunniland soils. Surface runoff is slow, and internal drainage is medium when not retarded by the high water table.

BLIGHTON AND FELLOWSHIP SERIES.—Soils of the Blichton and Fellowship series occupy areas that are

level to undulating. Their drainage is somewhat poor.

Blichton fine sand is the only member of the Blichton series mapped in Hillsborough County. This soil has developed from thin beds of fine sand that overlie sandy clay. The clays are partly mixed with residuum from phosphatic limestone. The surface layer is dark gray and is 6 to 9 inches thick. The subsurface layer consists of grayish-brown or gray loamy fine sand. Mottled light-gray, light yellowish-brown, and yellow fine sandy clay or fine sandy clay loam occurs at depths of 20 to 36 inches. A few phosphatic pebbles occur on the surface and throughout the profile. The soil is medium to strongly acid.

The surface layer of Fellowship loamy fine sand, the only soil of the Fellowship series mapped in Hillsborough County, is very dark gray and is 4 to 8 inches thick. The subsurface layer consists of dark-gray loamy fine sand. At depths of 12 to 16 inches, mottled gray, yellowish-brown, and yellow fine sandy clay occurs. The clay is sticky and plastic when wet and very hard when dry. Many pebbles and rounded stones occur on the surface and throughout the profile. This soil is strongly acid throughout.

RUSKIN SERIES.—Ruskin fine sand, the only soil of the Ruskin series mapped in Hillsborough County, is associated with soils of the Leon and Immokalee series. It occupies nearly level areas along the coast in the southwestern part of the county. The soil is somewhat poorly drained. It has developed from a thin bed of sand over clayey materials and shell marl. The profile is only slightly developed, and the soil materials are essentially the same as when they were deposited by the seas that covered the land.

A profile of Ruskin fine sand was observed in the SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 28, T. 31 S., R. 19 E. The following is a description of this profile:

- 0 to 4 inches, dark-gray (10YR 4/1) nearly loose fine sand; contains numerous small roots and a small quantity of partly decayed organic matter, which gives it a salt-and-pepper appearance; gray (10YR 6/1) when dry.
- 4 to 18 inches, light-gray (10YR 7/2) loose fine sand containing several small roots; white (10YR 8/2) when dry.
- 18 to 24 inches, dark yellowish-brown (10YR 4/4) fine sand containing several small roots; yellowish brown (10YR 5/4) when dry.
- 24 to 34 inches, yellowish-brown (10YR 5/6) fine sandy clay loam; same color when dry.
- 34 to 48 inches +, light-gray (10YR 7/2) shell marl; white (10YR 8/2) when dry.

HUMIC GLEY SOILS

The Humic Gley soils are poorly drained or very poorly drained hydromorphic soils. They have moderately thick dark-colored organic mineral horizons, underlain by mineral gley horizons.

The Humic Gley soils in Hillsborough County are members of the Rutlege, Delray, Manatee, Peace River, Portsmouth, and Scranton series. The soils of these series have thick, dark-colored surface layers over lower layers that are light colored. They occupy level or nearly level areas or slight depressions.

The Rutlege, Delray, Manatee, and Portsmouth soils receive seepage water from higher lying areas. They are poorly to very poorly drained, and many areas are covered by a few inches of water for several months of the year. The poorly drained Peace River soils are

frequently flooded by overflow from the nearby rivers and are under water for many months of the year. Though drainage is somewhat poor in the Scranton soil, moisture is generally more favorable for crops than in the Rutlege, Delray, Manatee, Peace River, and Portsmouth soils.

RUTLEGE AND DELRAY SERIES.—Soils of the Rutlege and Delray series have developed from moderately thick beds of sand. The Rutlege soils are strongly acid throughout, and the Delray, slightly acid to alkaline. In the modal profile of the soils of both series, fine sand extends to depths of more than 42 inches. Soils mapped as shallow phases have finer textured material at depths of 30 to 42 inches. The Rutlege series includes a mucky fine sand, the surface layer of which contains considerable organic matter.

A profile of Rutlege fine sand was observed in NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 32, T. 32 S., R. 22 E. A description of this profile follows:

- 0 to 10 inches, black (10YR 2/1) nearly loose fine sand; contains a large amount of organic matter and many small roots of grass; dark gray (10YR 4/1) when dry.
- 10 to 18 inches, very dark gray (10YR 3/1) nearly loose fine sand containing several small roots; grayish brown (10YR 5/2) when dry.
- 18 to 32 inches, grayish-brown (10YR 5/2) loose fine sand; light brownish gray (10YR 6/2) when dry.
- 32 to 48 inches +, mottled pale-yellow (2.5Y 7/4), yellow (2.5Y 7/6), and brownish-yellow (10YR 6/8), loose fine sand; mottled pale yellow (2.5Y 8/4) and yellow (2.5Y 8/6) when dry.

MANATEE SERIES.—Three soil types of the Manatee series are mapped in Hillsborough County—fine sandy loam; loamy fine sand; and fine sandy clay, heavy variant. The soils have developed from thin beds of sand over calcareous clay or marl. They occupy level areas or slight depressions and are often covered by water for several months each year. The upper part of the soil profile is slightly acid to neutral; the lower part is neutral or alkaline.

Manatee fine sandy loam has a black surface layer, 12 to 15 inches thick. This is underlain by gray or light-gray fine sandy clay. Marl of sandy clay texture underlies the fine sandy clay.

PORTSMOUTH SERIES.—The strongly acid Portsmouth soils have developed from thin beds of sand over acid, clayey materials. They occupy level or slightly depressed areas and may be under water during several months of the year. Portsmouth fine sand and Portsmouth mucky fine sand are the two types mapped in the county. The surface layers of these soils are black. Mottled gray, light-gray, yellowish-brown, or yellow fine sandy clay loam or fine sandy clay begins within 30 inches of the surface.

SCRANTON SERIES.—Scranton fine sand, the only soil of the Scranton series mapped in Hillsborough County, was derived from moderately thick beds of sand. The soil occupies nearly level positions and is somewhat poorly drained to poorly drained. It is strongly acid.

A profile of Scranton fine sand was observed in a forested area near Keysville (in the northeast corner of SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 22, T. 30 S., R. 22 E.). The following is a description of the profile observed:

- 0 to 10 inches, black (10YR 2/1) fine sand containing a large amount of organic matter and many small roots; very dark gray (10YR 3/1) when dry.

- 10 to 17 inches, very dark gray (10YR 3/1) fine sand containing a few small roots; dark grayish brown (2.5Y 4/2) or dark gray (10YR 4/1) when dry.

- 17 to 32 inches, pale-brown (10YR 6/3) nearly loose fine sand; very pale brown (10YR 7/3) when dry.

- 32 to 48 inches +, mottled pale-yellow (2.5Y 7/4), yellow (10YR 7/8), and light-gray (10YR 7/2) nearly loose fine sand; pale yellow (2.5Y 8/4) and white (10YR 8/2) when dry; a few small iron concretions occur at depths of 42 to 48 inches.

PEACE RIVER SOILS.—Because they have a dark-colored surface layer, the Peace River soils have been placed in the Humic Gley great soil group. They occupy nearly level flood plains along some of the larger streams, principally in the central and northern parts of the county. They are poorly drained and may be covered by water for many days at a time.

The soils have developed partly from sediments from acid soils and partly from phosphatic limestone. Within short distances the surface textures vary from loamy fine sand to fine sandy clay. The soils are generally underlain, at shallow depths, by calcareous clayey materials or by fine-textured marl.

A profile of Peace River fine sandy loam considered typical of the Peace River soils was observed near the Hillsborough River in the northeast corner NE $\frac{1}{4}$ sec. 8, T. 27 S., R. 21 E. The following is a description of that profile:

- 0 to 4 inches, black (10YR 2/1) friable fine sandy loam containing a moderate amount of organic matter; very dark gray (10YR 3/1) when dry.
- 4 to 12 inches, very dark gray (10YR 3/1) fine sandy clay; plastic and sticky when wet, very hard when dry; dark gray (10YR 4/1) when dry.
- 12 to 42 inches +, mottled gray (10YR 5/1) and yellowish-brown (10YR 5/6) calcareous fine sandy clay; contains many calcareous pebbles or concretions; gray (10YR 7/1) when dry.

BOG SOILS

The Bog soils are an intrazonal group of soils. They have mucky or peaty surface layers underlain by deep or moderately deep peaty or mucky materials. They have developed under marsh or swamp vegetation.

The Brighton, Istokpoga, Pamlico, and Terra Ceia series of Hillsborough County are Bog soils. These soils occupy broad, level areas that are covered by water during many months of the year. They were derived mainly from plant remains, which in some places are mixed with sand. The organic material ranges from 12 to 30 inches or more in depth.

The Brighton and Istokpoga soils have been mapped as peat and mucky peat. The Pamlico soil has been mapped as muck, and the Terra Ceia soil as peaty muck. In the soils mapped as muck or peaty muck, the organic matter in the surface layer is more decomposed and less fibrous than in the peat or mucky peat. The organic matter in the surface layer of the mucky peat is more decomposed and less fibrous than that in the peat. The muck contains decomposed organic matter and a small amount of sand.

BRIGHTON PEAT.—The remains of sedges, grasses, lilies, bonnets, arrowheads, and other aquatic plants supplied the parent materials for the Brighton peat

soils. The following is a representative profile of Brighton peat:

- 0 to 12 inches, very dark brown (10YR 2/2) nonfibrous peat containing numerous grass roots; dark brown (7.5YR 3/2) when dry.
- 12 to 24 inches, very dark grayish-brown (10YR 3/2) fibrous peat; same color when dry.
- 24 to 42 inches, very dark brown (10YR 2/2) fibrous peat; very dark grayish brown (10YR 3/2) when dry; slight admixture of fine sands in lower part.
- 42 to 54 inches +, dark-gray (10YR 4/1) loose fine sand that grades to light-gray fine sand with increasing depth; upper part gray (10YR 5/1) when dry.

ISTOKPOGA PEAT.—The Istokpoga peat soils are similar in color to Brighton peat. They differ chiefly in having developed from woody plants, such as bays, myrtle bushes, some cypress, and an undergrowth of vines and ferns.

PAMLICO MUCK.—This strongly acid or very strongly acid organic soil has developed from the remains of sedges, grasses, lilies, arrowheads, and bonnets. It overlies sand. The organic materials are in a more advanced stage of decomposition than the organic materials in the Brighton soils, and the soil is higher in mineral matter. It differs in reaction from Terra Ceia peaty muck, which is neutral or alkaline. Its black surface layer, which is 12 to 15 inches thick, contains a large amount of fairly well decomposed organic matter mixed with fine sand. The subsurface layers consist of dark-gray fine sand, underlain by gray or light-gray loose fine sand.

TERRA CEIA PEATY MUCK.—This organic soil has developed from the remains of sedges, grasses, lilies, arrowheads, and other aquatic plants. It overlies calcareous clayey or sandy materials. It has a black, non-fibrous peaty muck surface layer, 12 to 20 inches thick, and below the muck, a black or dark-gray fine sandy clay loam. Many small shells occur in the lower layers.

Azonal soils

The azonal soils lack distinct, genetically related horizons, commonly because of youth, resistant parent material, or steep topography. In this county the Regosols and the Alluvial soils belong to this order.

REGOSOLS

The Regosols are an azonal group of soils consisting of deep, unconsolidated rock or soft mineral deposits in which few or no clearly expressed soil characteristics have developed. The Regosols in Hillsborough County have developed largely from recent sandy materials. Soils of the Regosol great soil group in this county belong to the Blanton, Eustis, Lakeland, Orlando, Arredondo, Fort Meade, Gainesville, Kanapaha, Lakewood, Pomello, and St. Lucie series.

BLANTON, LAKELAND, ORLANDO, AND EUSTIS SERIES.—Soils of the Blanton, Lakeland, and Orlando series have developed from moderately thick beds of sand, and the Eustis soils have developed from thick beds of sand. The soils occupy areas of nearly level to undulating relief; slopes are less than 8 percent. The soils are well drained to somewhat excessively drained. All are strongly acid. Except for Lakeland fine sand,

shallow phase, in which a layer of sandy clay loam or sandy clay occurs at depths between 30 and 42 inches, the profiles of all of these soils are fine sand to depths of more than 42 inches.

The surface layer of the Blanton, Lakeland, and Eustis soils is dark gray to grayish brown, and it is 2 to 6 inches thick. The lower layers of the Blanton soils are predominantly pale yellow or mottled pale yellow and light gray. The lower layers of the Lakeland soils are yellow, yellowish brown, or brownish yellow, and those of the Eustis soils are strong brown or yellowish red.

Orlando fine sand, the only Orlando soil mapped in the county, has a dark-gray to black surface layer, 8 to 15 inches thick, and yellowish-brown to light-gray lower layers.

A profile of Lakeland fine sand was observed in a forested area in the western part of NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 2, T. 30 S., R. 20 E. Following is a description of that profile:

- 0 to 6 inches, dark-gray (10YR 3/1) loose fine sand containing a small amount of organic matter; gray (10YR 5/1) when dry.
- 6 to 14 inches, brown or grayish-brown (10YR 5/3 or 5/2) loose fine sand; pale brown (10YR 6/3) when dry.
- 14 to 30 inches, yellowish-brown (10YR 5/4) loose fine sand; light yellowish brown (10YR 6/4) when dry.
- 30 to 48 inches +, brownish-yellow (10YR 6/6) loose fine sand; yellow (10YR 7/6) when dry.

ARREDONDO, FORT MEADE, GAINESVILLE, AND KANAPAHA SERIES.—Soils of the Arredondo, Fort Meade, Gainesville, and Kanapaha series have developed from moderately thick beds of sand, mixed with materials from phosphatic limestone. The well-drained Arredondo, Fort Meade, and Gainesville soils occupy areas of nearly level to undulating relief. Kanapaha fine sand, the only Kanapaha soil mapped in Hillsborough County, occupies areas that are nearly level. It is moderately well drained to somewhat poorly drained.

The Arredondo soils have surface layers of dark-gray fine sand, 4 to 8 inches thick, that are underlain by yellowish-brown fine sand. The Fort Meade soils have surface layers of very dark gray to black loamy fine sand, 12 to 15 inches thick, that are underlain by brown to pale-brown loamy fine sand. The surface layer of the Gainesville soils is very dark gray or dark-brown loamy fine sand, 6 to 9 inches thick, and is underlain by brown, strong-brown, or reddish-brown loamy fine sand. The surface layer of the Kanapaha soil is grayish-brown fine sand, 3 to 6 inches thick, and is underlain by light-gray and pale-yellow lower layers.

A profile of Gainesville loamy fine sand, considered typical of the series, was observed in the southeast corner of NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 26, T. 28 S., R. 20 E. Following is a description of that profile:

- 0 to 8 inches, very dark grayish-brown (10YR 3/2) loamy fine sand containing a moderate amount of organic matter and numerous small roots; a few small rounded pebbles on the surface and throughout the layer; dark grayish brown (10YR 4/2) when dry.
- 8 to 20 inches, dark yellowish-brown to dark-brown (10YR 4/4 to 4/3) loamy fine sand; contains a few phosphatic pebbles; yellowish brown (10YR 5/4) when dry.
- 20 to 35 inches, brown (7.5YR 4/4) loamy fine sand; contains a few phosphatic pebbles; strong brown (7.5YR 5/6) when dry.

35 to 48 inches +, strong-brown (7.5YR 5/6) loamy fine sand containing a few phosphatic pebbles; reddish yellow (7.5YR 6/6) or strong brown (7.5YR 5/6) when dry.

ST. LUCIE, LAKEWOOD, AND POMELLO SERIES.—The strongly acid St. Lucie, Lakewood, and Pomello soils have developed from thick beds of sand. The St. Lucie and Lakewood soils are excessively drained, and the Pomello soil is moderately well drained to somewhat poorly drained. The soils occur on low ridges and knolls in the interior of the county.

The St. Lucie soil consists of light-colored fine sand throughout. The Lakewood soil has a yellow or brownish-yellow layer between depths of 18 and 48 inches. The Pomello soil has an organic-stained layer at depths between 50 and 60 inches.

A profile of St. Lucie fine sand considered typical was observed in SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 8, T. 31 S., R. 21 E. A description of the profile follows:

- 0 to 3 inches, gray (10YR 5/1) loose noncoherent fine sand containing a few small roots; light gray (10YR 7/1) when dry.
- 3 to 8 inches, light-gray (10YR 7/1) loose fine sand; white (10YR 8/1) when dry.
- 8 to 48 inches +, white (10YR 8/1) loose fine sand; same color when dry.

ALLUVIAL SOILS

The colluvial-alluvial soils of the Alluvial great soil group occur at the bases of slopes or in areas where recurrent floods have deposited sediments. In Hillsborough County the only soil in this great soil group is Alachua loamy fine sand.

ALACHUA SERIES.—Alachua loamy fine sand is the only soil of the Alachua series that occurs in Hillsborough County. It was derived from local alluvial and colluvial materials that were washed from the Arredondo, Fort Meade, and Gainesville soils and deposited in depressions or at the bases of slopes.

The soil is a loamy fine sand to depths greater than 42 inches. Its surface layer is very dark gray and is 10 to 15 inches thick. The lower layers consist of pale-brown, yellowish-brown, brown, or strong-brown loamy fine sand. The Alachua soil is well drained to moderately well drained and is medium to strongly acid.

Miscellaneous Land Types.—Miscellaneous land types are not classified by higher categories. The land types mapped in Hillsborough County are Alluvial land; Fresh water swamp (unclassified soils); Mines, pits, and dumps; Mixed alluvium, high bottom phase; Peace River soils; Shallow ponds with grass; Tidal marsh (unclassified soils); and Tidal swamp (unclassified soils).

Soil Survey Methods and Definitions

The scientist who makes a soil survey examines soils in the field, classifies the soils in accordance with facts that he observes, and maps their boundaries on an aerial photograph or other map.

FIELD STUDY.—The soil surveyor bores or digs many holes to see what the soils are like. The holes are not spaced in a regular pattern but are located

according to the lay of the land. Usually they are not more than a quarter of a mile apart, and sometimes they are much closer. In most soils each boring or hole reveals several distinct layers, called horizons, which collectively are known as the soil profile. Each layer is studied to see how it differs from others in the profile and to learn the things about this soil that influence its capacity to support plant growth (10).

Color is usually related to the amount of organic matter. The darker the surface soil, as a rule, the more organic matter it contains. Streaks and spots of gray, yellow, and brown in the lower layers generally indicate poor drainage and poor aeration.

Texture, or the content of sand, silt and clay, is determined by the way the soil feels when rubbed between the fingers and is later checked by laboratory analysis. Texture determines how well the soil retains moisture, plant nutrients, and fertilizer, and whether it is easy or difficult to cultivate.

Structure, which is the way the individual soil particles are arranged in larger grains and the amount of pore space between grains, gives us clues to the ease or difficulty with which the soil is penetrated by plant roots and by moisture.

Consistence, or the tendency of the soil to crumble or to stick together, indicates whether it is easy or difficult to keep the soil open and porous under cultivation.

Other characteristics observed in the course of the field study and considered in classifying the soil include the following: The depth of the soil over bedrock or compact layers; the presence of gravel or stones in amounts that will interfere with cultivation; the steepness and pattern of slopes; the degree of erosion; the nature of the underlying parent material from which the soil has developed; and acidity or alkalinity of the soil as measured by chemical tests.

CLASSIFICATION.—On the basis of the characteristics observed by the survey team or determined by laboratory tests, soils are classified into phases, types, and series. The soil type is the basic classification unit. A soil type may consist of several phases. Types that resemble each other in most of their characteristics are grouped into soil series.

Soil type.—Soils similar in kind, thickness, and arrangement of soil layers are classified as one soil type.

Soil phase.—Because of differences other than those of kind, thickness, and arrangement of layers, some soil types are divided into two or more phases. Slope variations, frequency of rock outcrops, degree of erosion, depth of soil over the substratum, or natural drainage, are examples of characteristics that suggest dividing a soil type into phases.

The soil phase (or the soil type if it has not been subdivided) is the unit shown on the soil map. It is the unit that has the narrowest range of characteristics. Use and management practices therefore can be specified more easily than for soil series or yet broader groups that contain more variation.

Soil series.—Two or more soil types that differ in surface texture, but that are otherwise similar in kind, thickness, and arrangement of soil layers, are normally designated as a soil series. In a given area, however, a soil series may be represented by only one

soil type. Each series is named for a place near which it was first mapped.

As an example of soil classification, consider the Arredondo series of Hillsborough County. This series is made up of only one soil type, subdivided into phases, as follows:

Series	Type	Phase
Arredondo ----	Fine sand -----	{Level phase. Gently undulating phase.

Miscellaneous land types.—Fresh stream deposits, mining areas, or other areas that have little true soil are not classified by types and series; they are identified by descriptive names, such as Alluvial land; Fresh water marsh (unclassified soils); or Mines, pits, and dumps.

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SUMMARY OF IMPORTANT CHARACTERISTICS

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Aa	Adamsville fine sand	0-2	Slow	Rapid when freed of the high water table.	Slightly acid to neutral or alkaline.	Dark-gray to gray fine sand, 3 to 8 inches thick.	Light-gray to brownish-yellow fine sand.	Vegetables, truck crops, pasture, and forest.	Pines; saw-palmettos; cabbage palmettos; wiregrass.	IVs-2.
Ab	Alachua loamy fine sand	0-2	Medium	Medium	Medium acid	Very dark grayish-brown to grayish-brown loamy fine sand, 6 to 8 inches thick. Contains a few small pebbles.	Dark-brown or pale-brown to yellowish-brown, brown, or strong-brown loamy fine sand. Contains a few small pebbles.	General crops, a few acres of vegetables, and pasture.	Hardwoods; a few shrubs and grasses.	IIw-1.
Ac	Alluvial land	Nearly level	Very slow	Very slow	Strongly acid to neutral or alkaline.	Variable	Variable	Forest, pasture, and refuges for wildlife.	Hammock vegetation of hardwoods; shrubs; vines; cypress; a few pines.	Vw-1.
Ad	Arredondo fine sand: Level phase	0-2	Medium	Rapid	Medium to slightly acid.	Very dark grayish-brown to grayish-brown fine sand, 6 to 8 inches thick. Contains a few small pebbles.	Dark yellowish-brown to yellowish-brown or brownish-yellow fine sand. Contains a few phosphatic pebbles.	Citrus fruits, general crops, pasture, and forest.	Pines; live and blue-jack oaks; hickory; various grasses.	IIIs-1.
Ae	Gently undulating phase.	2-8	Medium to rapid.	Rapid	Same	Same	Same	Citrus fruits, general crops, vegetables, pasture, and forest.	Same	IIIs-1.
Ba	Blanton fine sand: Level phase	0-2	Slow	Rapid	Medium acid	Dark-gray or gray fine sand, 4 to 8 inches thick.	Grayish-brown or light brownish-gray to very pale brown or light-gray fine sand, lower part spotted with pale yellow or yellow.	Citrus fruits, general crops, vegetables, pasture, and forest.	Oaks; pines; a few saw-palmettos; grasses.	IIIs-1.
Bb	Gently undulating phase.	2-5	Medium to rapid.	Rapid	Medium acid	Same	Same	Same	Same	IIIs-1.
Bc	Undulating phase	5-12	Rapid	Rapid	Medium acid	Same	Same	Forest, pasture, citrus fruits, and general crops.	Same	IIIs-1.
Bd	Brown-layer phase	0-2	Slow	Medium	Medium acid	Same	Gray or light brownish-gray fine sand over dark grayish-brown, organic stained layer; grayish-brown or pale-brown to very pale brown or light-gray fine sand, spotted with yellow at depths between 22 and 42 inches.	Pasture, general crops, and forest.	Oaks; a few pines and saw-palmettos; grasses.	IIIs-1.
Be	Blichton fine sand	0-8	Slow to medium.	Slow to medium.	Medium acid to strongly acid.	Dark-gray fine sand, 6 to 9 inches thick.	Grayish-brown or gray fine sand, containing a few pebbles and rounded stones, to mottled light yellowish-brown and yellow fine sandy clay or fine sandy clay loam con-	General crops, citrus fruits, pasture, and forest.	Hardwoods; pines; a few cabbage palmettos and saw-palmettos; grasses.	IIe-1.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Bf	Bradenton fine sand	0-2	Same	Same	Sand layers strongly acid to medium acid; clayey materials slightly acid to neutral.	Dark-gray fine sand, 4 to 9 inches thick.	taining many pebbles and rounded stones. Light grayish-brown or light-gray to pale-brown or grayish-brown fine sand over grayish-brown fine sandy clay; light-gray marl at depths between 32 and 42 inches.	Vegetables, truck crops, pasture, and forest.	Live oak; cabbage palmettos and saw-palmettos; pines; vines; shrubs; a few grasses.	III-2.
Bg	Thin surface phase	0-2	Same	Slow	Same	Same	Light grayish-brown or light-gray to pale-brown or grayish-brown fine sand over grayish-brown fine sandy clay at depths within 18 inches of the surface; gray marl at depths between 20 and 30 inches.	Pasture and forest.	Live oak, gum, elm, hickory, magnolia, and cabbage palmettos; rank growth of saw-palmettos, shrubs, and vines; a few grasses.	III-2.
Bh	Brighton peat	Nearly level or slightly depressed.	Very slow or ponded.	Slow	Strongly to very strongly acid.	Very dark brown fibrous peat.	Dark grayish-brown or brown fibrous peat, underlain by dark-gray or gray fine sand at depths between 20 and 48 inches.	Pasture and truck crops; used as organic fertilizer or as filler in mixed fertilizer.	Water plants and grasses.	III-4.
Bk	Brighton mucky peat	Same	Same	Slow	Same	Black nonfibrous mucky peat.	Dark-brown or grayish-brown fibrous felty peat underlain at depths between 15 and 40 inches by gray or light-gray fine sand.	Same	Same	III-4.
Bl	Broward fine sand	0-2	Slow	Medium to rapid if freed of high water table.	Sand layers slightly acid to alkaline.	Dark-gray or gray fine sand, 3 to 8 inches thick.	Light-gray to yellowish-brown fine sand. Limestone at 12 to 36 inches.	Pasture and forest.	Second-growth pine; cabbage palmettos, saw-palmettos, and runner oaks; gallberry and other shrubs; wiregrass.	IV-2.
Cg	Charlotte fine sand	Level or slightly depressed.	Very slow or ponded.	Rapid when freed of high water table.	Same	Grayish-brown fine sand, 3 to 8 inches thick.	Yellowish-brown to brownish-yellow fine sand at depths of 12 to 24 inches over light-gray or white fine sand, underlain by limestone or marl.	Pasture and a few acres of vegetables.	Grasses; a few pines; cabbage palmettos.	IV-3.
Dg	Delray fine sand	Same	Same	Same	Same	Black fine sand, 7 to 20 inches thick.	Very dark gray or dark-gray to light-gray or gray fine sand, lower part streaked with pale yellow and brown.	Same	Grasses; gallberry and myrtle bushes; a few cabbage palmettos; pines; hardwoods.	III-3.
Db	Shallow phase	Same	Same	Same	Same	Same	Dark-gray to gray or light-gray fine sand underlain, at depths between 30 and 42 inches, by gray to light-gray fine sandy clay loam or fine sandy clay, mottled with pale	Pasture and a few acres of vegetables and truck crops.	Same	III-3.

HILLSBOROUGH COUNTY, FLORIDA

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Ea	Eustis fine sand: Level phase.....	0-2	Slow to medium.	Rapid.....	Strongly acid.....	Dark grayish-brown or grayish-brown fine sand, 2 to 6 inches thick.	yellow and grayish brown. Strong-brown to reddish-yellow, or yellowish-red loose fine sand.	Citrus fruits, pasture, and a few acres of watermelons and general crops.	Oaks; sand pines; a few saw-palmettos; rosemary; grasses.	IIIs-1.
Eb	Gently undulating phase.	2-8	Medium to rapid.	Rapid.....	Strongly acid.....	Same.....	Same.....	Same.....	Same.....	IIIs-1.
Fa	Felda fine sand.....	Level or slightly depressed.	Very slow or ponded.	Medium when freed of high water table.	Sand layers slightly acid; clayey materials slightly acid to alkaline.	Very dark gray or dark-gray fine sand, 3 to 9 inches thick.	Grayish-brown to light-gray fine sand over slightly mottled light brownish-gray or light-gray fine sandy clay loam; mottled light-gray, brownish-yellow, and yellow fine sandy clay loam containing a few lime and iron concretions at depths between 30 and 48 inches.	Pasture, vegetables, truck crops, and forest.	Grasses; a few pines; saw-palmettos; cabbage palmettos; gallberry bushes, myrtle bushes, and other shrubs.	IIIs-3.
Fb	Fellowship loamy fine sand.	0-8	Medium.....	Slow.....	Strongly acid.....	Very dark gray loamy fine sand containing a few pebbles; 4 to 8 inches thick.	Dark-gray loamy fine sand containing many pebbles to mottled gray, yellowish-brown, and yellow fine sandy clay, containing many pebbles and stones.	Pasture, general crops, forest.	Live oaks; pines; shrubs; grasses.	IIs-1.
Fc	Fort Meade loamy fine sand: Level phase.....	0-2	Slow to medium.	Medium to rapid.	Medium acid.....	Black loamy fine sand containing a few phosphatic pebbles; 10 to 20 inches thick.	Dark grayish-brown to grayish-brown or brown loamy fine sand containing many pebbles and small rounded stones in lower part.	Citrus fruits, vegetables, general crops, improved pasture, forest.	Oaks; hickory and other hardwoods; pines; grasses.	IIs-2.
Fd	Undulating phase.....	2-12	Medium to rapid.	Medium to rapid.	Medium acid.....	Same.....	Same.....	Same.....	Same.....	IIs-2.
Fe	Fresh water swamp (unclassified soils).	Level or depressions.	Soil covered by water during much of year.	Medium to rapid if freed of high water table.	Variable.....	Variable.....	Variable.....	Forest, refuges for wildlife.	Hardwoods; cypress; vines; shrubs; grasses.	Unclassified.
Ga	Gainesville loamy fine sand: Level phase.....	0-2	Slow to medium.	Medium to rapid.	Medium acid.....	Very dark grayish-brown loamy fine sand containing a few small phosphatic pebbles; 6 to 9 inches thick.	Dark-brown to strong-brown loamy fine sand containing a few pebbles and small stones.	Citrus fruits, general crops, improved pasture, forest.	Oaks; hickory; magnolia; pines; shrubs; grasses.	IIs-2.
Gb	Gently undulating phase.	2-5	Rapid.....	Medium to rapid.	Medium acid.....	Same.....	Same.....	Same.....	Same.....	IIs-2.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
la	Immokalee fine sand.....	0-2	Slow.....	Medium to rapid when freed of high water table.	Strongly to very strongly acid.	Dark-gray fine sand, 3 to 8 inches thick.	Gray to light-gray fine sand, between depths of 30 and 42 inches, overlying a very dark brown fine sand, weakly cemented layer grading to lighter color with depth.	Pasture, forest, and a few acres of vegetables.	Second-growth pine; saw-palmettos; runner oak; gallberry bushes; grasses.	IVs-2.
lb	Alkaline variant.....	0-2	Slow.....	Same.....	Upper part of profile strongly to very strongly acid; lower part, immediately below the hardpan, neutral to alkaline.	Same.....	Same.....	Pasture and forest.	Pines; saw-palmettos; shrubs; grasses.	IVs-2.
lc	Istokpoga peat.....	Level or slightly depressed.	Very slow or ponded.	Slow.....	Strongly to very strongly acid.	Black or very dark brown woody peat, 8 to 15 inches thick.	Dark reddish-brown to dark-brown woody peat underlain by gray or light-gray fine sand at depths of 30 to 60 inches.	Pasture, forest, and wildlife.	White and red bays; cypress; maple and other hardwoods; myrtle bushes; briars; vines; ferns; grasses.	IVs-4.
ld	Istokpoga mucky peat.....	Same.....	Same.....	Slow.....	Same.....	Black mucky peat, 6 to 10 inches thick.	Dark grayish-brown or reddish-brown woody peat over gray or light-gray fine sand.	Same.....	Same.....	IVs-4.
Ka	Kanapaha fine sand.....	0-2	Slow to medium.	Slow to medium.	Strongly acid.....	Dark-gray fine sand, 3 to 6 inches thick.	Light-gray or light yellowish-brown to very pale brown fine sand containing a few pebbles. Streaked in lower part with yellowish brown, and brownish yellow.	Vegetables, citrus fruits, pasture, and forest.	Gums; hickory; magnolia; oak; cabbage palmettos; saw-palmettos; pines; grasses.	IIIs-1.
Kb	Keri fine sand.....	0-2	Slow.....	Medium.....	Fine sand layers strongly acid to slightly acid. Marl layer strongly alkaline and overlies neutral to mildly alkaline fine sand.	Dark-gray or gray fine sand, 3 to 8 inches thick.	Light-gray or light brownish-gray fine sand over light-gray marl, streaked in places with yellow. Underlying layer mottled light-gray, brownish-yellow, and yellow fine sand.	Pasture, forest, and a few acres of vegetables.	Pines; runner oak; gallberry bushes; saw-palmettos; a few cabbage palmettos; grasses.	IVs-2.
Lb	Lakeland fine sand: Level phase.....	0-2	Slow to medium.	Rapid.....	Strongly to very strongly acid.	Dark-gray fine sand, 3 to 8 inches thick.	Yellowish-brown or brownish-yellow to light yellowish-brown loose fine sand.	Citrus fruits, watermelons, general crops, pasture, and forest.	Pines; a few shrubs and grasses; and bluejack oaks.	IIIs-1.
Ld	Gently undulating phase.....	2-5	Medium to rapid.	Rapid.....	Same.....	Same.....	Same.....	Same.....	Same.....	IIIs-1.
Le	Undulating phase.....	5-8	Rapid.....	Rapid.....	Same.....	Same.....	Same.....	Same.....	Oaks; a few pines; shrubs; grasses.	IIIs-1.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Lc	Shallow phase.....	0-5	Slow to medium.	Rapid through sandy layer; medium to slow through clayey materials.	Same.....	Same.....	Yellowish-brown to brownish-yellow fine sand underlain at depths of 30 to 42 inches by fine sandy clay loam or sandy clay.	Citrus fruits, general crops, and pasture.	Same.....	IIIs-1.
Lc	Level deep phase.....	0-5	Slow to rapid.	Rapid.....	Same.....	Gray or light-gray fine sand, 4 to 8 inches thick.	Yellowish-brown to pale-yellow fine sand; finer textured materials at depths greater than 72 inches.	Pasture.....	Scrub live oaks; a few turkey oaks; sand pines; rosemary; grasses.	IIIs-1.
Lf	Undulating deep phase.....	Undulating	Same.....	Rapid.....	Same.....	Same.....	Same.....	Pasture.....	Scrub live oaks; sand pines; rosemary; saw-palmettos; a few grasses.	IIIs-1.
Lg	Lakewood fine sand.....	0-2	Very slow because of rapid infiltration.	Medium to rapid.	Strongly acid throughout.	Light-gray or gray fine sand, 2 to 4 inches thick.	White fine sand to depths of 12 to 24 inches over yellow or brownish-yellow fine sand that grades to light gray and white with increasing depth.	Pasture, forest, and building sites.	Sand pine; scrub oak; undergrowth of saw-palmettos, rosemary, runner oak, pricklypear cactus, and wiregrass; few turkey and bluejack oaks.	IVs-1.
Lh	Leon fine sand.....	0-2	Slow.....	Medium to rapid if freed of high water table.	Very strongly acid.	Dark-gray fine sand, 3 to 8 inches thick.	Light-gray fine sand over the very dark grayish-brown or black pan that begins at depths of 14 to 30 inches; dark-brown to yellowish-brown fine sand below the organic pan.	Pasture, forest, vegetables, and strawberries.	Second-growth pine; saw-palmettos; a few gallberry bushes and runner oaks; wiregrass.	IVs-2.
Li	Heavy substratum phase.....	0-2	Slow.....	Same.....	Strongly acid; lower part of clayey material strongly acid to neutral or alkaline.	Same.....	Light-gray fine sand over very dark grayish-brown organic pan that begins at depths of 24 to 32 inches; light-gray to yellowish-brown sandy clay loam or sandy clay below organic pan.	Pasture and forest.	Pine; runner oaks, gallberry bushes, a few myrtle bushes; grasses.	IVs-2.
Lk	Light-colored surface phase.....	0-2	Slow to medium.	Same.....	Very strongly acid.	Light-gray or gray fine sand, 1 to 3 inches thick.	Light-gray fine sand over the very dark grayish-brown or black organic pan; dark-brown to yellowish-brown fine sand below the pan.	Pasture and forest.	Pines; saw-palmettos; a few gallberry bushes and runner oaks; wiregrass.	Vs-1.
Ma	Made land.....	Variable.....	Variable.....	Variable.....	Variable.....	Variable.....	Variable.....	Roadbuilding material, building sites, pasture, and forest.	Pines; grasses.....	Unclassified.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Mc	Manatee fine sandy loam	Level or slightly depressed.	Very slow or ponded.	Medium to slow when freed of high water table.	Upper layers slightly acid to neutral; lower layers neutral to alkaline.	Black fine sandy loam, 6 to 15 inches thick.	Black or very dark gray to mottled dark-gray or gray fine sandy clay underlain at depths within 42 inches by light-gray marl, streaked with pale yellow and gray.	Vegetables, pasture, and forest.	Hardwoods; cypress; a few cabbage palmettos; vines; shrubs; grasses; aquatic plants.	III-3.
Md	Manatee loamy fine sand	Same	Same	Same	Same	Black loamy fine sand, 9 to 20 inches thick.	Dark-gray or very dark gray fine sandy clay loam to mottled gray or light-gray fine sandy clay, in places underlain by marl that begins at depths of 30 to 36 inches.	Pasture, vegetables, and forest.	Hammock vegetation of oaks; cabbage palmettos; saw-palmettos; a few pines and cypress trees; aquatic plants.	III-3.
Mb	Manatee fine sandy clay, heavy variant.	Same	Very slow	Very slow	Upper layers slightly acid to neutral; lower layer alkaline.	Very dark gray or dark-gray fine sandy clay, 8 to 14 inches thick.	Gray or grayish-brown fine sandy clay, or streaked or mottled gray or grayish-brown fine sandy clay.	Pasture and forest.	Grasses; shrubs; a few pines and hardwoods.	III-3.
Me	Mines, pits, and dumps	Variable	Variable	Variable	Variable	Variable	Variable	Variable	Pines; saw-palmettos; shrubs; grasses	Unclassified.
Mf	Mixed alluvium, high bottom phase.	0-2	Slow	Slow to medium.	Upper layers slightly acid; lower layers strongly acid to neutral or mildly alkaline.	Dark-gray fine sand, 3 to 8 inches thick.	Grayish-brown to light-gray or very pale brown fine sand overlying mottled gray, light-gray, and yellowish-brown fine sandy clay loam; light brownish-gray fine sand at depths between 20 and 38 inches.	Pasture and forest.	Oaks; pines; saw-palmettos; shrubs; grasses.	IV-2.
Oa	Ona fine sand	0-2	Slow	Rapid if freed of high water table.	Strongly acid	Dark gray to black fine sand, 6 to 12 inches thick.	Dark-brown fine sand, color grading to light yellowish brown, and light gray with increasing depth.	Vegetables, strawberries, pasture, forest, and citrus fruits.	Pines; saw-palmettos; gallberry and myrtle bushes; grasses.	II-1.
Ob	Light-colored surface phase.	0-2	Slow	Same	Strongly acid	Light-gray to gray fine sand, 4 to 10 inches thick.	Same	Pasture, vegetables, strawberries, citrus fruits, and forest.	Pines; oaks; saw-palmettos; grasses.	III-2.
Oc	Orlando fine sand	0-2	Slow	Rapid	Strongly acid	Very dark gray fine sand, 9 to 15 inches thick.	Dark grayish-brown to yellowish-brown or light yellowish-brown fine sand.	Citrus fruits, vegetables, general crops, pasture, and forest.	Oaks; pines; grasses	III-1.
Pa	Pamlico muck	Level or depressed.	Very slow or ponded. Covered by water much of the time.	Medium when freed of the high water table.	Strongly acid	Black muck, 6 to 15 inches thick.	Black muck or mucky fine sand over dark-gray or gray fine sand, color grading to light gray with increasing depth.	Pasture, wildlife	Aquatic plants	III-4.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

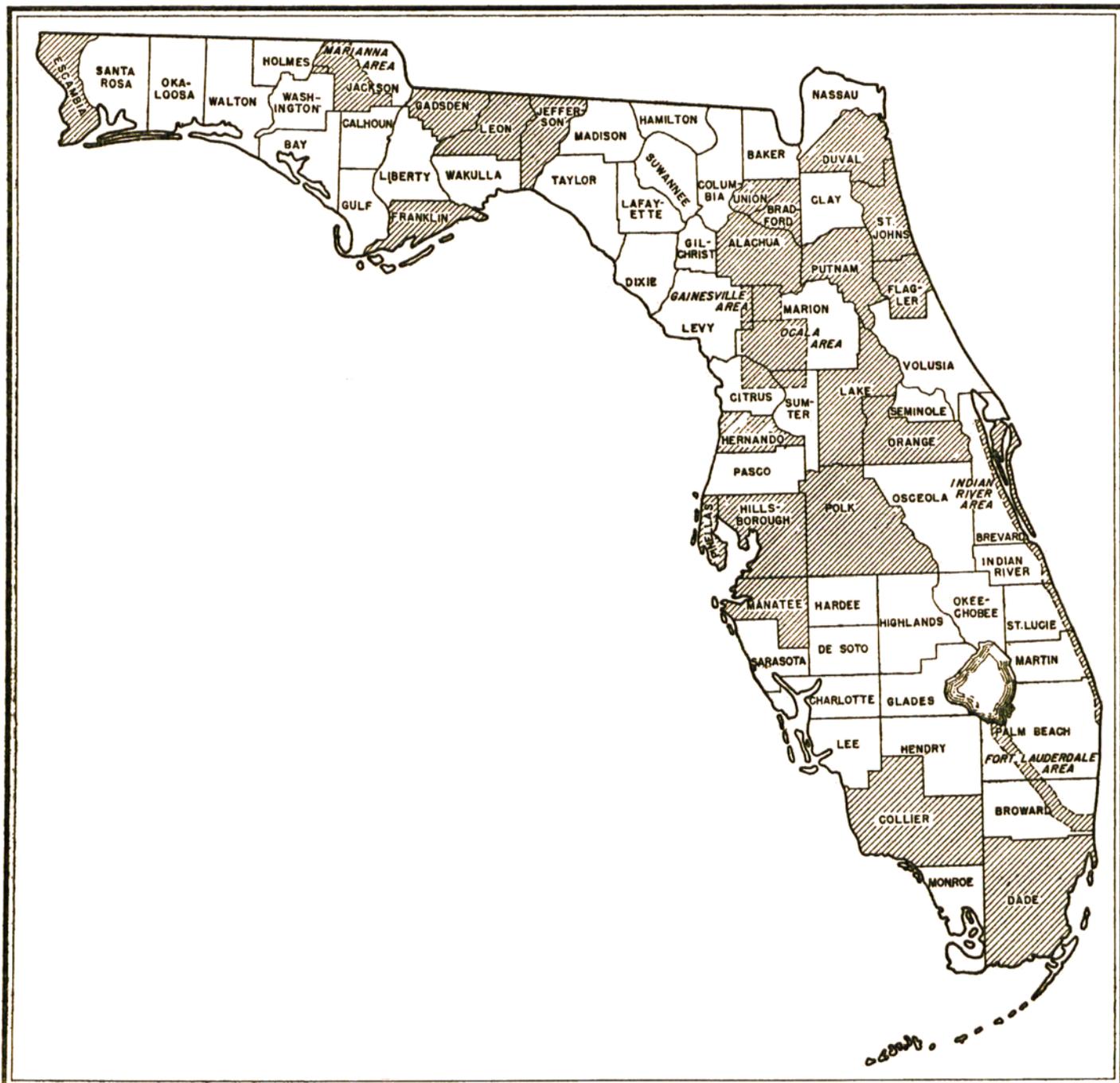
Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Pb	Parkwood fine sand.....	0-2	Slow.....	Medium to slow.	Sand layers slightly acid to mildly alkaline; marl slightly alkaline.	Dark-gray or grayish-brown fine sand, 4 to 8 inches thick.	Gray to light brownish-gray fine sand over light-gray marl.	Vegetables, pasture, and forest.	Cabbage palmettos; oaks and other hardwoods; pines; vines; bamboo briars; a few saw-palmettos.	III-2.
Pc	Peace River soils.....	0-2	Slow.....	Slow.....	Loamy fine sand layers slightly acid to neutral; clayey materials neutral to alkaline.	Black loamy fine sand, 8 to 14 inches thick.	Very dark gray or very dark grayish-brown loamy fine sand over dark-gray fine sandy clay streaked in a few places with yellowish brown; mottled gray, light-gray, and yellowish-brown fine sandy clay at depths between 26 and 40 inches.	Pasture, forest, wildlife.	Hardwoods; cypress; cabbage palmettos; vines; shrubs; grasses.	Unclassified.
Pd	Plummer fine sand.....	Nearly level or slightly depressed.	Very slow or ponded; sometimes under water.	Rapid when freed of high water table.	Strongly acid.....	Dark-gray or gray fine sand, 4 to 8 inches thick.	Light brownish-gray to light-gray or very pale brown fine sand.	Pasture and forest.	Grasses; a few saw-palmettos; shrubs; and pines.	IVs-3.
Pe	Shallow phase.....	Same.....	Same.....	Same.....	Strongly acid.....	Same.....	Same.....	Pasture and forest.	Same.....	IVs-3.
Pf	Pomello fine sand.....	0-2	Slow to medium.	Rapid.....	Strongly acid.....	Gray or dark-gray fine sand, 3 to 6 inches thick.	Light-gray through white fine sand to depths of 42 inches.	Pasture, gladioli, and building sites.	Saw-palmettos; oaks; grasses.	Vs-1.
Pg	Pompano fine sand.....	Level or nearly level.	Slow or ponded; sometimes covered by water.	Rapid when freed of high water table.	Upper part slightly acid to neutral; lower part neutral to alkaline.	Dark-gray or dark grayish-brown fine sand, 4 to 8 inches thick.	Grayish-brown to light brownish-gray or light-gray fine sand.	Pasture, vegetables, truck crops.	Grasses; pines; cabbage palmettos; saw-palmettos.	IVs-3.
Ph	Shallow phase.....	Level areas or slightly depressed.	Same.....	Rapid to medium when freed of high water table.	Same.....	Same.....	Grayish-brown to light brownish-gray or light-gray fine sand underlain, at depths between 30 and 42 inches, by grayish-brown to light-gray fine sandy clay loam or fine sandy clay, mottled yellowish brown and yellow.	Pasture and vegetables.	Same.....	IVs-3.
Pk	Portsmouth fine sand.....	Level or slightly depressed.	Very slow or ponded.	Medium to slow when freed of high water table.	Strongly acid.....	Black to very dark gray fine sand, 10 to 15 inches thick.	Gray to light-gray fine sand over mottled light-gray, yellowish-brown, and yellow fine sandy clay loam.	Pasture, forest, and vegetables.	Grasses; shrubs; pines; a few cypress and hardwood trees.	IVs-3
Pl	Portsmouth mucky fine sand.	Same.....	Same.....	Same.....	Strongly acid.....	Black to very dark gray mucky fine sand, 8 to 15 inches thick.	Very dark gray or black fine sand, underlain by gray and yellowish-brown fine sandy clay or fine sandy clay loam.	Same.....	Grasses; shrubs; hardwoods; vines.	IVs-3.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
R _a	Rains fine sand.....	Same.....	Very slow..	Medium when freed of high water table.	Strongly acid...	Dark-gray or gray fine sand, 4 to 8 inches thick.	Light-gray or light brownish-gray fine sand over gray or grayish-brown fine sandy clay, streaked with strong brown and yellow; mottled light brownish-gray fine sandy clay at depths between 28 and 48 inches.	Same.....	Grasses; shrubs; a few pines.	IVs-3.
R _b	Ruskin fine sand.....	Level or nearly level.	Slow.....	Same.....	Medium acid in upper part to slightly acid or neutral in lower part.	Dark-gray fine sand, 4 to 9 inches thick.	Light-gray fine sand, over mottled brownish-yellow or yellowish-brown fine sandy clay loam; white and pale-yellow shell marl at depths between 24 and 42 inches.	Vegetables, truck crops, pasture, and forests.	Pines; saw-palmettos; runner oaks; grasses.	IIIs-2.
R _c	Rutlege fine sand.....	Nearly level or slightly depressed.	Very slow to ponded.	Rapid when freed of high water table.	Strongly acid...	Black fine sand, 9 to 15 inches thick.	Very dark gray to dark-gray fine sand over mottled light-gray, pale-yellow, and brownish-yellow fine sand.	Pasture, vegetables, and strawberries.	Grasses; shrubs; pines; hardwoods; cypress trees.	IIIs-3.
R _d	Shallow phase.....	Same.....	Same.....	Moderate when freed of high water table.	Strongly acid...	Same.....	Very dark gray to light gray or light brownish-gray fine sand over mottled grayish-brown, light olive-brown, and yellowish-brown fine sandy clay at depths between 30 and 42 inches.	Same.....	Same.....	IIIs-3.
R _e	Rutlege mucky fine sand.	Same.....	Same.....	Rapid when freed of high water table.	Strongly acid...	Black mucky fine sand, 6 to 15 inches thick.	Black or very dark gray fine sand, grading to lighter colors with increasing depth.	Same.....	Grasses; shrubs; cypress and hardwood trees.	IIIs-3.
S _d	St. Lucie fine sand.....	Nearly level..	Very slow because of rapid infiltration.	Rapid.....	Strongly acid...	Light-gray or gray fine sand, 2 to 4 inches thick.	Light-gray to white fine sand.	Pasture and refuges for wildlife.	Live oaks; sand pines; rosemary; saw-palmettos; prickly-pear cactus; grasses.	VIIIs-1.
S _g	Sandy local alluvium.....	Small depressions on bases of slopes.	Medium to slow.	Rapid.....	Strongly acid...	Very dark gray fine sand, 6 to 12 inches thick.	Gray to mottled very pale brown fine sand.	General crops, pasture.	Oaks; pines; shrubs; grasses.	IIw-1.
Y _b	Scranton fine sand.....	0-2	Slow.....	Medium if freed of high water table.	Strongly acid...	Black fine sand, 9 to 15 inches thick.	Dark grayish-brown to pale-yellow, very pale brown, and brownish-yellow fine sand mottled in lower part.	Vegetables, strawberries, citrus fruits, pasture, forest.	Pine; saw-palmettos; shrubs; grasses.	IIIs-1.
Sc	Shallow ponds with grass.	Depressions...	Covered by water during much of year.	Covered by water during much of year.	Surface layer strongly acid; lower part strongly acid to alkaline.	Variable.....	Light-gray or gray fine sand.	Refuges for wildlife, pasture.	Water-tolerant plants..	Unclassified.

SUMMARY OF IMPORTANT CHARACTERISTICS—Continued

Map symbol	Soil	Relief or percent slopes	Drainage		Reaction	Surface soil	Lower layers	Principal uses	Principal native vegetation	Capability unit
			Surface runoff	Internal						
Se	Sunniland fine sand: Moderately shallow over marl.	Level or nearly level.	Slow.....	Medium to slow through the sandy clay loam layer.	Upper part strongly acid; lower part neutral to alkaline.	Dark-gray fine sand, 3 to 8 inches thick.	Light-gray fine sand over mottled yellowish-brown, strong-brown, and light-gray fine sandy clay or fine sandy clay loam; white marl at depths between 40 and 48 inches.	Pasture, forest, vegetables.	Pines; cabbage palmettos; saw-palmettos; oaks; waxmyrtle bushes; grasses.	IIIs-2.
Sf	Shallow over marl.....	Same.....	Slow.....	Medium to slow.	Same.....	Same.....	Light-gray fine sand over brown, stained layer; brownish-yellow and yellowish-brown fine sandy clay at depths between 14 and 22 inches, underlain by white marl, streaked with yellow.	Pasture, forest, and vegetables.	Pines; oaks; cabbage palmettos; saw-palmettos; shrubs; grasses.	IIIs-2.
Ta	Terra Ceia peaty muck.....	Level or slightly depressed.	Very slow. or ponded.	Rapid when freed of high water table. Covered by water for long periods.	Slightly acid to neutral in upper part; neutral or mildly alkaline in lower part.	Black peaty muck, 10 to 15 inches thick.	Black or very dark brown muck over dark gray or very dark gray fine sandy clay loam; light gray fine sandy clay at depths between 20 and 36 inches.	Pasture and vegetables.	Water-tolerant plants	IIIs-4.
Tb	Tidal marsh (unclassified soils).	Level or nearly level.	Covered by high tides.	Covered by high tides.	Variable.....	Nearly black mucky fine sand to dark-gray fine sand, 3 to 8 inches thick.	Light-gray or gray fine sand, mixed with shells.	Refuges for wildlife.	Salt-tolerant grasses.	Unclassified.
Tc	Tidal swamp (unclassified soils).	Same.....	Same.....	Same.....	Variable.....	Variable.....	Light-gray or gray fine sand or sandy clay loam.	Same.....	Salt-tolerant grasses.	Unclassified.



Areas surveyed in Florida shown by shading.

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