United States Department of Agriculture

Soil Conservation Service

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

Soil Survey of Putnam County Area, Florida

How To Use This Soil Survey

General Soil Map

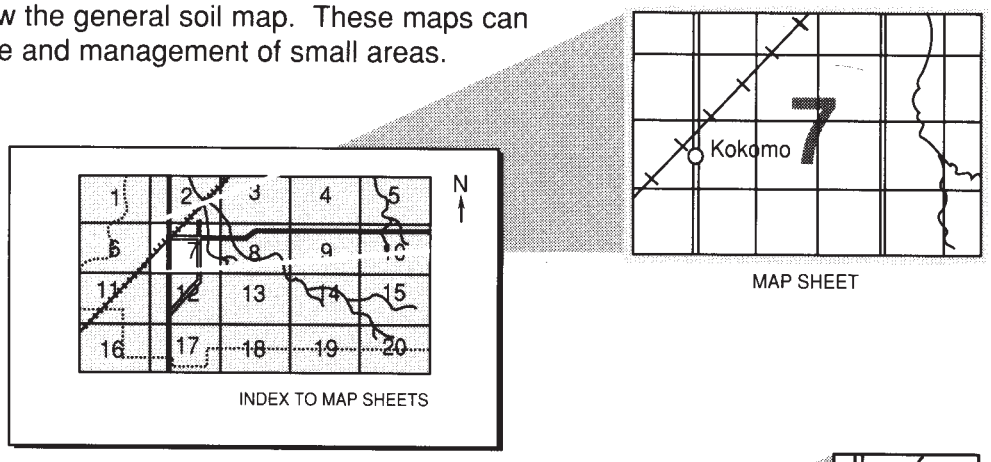
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

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

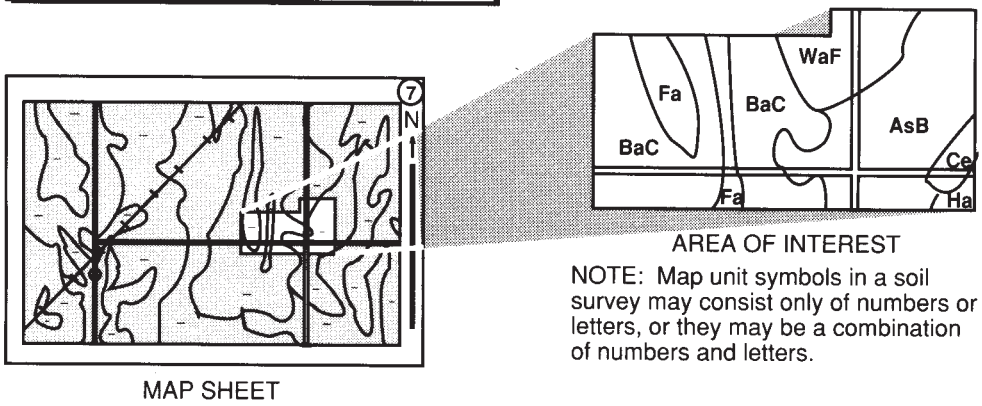
Detailed Soil Maps

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

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



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



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

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

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1985. Soil names and descriptions were approved in 1985. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1985. This soil survey was made cooperatively by the Soil Conservation Service and the University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations and Soil Science Department, and Florida State Department of Agriculture and Consumer Services. It is part of the technical assistance furnished to the Putnam Soil and Water Conservation District. The Putnam County Board of Commissioners contributed financially to accelerate the completion of the fieldwork for this survey.

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

This survey supercedes the soil survey of Putnam County published in 1914 *(13)*.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Leatherleaf fern is grown under a protective canopy in an area of Centenary fine sand.

Contents

Index to map units iv
Summary of tables v
Foreword vii
General nature of the survey area 1
How this survey was made 6
Map unit composition 7
General soil map units 9
Detailed soil map units 17
Use and management of the soils 69
Crops and pasture 69
Grazeable woodland 73
Woodland management and productivity 75
Recreation 78
Wildlife habitat 78
Engineering 79
Soil properties 85
Engineering index properties 85
Physical and chemical properties 86
Soil and water features 87
Physical, chemical, and mineralogical analyses of selected soils 88
Engineering index test data 91
Classification of the soils 93
Soil series and their morphology 93
Formation of the soils 127
Factors of soil formation 127
Processes of soil formation 128
References 129
Glossary 131
Tables 139

Soil Series

Adamsville series 93
Apopka series 94
Astatula series 95
Astor series 95
Bluff series 96
Bonneau series 96
Candler series 97
Cassia series 98
Centenary series 99
Deland series 99
Electra series 100
Florahome series 101
Floridana series 101
Hobe series 102
Holopaw series 103
Hontoon series 103
Immokalee series 104
Lochloosa series 105
Malabar series 105
Millhopper series 106
Monteocha series 107
Mulat series 108
Myakka series 109
Narcoossee series 109
Newnan series 110
Okeechobee series 111
Ona series 111
Orsino series 112
Paisley series 113
Palmetto series 114
Paola series 114
Placid series 115
Pomona series 115
Pompano series 116
Riviera series 117
Samsula series 118
Shenks series 118
Sparr series 119
St. Johns series 120
Surrency series 120
Tavares series 121
Terra Ceia series 121
Tomoka series 122
Wabasso series 123
Wauchula series 123
Winder series 124
Zolfo series 125

Issued March 1990

Index to Map Units

1—Candler fine sand, 0 to 5 percent slopes 17
2—Candler fine sand, 5 to 8 percent slopes 18
3—Myakka fine sand 19
4—Zolfo fine sand 20
5—Placid fine sand, depressional 21
6—Tavares fine sand, 0 to 5 percent slopes 22
7—Immokalee fine sand 23
8—Arents, 0 to 2 percent slopes 24
9—Pomona fine sand 24
10—Pompano fine sand 25
11—Udorthents, excavated 26
12—Electra fine sand 26
13—St. Johns fine sand, depressional 27
14—Cassia fine sand 28
15—Apopka sand, 0 to 5 percent slopes 28
16—Adamsville sand 29
17—Millhopper sand, 0 to 5 percent slopes 30
18—Lochloosa sand, 0 to 5 percent slopes 31
19—Pomona fine sand, depressional 32
20—Bluff sandy clay loam, frequently flooded 32
21—Apopka sand, 5 to 8 percent slopes 33
22—Tomoka muck 34
23—Palmetto fine sand 35
24—Holopaw fine sand, frequently flooded 36
25—Narcoossee fine sand 36
26—Terra Ceia muck, frequently flooded 37
27—Samsula muck 38
28—Centenary fine sand 38
29—Riviera fine sand, frequently flooded 39
30—Hontoon muck 40
31—Myakka fine sand, depressional 41
32—Sparr sand, 0 to 5 percent slopes 41
33—Winder fine sand 42
34—Riviera fine sand 43
35—Malabar fine sand 44
36—Shenks muck, frequently flooded 45
37—Ona fine sand 46
38—Holopaw fine sand 46
39—Holopaw fine sand, depressional 47
40—Paola fine sand, 0 to 8 percent slopes 48
41—Millhopper sand, 5 to 8 percent slopes 49
42—Riviera fine sand, depressional 49
43—Placid-Pompano association, frequently flooded 50
44—Candler sand, 12 to 25 percent slopes 51
45—Astatula fine sand, 0 to 8 percent slopes 52
46—Astatula fine sand, 8 to 15 percent slopes 52
47—Myakka-Urban land complex 53
48—Florahome sand 54
49—Bonneau fine sand, 0 to 5 percent slopes 54
50—Wabasso fine sand 55
51—Surrency fine sand, depressional 56
52—Orsino fine sand, 0 to 8 percent slopes 57
53—Zolfo-Urban land complex 58
54—Candler-Urban land complex, 0 to 8 percent slopes 58
55—Centenary-Urban land complex, 0 to 5 percent slopes 59
56—Mulat fine sand 60
57—Deland fine sand, 0 to 8 percent slopes 60
58—Wauchula fine sand 61
59—Floridana fine sand 62
60—Astor mucky fine sand, frequently flooded 63
61—Newnan fine sand 64
62—Monteocha sand, depressional 65
63—Okeechobee muck 65
64—Paisley loamy fine sand 66
65—Hobe fine sand, 0 to 5 percent slopes 67

Summary of Tables

Temperature and precipitation (table 1) 140

Freeze data (table 2) 141

Acreage and proportionate extent of the soils (table 3) 142
Acres. Percent.

Land capability and yields per acre of crops and pasture (table 4) 144
Land capability. Irish potatoes. Cabbage. Watermelons. Oranges. Improved bermudagrass. Improved bermudagrass hay. Leatherleaf fern.

Grazeable woodland sites (table 5) 148
Soil. Woodland sites.

Grazeable woodland sites potential productivity (table 6) 151
Woodland sites. Annual production in excellent grazing condition. Air-dry weight herbage. Important grazing plants. Percent of cover in excellent condition.

Woodland management and productivity (table 7) 152
Ordination symbol. Management concerns. Potential productivity. Trees to plant.

Recreational development (table 8) 161
Camp areas. Picnic areas. Playgrounds. Paths and trails. Golf fairways.

Wildlife habitat (table 9) 166
Potential for habitat elements. Potential as habitat for—Openland wildlife, Woodland wildlife, Wetland wildlife.

Building site development (table 10) 170
Shallow excavations. Dwellings without basements. Dwellings with basements. Small commercial buildings. Local roads and streets. Lawns and landscaping.

Sanitary facilities (table 11) 175
Septic tank absorption fields. Sewage lagoon areas. Trench sanitary landfill. Area sanitary landfill. Daily cover for landfill.

Construction materials (table 12) 181
Roadfill. Sand. Gravel. Topsoil.

Water management (table 13) 185
Limitations for—Pond reservoir areas; Embankments, dikes, and levees; Aquifer-fed excavated ponds. Features affecting—Drainage, Irrigation, Terraces and diversions, Grassed waterways.

Engineering index properties (table 14) 192
Depth. USDA texture. Classification—Unified, AASHTO. Fragments greater than 3 inches. Percentage passing sieve—4, 10, 40, 200. Liquid limit. Plasticity index.

Physical and chemical properties of the soils (table 15) 200
Depth. Clay. Moist bulk density. Permeability. Available water capacity. Soil reaction. Shrink-swell potential. Erosion factors. Wind erodibility group. Organic matter.

Soil and water features (table 16) 205
Hydrologic group. Flooding. High water table. Subsidence. Risk of corrosion.

Depth to water table in selected soils (table 17) 209
Soil. Year. Month.

Physical properties of selected soils (table 18) 211
Depth. Horizon. Particle-size distribution. Hydraulic conductivity. Bulk density. Water content.

Chemical properties of selected soils (table 19) 215
Depth. Horizon. Extractable bases. Extractable acidity. Sum of cations. Base saturation. Organic carbon. Electrical conductivity. pH. Pyrophosphate extractable. Citrate-dithionite extractable.

Clay mineralolgy of selected soils (table 20) 219
Depth. Horizon. Percentage of clay minerals.

Engineering index test data (table 21) 221
Report number. Classification. Mechanical analyses. Liquid limit. Plasticity index. Moisture density.

Classification of the soils (table 22) 224
Family or higher taxonomic class.

Foreword

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

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

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

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

James W. Mitchell
State Conservationist
Soil Conservation Service

Location of Putnam County Area in Florida.

Soil Survey of Putnam County Area, Florida

By Elmer L. Readle, Soil Conservation Service

Fieldwork by Robert Baldwin, Jeffrey E. Leppo, Alfred O. Jones, Cornelius J. Heidt, Brian F. Grissi, and Duane T. Simonson, Soil Conservation Service

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

PUTNAM COUNTY AREA is in the northeast part of peninsular Florida. It is bordered on the north by Clay County, on the west by Alachua County, on the south by Marion County, on the southeast by Volusia County, and on the east by Flagler and St. Johns Counties. Orange Creek, Rodman Reservoir, and the Oklawaha River form part of the border on the south. Crescent Lake forms part of the border on the southeast. St. Johns River forms part of the border on the northeast.

The survey area, which does not encompass all of Putnam County, covers 444,604 acres, or 694 square miles. 24,000 acres of the Ocala National Forest is in Putnam County but is not included in this survey.

At its widest point, the survey area is about 34 miles long from north to south and is about 32 miles wide from east to west. The county seat is Palatka. According to the 1980 census, the population of Palatka was 10,975. The total population of Putnam County was 50,549.

Agriculture, forestry, and wood product industries are the main enterprises.

General Nature of the Survey Area

In this section, environmental and cultural factors that affect the use and management of the soils in the Putnam County Area are discussed. These factors are climate, history and development, geomorphology and geology, water resources, farming, and transportation.

Climate

Data and information prepared by the National Climatic Data Center, Asheville, North Carolina, and from data collected by the University of Florida, Agriculture Research Center, Hastings, Florida *(20)*.

Putnam County has a humid, subtropical climate. The summers are long, warm, and relatively humid. The winters are mild and relatively dry. Nearness to the Atlantic Ocean causes some climatic differences in the county. The frequency of frost or freezing temperatures is greater in the western part of the county, and rainfall is more frequent in the eastern part. The prevailing winds are northerly in fall and winter and southerly in spring and summer. Average windspeed is 12 to 18 miles per hour during the day, and it mostly is under 8 miles per hour at night. Tropical storms are not a great hazard in Putnam County. Generally, the Atlantic storms do not approach this area sufficiently close to cause sustained high winds. Tropical storms on occasion produce intense, heavy rains in the area. Tornadoes occasionally occur in the county. Storm paths have been short and narrow, and according to available records, damage has not been extensive.

In summer, temperatures vary only slightly from day to day. The average daily maximum temperature is 89

degrees F, and the average daily minimum temperature is 70 degrees. Afternoon temperatures reach 90 degrees or higher with great regularity, and at night temperatures may fall to the 70's. Although temperatures above 100 degrees have been recorded, their occurrence is rare. In winter, temperatures vary considerably from day to day as periodic cold fronts move southward across the State. These cold waves seldom last more than 3 or 4 days. The second day after the front passes is generally the coldest. Temperatures may vary from the 70's during midday to an early morning low in the 30's. In winter, the average daily maximum temperature is 67 degrees, and the average daily minimum temperature is 40 degrees. Temperatures of 32 degrees or lower, which occur 8 to 10 times per year, have been recorded as early as November 3 and in spring as late as March 26. A low temperature of 15 degrees was recorded January 13, 1981. Table 1 gives data on temperatures and precipitation for the survey area from 1952 to 1984. Table 2 shows freeze probabilities.

Actual rainfall averages about 56 inches. Approximately 60 percent of the annual rainfall occurs between June and September. Most rainfall occurs as convection thundershowers late in the afternoon and evening. The drier months are October and November. From October through May, the rainfall is more evenly distributed and may occur at anytime of the day. Most of this rain is associated with frontal passages.

During winter and early in the spring, heavy fog forms frequently at night but generally dissipates by early morning. In spring, the relative humidity in the afternoon ranges from 40 to 50 percent; and from June through September, it ranges from 40 to 60 percent. The humidity may rise to 90 or 95 percent early in the morning, causing a heavy dew.

History and Development

Janice S. Mahaffey, archivist, Putnam County Archives and History Commission, assisted in preparing this section.

Putnam County was created on January 13, 1849, from parts of Alachua, St. Johns, Duval, Marion, and Mosquito (Orange) Counties. In the middle of the 19th century, the county seat was established at Palatka, also known as Pilatka.

The county was named in honor of Benjamin Alexander Putnam, Surveyor-General of East Florida. He also served as a state legislator and as a circuit judge. He later became the first president of the Florida Historical Society. A common misconception is that the county was named in honor of Israel Putnam of Revolutionary War fame.

One of the first settlers in Putnam County was Denys Rolles, Esq., who established Rollestown, also known as Rolleston or Charlotia, in the area that is now known as East Palatka. Rolles received a 20,000 acre land grant from Governor James Grant when Florida was ruled by England, and he was promised an additional 20,000 acres if he could establish and populate this area.

John Bartram and his son, William, plied the St. Johns River together in 1768. William returned alone in 1774 and wrote about his adventures in Bartram's Travels. He gave a detailed account of his trip and what he saw of this area in the middle of the 17th century. In his writings, Bartram makes reference to "Spaulding's Upper Store." This trading point was in Putnam County, in an area that is now known as Stokes Landing. Spaulding traded extensively with the Indians in the area. Bartram also visited and wrote about Mount Royal, the largest Indian ceremonial mound in Florida. Mount Royal is in the area of Welaka.

James Marver, who has been credited with being the first settler of Palatka, established a trading post in 1821, which was in the area where Memorial Bridge now crosses the St. Johns River. It was a viable trading post until the outbreak of the Seminole War, when it was burned by the Indians.

In about 1832 and during the outbreak of the Second Seminole War, the United States established Fort Shannon, which was in the area where the Post Office now stands. Palatka had the beginnings of maintained roads, businesses, law and order, and permanent buildings.

Putnam County continued to progress during the 1850's when Palatka was designated headquarters for deep water navigation *(8)*. This enabled large ocean steamers to use Palatka as a port of entry. Hubbard L. Hart, owner of a line of steamers, received permission from officials at the State capitol in Tallahassee to open up the Ockalawaha River for navigation. The opening of the river for navigation brought commerce to the area even before the Civil War. The steamboat industry was established, and many of the steamers that were in existence before the war were commissioned for use by the Confederate Army. Some of these vessels were later captured by the Federal troops. After the war, Hart decided that the beauty of the Ockalawaha River was a marketable item, and he established a boat excursion, which was named the Silver Springs Run. These excursion boats traveled from Palatka to Silver Springs and back. The round trip took about 3 days.

During the peak of the steamboat era, from about the 1870's to the 1920's, Putnam County had approximately six major boat lines that plied the St. Johns River.

After the Civil War, Putnam County was mainly developed by northerners, who were interested in the newly developing citrus industry. One of the main areas was in the southern part of Putnam County, and it was known as the Fruitland Peninsula. This area became the "citrus belt." Citrus was a viable industry until the freeze of 1894-95. At this time, "the citrus belt" moved to central Florida. The citrus industry persisted in the county, but on a smaller scale, even after most of the the citrus industries moved from the area.

On November 7, 1884, another disaster struck Palatka. A fire destroyed three commercial blocks, two banks, two major hotels, warehouses, and numerous businesses. As a result of the fire, many businesses moved elsewhere, and Palatka was no longer the second largest city on the St. Johns River. Jacksonville became a major port of entry for the shipping industry. Palatka never fully recovered from the "Great Fire."

During the 1920's, a local campaign to have Palatka become the Capitol of Florida began. The argument was that Palatka was centrally located, and numerous railroad lines ran through the heart of the city. Proponents of this campaign felt that moving the capitol to Palatka from Tallahassee could better serve the State of Florida.

Geomorphology and Geology

Thomas M. Scott, Ph.D., senior geologist, Department of Natural Resources, Florida Geological Survey, Bureau of Geology, prepared this section.

Several geomorphic features are recognized in Putnam County *(23)*. The highland parts of the county include the Northern Highlands, the Duval Upland, the Crescent City Ridge, and relatively isolated features including the Teasdale Hill, Palatka Hill, San Mateo Hill, and Welaka

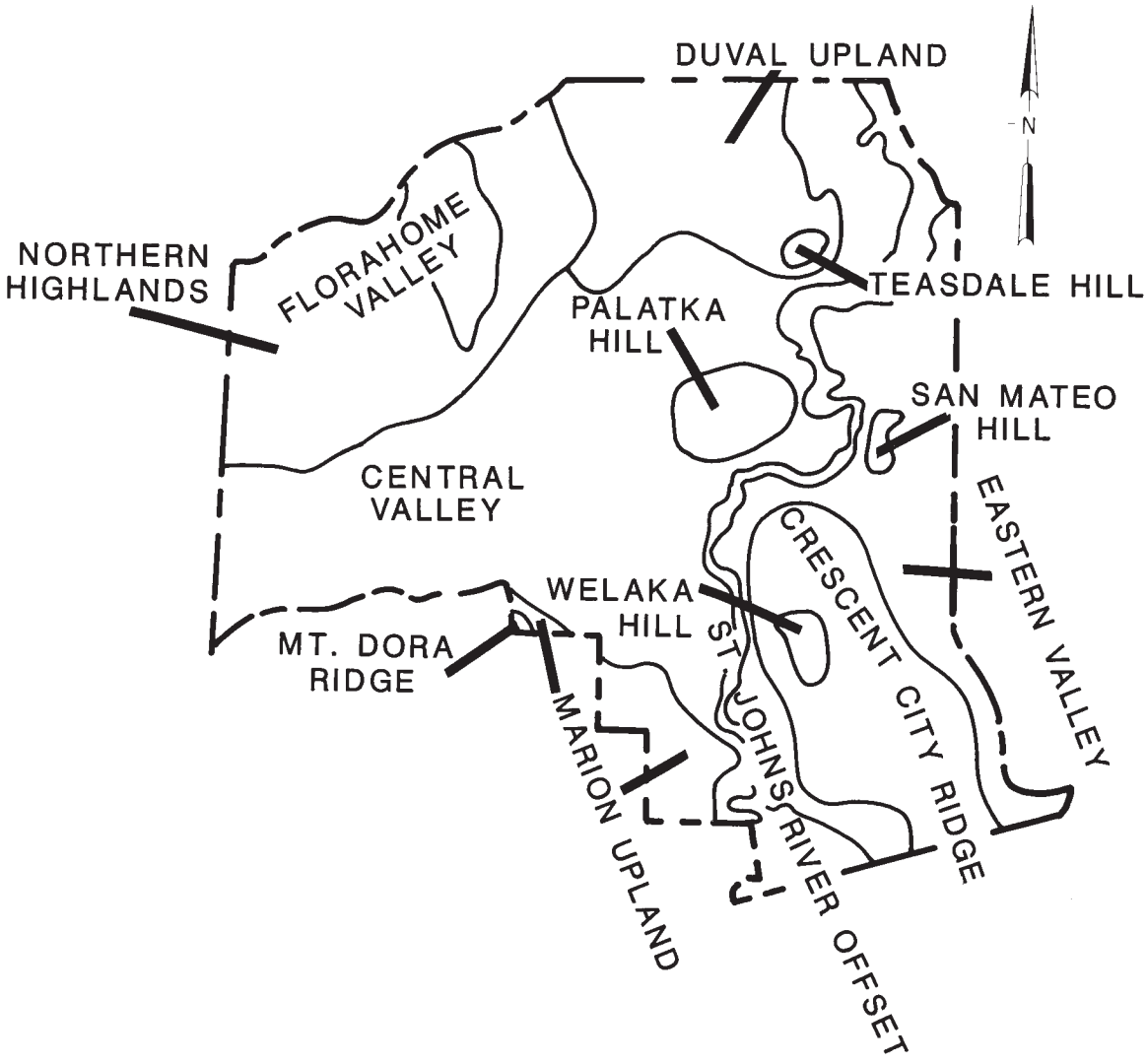


Figure 1.—Geomorphic features of Putnam County.

Hill. The Marion Uplands and the Mount Dora Ridge occur in a very small section of southwestern Putnam County (fig. 1).

The lower lying regions of Putnam County are in the Central Valley, the St. Johns River Offset, and the Eastern Valley.

The Florahome Valley, which is near the edge of the Northern Highlands, is a unique and interesting geomorphic feature. This valley is a flat-floored basin surrounded by higher hills. Some believe that the Florahome Valley was a large depression that resulted from the dissolution of the underlying limestone of the Eocene age.

Putnam County is underlain by sedimentary rocks with an average thickness of nearly 4,000 feet that range in age from the early Paleozoic era to the Recent. The sediments of the Cenozoic era consist of carbonate sediments, mostly dolomite and limestone, which are dominant in the Paleogene section, and clastic sediments, mostly sand and clay, which are dominant in the Neogene section (fig. 2). The strata of the Cenozoic era are nearly 1,800 feet thick in this area.

The oldest Cenozoic era sediments in this area belong to the Cedar Keys Formation of Paleocene age. This formation consists of soft to hard, fossiliferous limestone and dolomite with variable percentages of anhydrite and gypsum. The Cedar Keys Formation is approximately 500 feet thick. The top of the formation is between depths of 1,500 and 1,700 feet below sea level. This formation does not contain potable water.

Overlying the Cedar Keys Limestone is the Oldsmar Limestone of Early Eocene age. The Oldsmar Limestone consists of soft to hard, fossiliferous limestone and dolomite with minor amounts of evaporites (anhydrite and gypsum). It is separated from the Cedar Keys Limestone by color change and by its included fossil content. The Oldsmar Limestone ranges from 400 to 500 feet in thickness. The top of the unit is between depths of 1,000 and 1,200 feet below sea level. The Oldsmar Limestone also does not contain potable water.

The Middle Eocene age carbonates of northern Florida Park Limestone are referred to as the Avon Park Limestone. This unit consists of beds of soft to hard, variably fossiliferous, white to brown carbonates of limestone and dolomite. Grain size ranges from sand size to clay size. Some beds are very porous and permeable, while others are impermeable. These sediments range from 450 to 740 feet in thickness. The top of the Avon Park Limestone generally is 250 to 300 feet below sea level in this area. This formation forms the lower part of the Floridan Aquifer and supplies potable water to wells drilled into it.

The Late Eocene age Ocala Group limestones are underlain by the Avon Park Limestone in the Putnam County Area. In ascending order, the Ocala Group consists of the Inglis Formation, Williston Formation, and the Crystal River Formation. The group is composed of white to buff limestones that are generally fossiliferous, poorly indurated, and granular. The limestones range

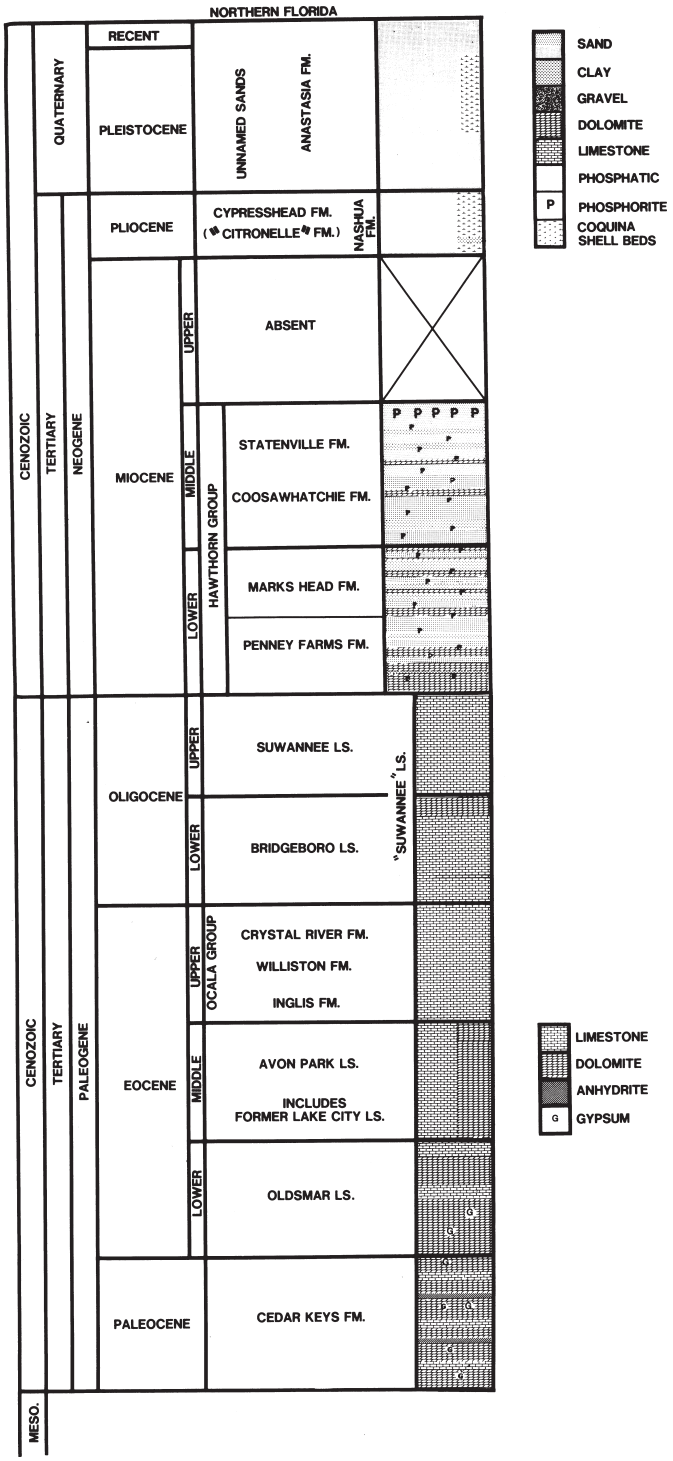


Figure 2.—Cenozoic stratigraphic column.

from fine to coarse. Dolomite is not common in the Ocala Group.

The formations of the Paleogene section generally are considered to be unconformably related to each other; that is, the top of each unit has been subjected to erosion or nondeposition for some time before the overlying unit was deposited. These missing intervals may span millions of years. In these sediments, however, it is often difficult to recognize the unconformity because of the very similar nature of the sediments on either side of the unconformity. The unconformity, however, at the top of the Ocala Group is very easily recognized. The sandy, phosphatic dolomites of the basal Miocene age contrast markedly with the fossiliferous limestones of the Late Eocene age. The unconformity also represents the longest span of time of an unconformity encountered in this area. The amount of time missing from the sedimentary record may span as much as 15 million years, from the middle part of the Late Eocene age section to the base of the Miocene age section. The Oligocene age section is completely absent in the northeastern part of Florida.

Overlying the unconformity on the top of the Ocala Group are the sediments of the Miocene Hawthorn Group. The Hawthorn Group is characterized as a complex lithologic sequence of interbedded carbonates, generally dolomite, and clastics of quartz sands and clays *(11)*. The Hawthorn Group is composed of, in ascending order, the Penney Farms Formation, the Marks Head Formation, and the Coosawhatchie Formation *(12)*.

The Early Miocene age Penney Farms Formation consists of quartz, sandy, phosphatic dolomites interbedded with dolomitic, clayey, phosphatic quartz sands and clays. Dolomite is most abundant in the lower part of the formation. The Penney Farms Formation is over the entire county, ranging in thickness from a few feet to 50 feet. The top ranges from 25 to 200 feet below sea level.

The Early Miocene age Marks Head Formation is a complex, interbedded sequence of dolomites, clays, and quartz sands. Lithologically, the sediments range from quartz sandy, phosphatic dolomites to quartz sandy, dolomitic, phosphatic clays and clayey, dolomitic, phosphatic quartz sands. Because of erosion, this unit is absent in southeastern Putnam County. It ranges up to 75 feet in thickness in other parts of the county. The top of the Marks Head Formation is between 50 feet above mean sea level and 100 feet below mean sea level.

The Middle Miocene age Coosawhatchie Formation, the uppermost formation of the Hawthorn Group, consists of quartz sandy, clayey, phosphatic dolomites and dolomitic, clayey, phosphatic quartz sands with some clay beds, particularly near the base of the unit. Because of erosion, this formation is absent in the southeastern part of the county. It attains a maximum thickness of 50 feet in other parts of the county. The top of the Coosawhatchie Formation ranges from 75 feet above mean sea level to 74 feet below mean sea level.

Sediments of the Hawthorn Group typically provide very little water to wells. The Hawthorn Group typically is considered as the aquiclude or aquitard, sealing the underlying Floridan Aquifer (fig. 3).

The sediments overlying the Hawthorn Group have often been discussed as post-Hawthorn Undifferentiated

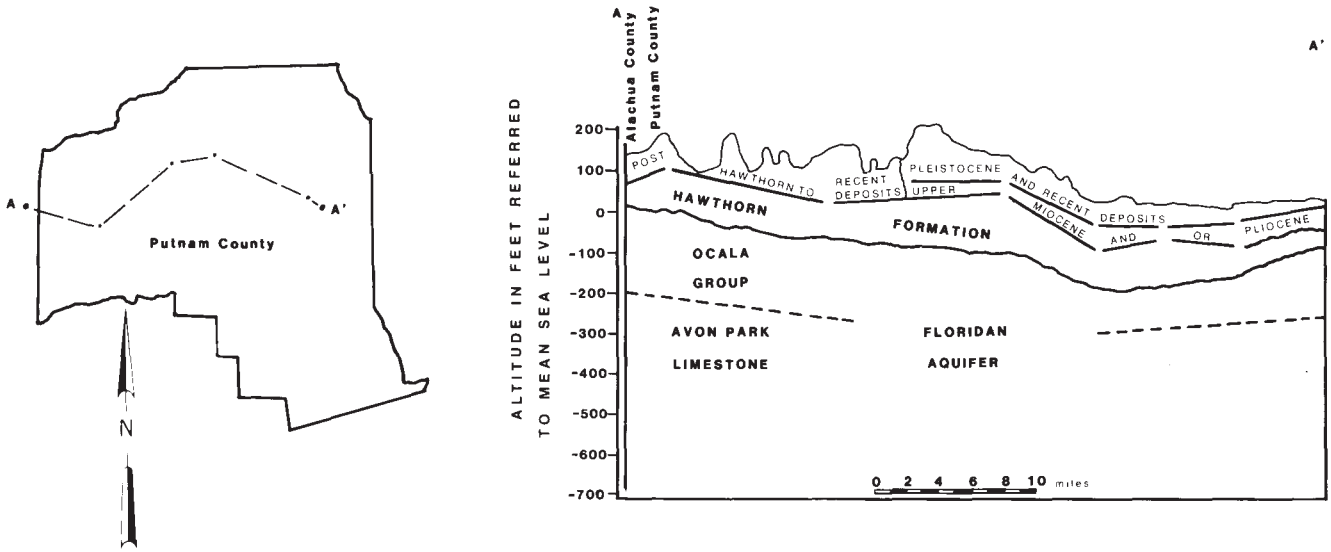


Figure 3.—Geological cross section A-A' in Putnam County.

because of the difficulties in identifying the individual formations. No sediments of known Late Miocene age have been recognized. However, zones of reworked Hawthorn Group sediments may represent the Late Miocene age.

Shelly sands and clays overlie the Hawthorn Group in eastern Putnam County. These sediments have been called the Nashua Formation of Pliocene age. The Nashua Formation consists of quartz sands with variable percentages of clay and carbonate in the matrix and common to abundant mollusk shells. The sediment is generally very clayey and often is predominantly a clay with quartz sand and mollusk shells. The areal extent and thickness of this unit is not currently known.

In the western part of Putnam County, sands are underlain by the Hawthorn Group. These sands have been called Citronelle Formation *(5)* and Cypresshead Formation *(7)*. These sediments are thought to be the nonmarine to near-shore equivalent of the Nashua Formation. The sands are typically slightly clayey (kaolin), silty, poorly sorted, poorly indurated quartz sands. These formations range up to 130 feet in thickness and are thin toward the west.

The Pleistocene age and Recent deposits in Putnam County Area have not been accurately delineated or named. They consist of quartz sand, clay, and shell material. The thickness of these sediments is not accurately known.

Water Resources

The Floridan Aquifer is the major source of potable ground water in Putnam County *(3)*. This source consists of porous limestone formations 150 to 200 feet deep. Wells drilled into the aquifer yield large quantities of water for domestic, industrial, and agricultural uses. The shallow aquifer is a secondary source of water. This aquifer overlies the Floridan Aquifer and is composed of unconsolidated sand, shells, and clay in and above the upper part of the Hawthorn Group. Most residential sites outside the larger cities are serviced by individual wells placed in the shallow aquifer. Larger cities with community or public water supplies generally obtain water from the deeper Floridan Aquifer.

The St. Johns River and its tributaries, the Oklawaha River, Dunns Creek, and Rice Creek, are major streams in Putnam County. These streams provide excellent recreation. The St. Johns River is a major barge route and water source for industry located on or near the river. These streams are not normally used for agricultural or domestic uses. These streams receive most of the surface drainage from the flatwoods. No major streams flow through the uplands, and drainage patterns are indistinct.

Putnam County has many freshwater lakes. These water areas range from a few acres to several square miles. Georges Lake in the northwestern part of the county and Crescent Lake in the southeastern part are two of the largest lakes. Most of the lakes are on the uplands in the western and southeastern parts of the county. Water for irrigation of crops is pumped from many of these lakes.

Farming

Agriculture is an important industry in Putnam County. Many of the soils and the climate are well suited to vegetables, pasture grasses, ferns, fruit, and pine trees.

According to the 1982 Census of Agriculture *(21)*, there were 549 farms in the county. Total value of agricultural products sold in 1982 was approximately 21 million dollars.

Farming has been important in Putnam County since the county was created. The Federal Point area became an established center for growing Irish potatoes in the early 1900's *(9)*. Most of the cabbage and Irish potatoes produced in Putnam County are grown on the flatwoods in the East Palatka and Federal Point areas. These areas are served by established drainage districts which facilitate the establishment of water control measures needed to grow vegetable crops on the poorly drained soils on the flatwoods.

The area west of Crescent City has been an important citrus producing area until severe freezes were experienced in the early and middle 1980's. As the acreage of citrus has declined, acreages planted to other fruits, such as grapes, blueberries, and peaches, has increased. Acreage of fern used in the florist trade has been steadily increasing.

Many farmers in Putnam County raise beef cattle, swine, poultry, and a few goats. Horses are increasing in number. Only a few dairy farms are in operation. Fish farming is a growing business. Several fish farms located in the county specialize in raising eels and catfish for food and tropical fish for aquariums.

Transportation

Putnam County has several county and State highways and a U.S. highway, which provide good access to most parts of the county. Railroads serve the eastern and central parts of the county. Rail spurs from the main railroad system serve the transportation needs for shipping bulk freight from several locations in the county. Rail passenger service is available in Palatka. Bus transportation and charter air service are also available locally.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a

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

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

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

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

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

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

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

Map Unit Composition

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

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting

(dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed, and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

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

General Soil Map Units

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

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

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

Soils on the Flatwoods

The four general soil map units in this group consist of soils that are nearly level and very poorly drained to somewhat poorly drained. Some of these soils are sandy throughout. Some are sandy to a depth of 40 to 80 inches. Some are sandy to a depth of 20 to 40 inches and are loamy below. Others are loamy and have a clayey subsoil. The soils in these map units are mainly in areas east of the St. Johns River and north of Dunn's Creek and north, northwest, and southwest of Palatka.

1. Pomona-Palmetto

Nearly level, poorly drained soils that are sandy to a depth of more than 40 inches and are loamy below; these soils have layers at a depth of 10 to 30 inches that are stained by organic matter

The soils in this map unit are mostly on the broad flatwoods that are interspersed with numerous depressional areas and poorly defined to well defined drainageways. The depressional areas are ponded, and the drainageways are periodically flooded. This map unit is mostly located northwest, west, and southwest of Palatka.

The natural vegetation on the flatwoods is slash pine, longleaf pine, sawpalmetto, gallberry, waxmyrtle, and native grasses. In the depressions and drainageways, the vegetation consists of cypress, bay, gum, maple, and other hardwoods.

This map unit makes up about 71,127 acres, or about 16 percent, of the survey area. It is about 45 percent Pomona soils, 17 percent Palmetto soils, and 38 percent soils of minor extent.

Pomona soils are poorly drained. Typically, the surface layer is black fine sand about 6 inches thick. The subsurface layer, to a depth of 20 inches, is gray and light gray fine sand. The upper part of the subsoil, to a depth of 28 inches, is dark reddish brown loamy fine sand. The middle layers, to a depth of 42 inches, are dark brown and light brownish gray fine sand. The lower part of the subsoil, to a depth of 73 inches, is gray and light gray fine sandy loam. The substratum to a depth of about 80 inches is greenish gray fine sandy loam.

Palmetto soils are poorly drained. Typically, the surface layer is very dark gray and dark gray fine sand about 10 inches thick. The upper part of the subsurface layer, to a depth of 21 inches, is gray and light gray fine sand. The lower part, to a depth of 26 inches, is gray fine sand mixed with fragments of dark reddish brown fine sand. The upper part of the subsoil, to a depth of 34 inches, is dark yellowish brown and yellowish brown fine sand. The next layer, to a depth of about 52 inches, is light gray fine sand. Below that layer, the subsoil, to a depth of 75 inches, is light gray fine sandy loam and to a depth of 80 inches is gray loamy fine sand.

The soils of minor extent in this map unit are Holopaw, Myakka, Ona, Pompano, and Riviera soils.

Most of the acreage in this map unit is used as commercial woodland. A few small areas are in improved pasture. In some areas east of the St. Johns River, these soils are used for cultivated crops.

2. Myakka-Zolfo-Immokalee

Nearly level, poorly drained and somewhat poorly drained soils that are sandy throughout; these soils have a dark subsoil at a depth of 20 to more than 50 inches

The soils in this map unit are mostly in the broad flatwood areas and on low ridges and knolls that are interspersed with depressional areas and well defined to poorly defined drainageways. The depressional areas are ponded, and the drainageways are periodically flooded. This map unit is located mostly northwest and west of Palatka. Another area of this map unit is located west of Crescent City.

The natural vegetation on the flatwoods is slash pine, longleaf pine, sawpalmetto, gallberry, waxmyrtle, and grasses, mostly bluestem and pineland threeawn. The vegetation on the low ridges and knolls is mostly live oak, laurel oak, water oak, slash pine, and longleaf pine. The dominant vegetation in the depressions and drainageways is cypress, bay, gum, maple, and other hardwoods.

This map unit makes up about 62,245 acres, or about 14 percent, of the survey area. It is about 60 percent Myakka soils, 10 percent Zolfo soils, 10 percent Immokalee soils, and about 20 percent soils of minor extent.

Myakka soils are poorly drained. Typically, the surface layer is black and dark gray fine sand about 8 inches thick. The subsurface layer, to a depth of 21 inches, is gray fine sand. The upper part of the subsoil, to a depth of 38 inches, is black and very dark gray fine sand. Below that layer, to a depth of about 42 inches, is gray fine sand. The lower part of the subsoil, to a depth of 60 inches, is very dark gray fine sand. The substratum to a depth of 80 inches is dark gray fine sand.

Zolfo soils are somewhat poorly drained. Typically, the surface layer is very dark gray fine sand about 6 inches thick. The subsurface layer, to a depth of 64 inches, is pale brown, very pale brown, light gray, and dark grayish brown fine sand. The subsoil to a depth of 80 inches or more is dark reddish brown fine sand.

Immokalee soils are poorly drained. Typically, the surface layer is black and dark gray fine sand about 7 inches thick. The subsurface layer, to a depth of 35 inches, is light gray fine sand. The upper part of the subsoil, to a depth of 48 inches, is black and dark reddish brown fine sand. The lower part, to a depth of 68 inches, is dark yellowish brown fine sand. The substratum to a depth of 80 inches or more is dark gray fine sand.

The soils of minor extent in this map unit are Adamsville, Cassia, Ona, and St. Johns soils.

Most of the acreage in this map unit is used for commercial production of pine trees. Some small areas are used as improved pasture, cropland, or for residential development.

3. Pomona-Wauchula-Mulat

Nearly level, poorly drained soils; some are sandy to a depth of 20 to 40 inches and are loamy below; some are sandy to a depth of 40 to 79 inches and are loamy below; and some have a dark subsoil above the loamy layer

The soils in this map unit are mostly on the broad flatwoods that are interspersed with a few depressions and drainageways. The depressional areas are ponded, and the drainageways are periodically flooded. The largest area of this map unit is in East Palatka and Federal Point. Smaller areas are along the northern part of the Putnam-Alachua county line.

The natural vegetation on the flatwoods is slash pine, longleaf pine, sawpalmetto, gallberry, and waxmyrtle. The vegetation in the depressions and drainageways consists of bay, cypress, gum, and maple.

This map unit makes up about 17,784 acres, or 4 percent, of the survey area. It is about 40 percent Pomona soils, 15 percent Wauchula soils, 15 percent Mulat soils, and 30 percent soils of minor extent.

Typically, Pomona soils have a surface layer of black fine sand about 6 inches thick. The subsurface layer, to a depth of 20 inches, is gray and light gray fine sand. The upper part of the subsoil, to a depth of 28 inches, is dark reddish brown loamy fine sand. The middle layers, to a depth of 42 inches, are dark brown and light brownish gray fine sand. The lower part of the subsoil, to a depth of 73 inches, is gray and light gray fine sandy loam. The substratum to a depth of about 80 inches is greenish gray fine sandy loam.

Typically, Wauchula soils have a surface layer of black fine sand about 6 inches thick. The subsurface layer, to a depth of 12 inches, is light gray fine sand. The upper part of the subsoil, to a depth of 22 inches, is black and very dark grayish brown fine sand. Below that layer, to a depth of 34 inches, is brown fine sand. The lower part of the subsoil, to a depth of 44 inches, is gray fine sandy loam. The substratum to a depth of 80 inches is grayish brown fine sand.

Typically, Mulat soils have a surface layer of very dark gray and dark gray fine sand about 9 inches thick. The subsurface layer, to a depth of 33 inches, is grayish brown and dark grayish brown fine sand. The upper part of the subsoil, to a depth of 38 inches, is gray fine sandy loam. The lower part, to a depth of 58 inches, is gray sandy clay loam. The upper part of the substratum, to a depth of 63 inches, is gray loamy fine sand. The lower part to a depth of 80 inches or more is light gray fine sand.

The soils of minor extent in this map unit are Myakka, Paisley, Palmetto, Riviera, and Wabasso soils.

Most of the acreage in this map unit is used as commercial woodland or pasture. Some large acreages in the East Palatka and Federal Point areas are in cultivated crops.

4. Holopaw-Riviera-Bluff

Nearly level, poorly drained and very poorly drained soils; some are sandy to a depth of 20 to 40 inches and are loamy below; some are sandy to a depth of 40 to 79 inches and are loamy below; and some are loamy and have a clayey subsoil

The soils in this map unit are mostly on the flatwoods that are interspersed with broad drainageways and depressions. The drainageways are periodically flooded, and the depressions are ponded for long periods. This map unit is located east, northeast, and southwest of

Palatka. A small area is located along the Putnam-Volusia county line.

The natural vegetation on the flatwoods is slash pine, longleaf pine, water oak, gallberry, waxmyrtle, scattered bay, scattered sawpalmetto, and grasses, mostly bluestem and threeawn. The vegetation in the drainageways and depressions consists mostly of cypress, bay, and mixed hardwoods.

This map unit makes up about 44,460 acres, or 10 percent, of the survey area. It is about 35 percent Holopaw soils, 35 percent Riviera soils, 10 percent Bluff soils, and 20 percent soils of minor extent.

Holopaw soils are poorly drained and very poorly drained. Typically, the surface layer is dark gray fine sand about 6 inches thick. The subsurface layer, to a depth of 55 inches, is light gray, gray, and dark gray fine sand. The upper part of the subsoil, to a depth of about 69 inches, is gray fine sandy loam. The lower part to a depth of 80 inches or more is greenish gray sandy clay loam.

Riviera soils are poorly drained. Typically, the surface layer is black fine sand about 5 inches thick. The subsurface layer, to a depth of 25 inches, is gray fine sand. The upper part of the subsoil, to a depth of 41 inches, is gray sandy clay loam. The lower part, to a depth of 50 inches, is gray fine sandy loam. The upper part of the subsoil has tongues of gray fine sand extending into it from the subsurface layer. The substratum to a depth of 80 inches or more is grayish brown loamy fine sand.

Bluff soils are very poorly drained and are frequently flooded. Typically, the upper part of the surface layer is black sandy clay loam about 16 inches thick. The lower part, to a depth of 19 inches, is very dark gray sandy clay. The upper part of the subsoil, to a depth of 39 inches, is dark gray sandy clay loam. The middle part, to a depth of 60 inches, is gray and olive gray sandy clay. The substratum to a depth of 80 inches is light gray sandy clay loam mixed with soft calcium carbonate accumulations and hard calcium carbonate nodules.

The soils of minor extent in this map unit are Astor, Placid, Pompano, and Winder soils.

Most of the acreage in this map unit is used as commercial woodland and for cultivated crops. Areas that are flooded or ponded are used for wildlife habitat. Hardwood timber is harvested in some areas in this map unit.

Soils on the Uplands

The six general soil map units in this group consist of soils that are nearly level to steep and somewhat poorly drained to excessively drained. Some of these soils are sandy to a depth of 80 inches or more. Some are sandy to a depth of 40 inches or more and are loamy below. Some soils in these map units have thin lamellae at a depth of 60 to 80 inches, and some have a dark subsoil at a depth of more than 50 inches. These soils mostly are west of Palatka and west of Crescent Lake.

5. Candler-Apopka

Nearly level to steep, excessively drained and well drained soils; some are sandy to a depth of more than 80 inches and have thin lamellae at a depth of 60 to 80 inches; and some are sandy and have a loamy subsoil below a depth of 40 to 79 inches

The soils in this map unit are on the broad, rolling uplands that are interspersed with remnant sinkholes and long, narrow hillsides. Lakes and intermittent ponds are common. The water level in the lakes and ponds fluctuates, depending on rainfall and seepage from the surrounding soils and underground aquifers. This map unit is located in the western half of Putnam County between Florida State Highways 20 and 100 in the Interlachen area.

The natural vegetation consists of turkey oak and live oak and a few longleaf pine (fig. 4). The understory vegetation includes pineland threeawn, bluestem, lopsided indiangrass, and scattered sawpalmetto. Rosemary grows in some areas of this map unit.

This map unit makes up about 71,137 acres, or 16 percent, of the survey area. It is about 50 percent Candler soils, 14 percent Apopka soils, and 36 percent soils of minor extent.

Candler soils are excessively drained. Typically, the surface layer is brownish gray fine sand about 4 inches thick. The upper part of the subsurface layer, to a depth of 61 inches, is very pale brown fine sand. The lower part to a depth of 80 inches is very pale brown fine sand that has thin layers of yellowish brown loamy fine sand lamellae.

Apopka soils are well drained. Typically, the surface layer is dark grayish brown sand about 7 inches thick. The upper part of the subsurface layer, to a depth of 40 inches, is pale brown and very pale brown sand. The lower part, to a depth of 43 inches, is brownish yellow sand that is mixed with the underlying layer. The subsoil to 80 inches or more is yellowish red sandy clay loam.

The soils of minor extent in this map unit are Adamsville, Astatula, Millhopper, Myakka, Placid, Samsula, Sparr, and Tavares soils.

In many areas, the soils in this map unit are used for community development, but a much larger acreage is used for pine production, improved pasture, and hay. Most of the acreage in this map unit is in natural vegetation and is used as habitat for wildlife.

6. Millhopper-Sparr

Nearly level to sloping, moderately well drained and somewhat poorly drained soils that are sandy and have a loamy subsoil below a depth of 40 to 79 inches

The soils in this map unit are in broad, gently rolling areas on the uplands. Small knolls and low ridges are

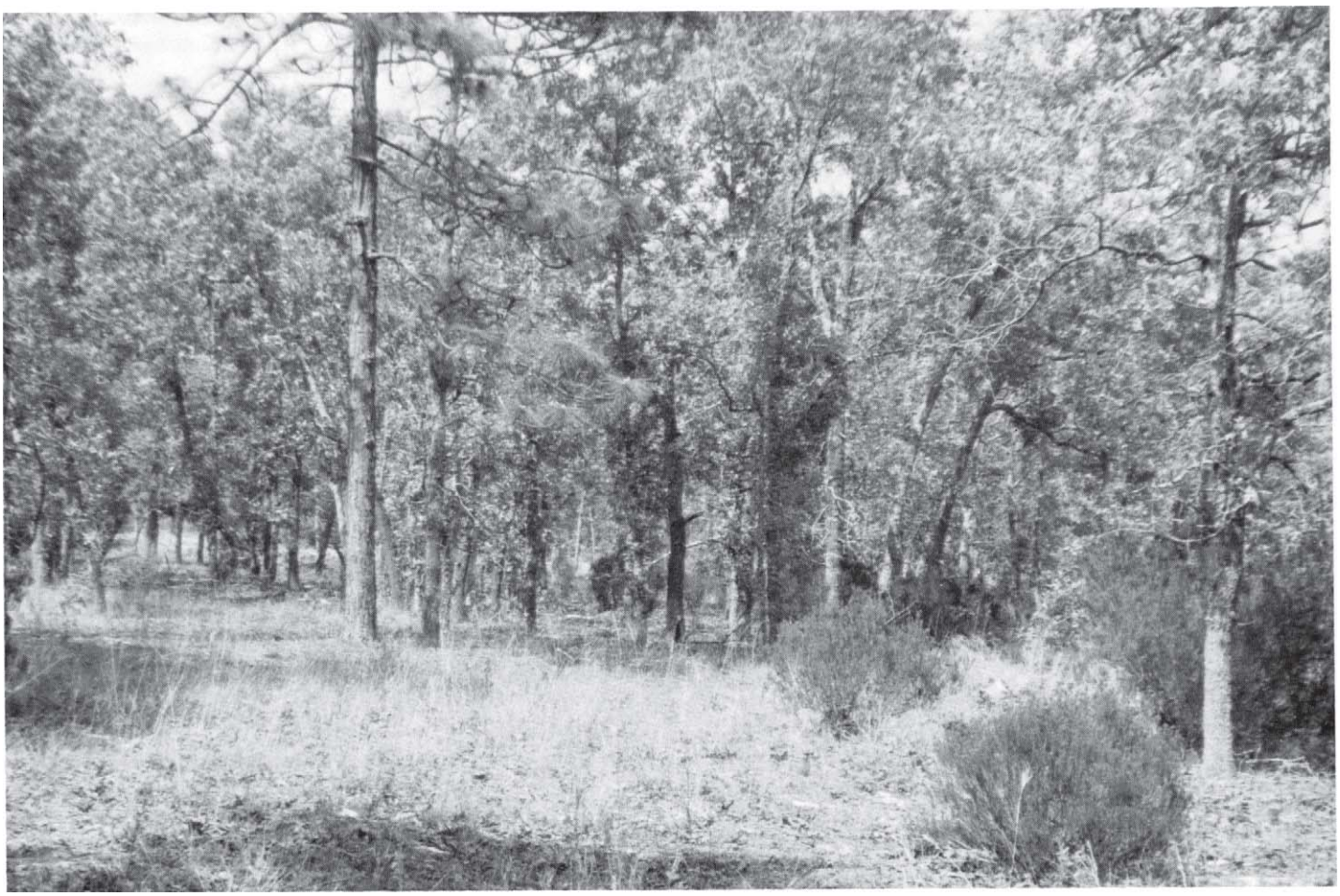


Figure 4.—The natural vegetation of turkey oak, longleaf pine, rosemary, grasses, and forbs in an area of the Candler-Apopka general soil map unit provides good habitat for wildlife.

dissected by intermittent streams and ponds and by long, narrow swales. Most of this map unit is located in the western part of the county between the Putnam-Alachua county line and Florida State Highway 21 and from State Highway 20 north to Melrose. Another area is located between the Putnam-Marion county line and the town of Johnson. Smaller areas are in the extreme southwest corner of Putnam County that adjoins and intersects the county lines of Alachua and Marion Counties.

The natural vegetation includes live oak, laurel oak, water oak, turkey oak, longleaf pine, and loblolly pine. The understory vegetation is mainly pineland threeawn, lopsided indiangrass, bluestem, low panicum, greenbrier, and sawpalmetto. The vegetation in the narrow swales and in areas that are adjacent to ponds and streams includes magnolia, sweetgum, hickory, and slash pine.

This map unit makes up about 17,784 acres, or about 4 percent, of the survey area. It is about 55 percent Millhopper soils, 30 percent Sparr soils, and about 15 percent soils of minor extent.

Millhopper soils are moderately well drained. Typically, the surface layer is grayish brown sand about 3 inches thick. The subsurface layer, to a depth of 66 inches, is light yellowish brown, very pale brown, and light gray sand. The upper part of the subsoil, to a depth of 70 inches, is brown fine sandy loam. The lower part to a depth of 80 inches or more is gray sandy clay loam.

Sparr soils are somewhat poorly drained. Typically, the surface layer is dark grayish brown sand about 9 inches thick. The upper part of the subsurface layer, to a depth of 30 inches, is very pale brown sand. The lower part, to a depth of 65 inches, is white sand. The upper part of the subsoil, to a depth of about 70 inches, is yellowish

brown loamy sand. The lower part to a depth of 80 inches or more is yellowish brown fine sandy loam.

The soils of minor extent in this map unit are Apopka, Bonneau, Candler, Electra, Lochloosa, Placid, Pomona, and Tavares soils.

Most of the acreage in this map unit is used as improved pasture, pine woodlands, and for community development.

7. Tavares-Centenary-Zolfo

Nearly level and gently sloping, moderately well drained and somewhat poorly drained soils that are sandy throughout; some have a dark subsoil at a depth of more than 50 inches

The soils in this map unit are in broad, undulating areas on the uplands that are interspersed with intermittent ponds and lakes. These soils also are along major drainageways. Narrow sand ridges and knolls are parallel to the drainageways and are often dissected by intermittent and perennial streams. Some areas of this map unit are in the southwest part of Putnam County that adjoins Marion County. Some areas are west of Palatka along Florida State Highways 20 and 19. Other major areas are south and west of Crescent City, southeast of Georges Lake, and west of Bostwick in the northern part of Putnam County.

The natural vegetation consists of live oak, laurel oak, turkey oak, longleaf pine, slash pine, and scattered sand pine. The understory vegetation includes pineland threeawn, lopsided indiangrass, bluestem, and sawpalmetto.

This map unit makes up about 53,353 acres, or 12 percent, of the survey area. It is about 25 percent Tavares soils, 20 percent Centenary soils, 15 percent Zolfo soils, and 40 percent soils of minor extent.

Tavares soils are moderately well drained. Typically, the surface layer is dark grayish brown fine sand about 5 inches thick. The upper part of the underlying material, to a depth of 45 inches, is very pale brown and yellow fine sand. The middle part, to a depth of 67 inches, is very pale brown fine sand and contains masses of white fine sand. The lower part to a depth of 80 inches or more is white fine sand.

Centenary soils are moderately well drained. Typically, the surface layer is dark gray fine sand about 8 inches thick. The upper part of the subsurface layer, to a depth of 50 inches, is yellow and very pale brown fine sand. The lower part, to a depth of 65 inches, is light gray fine sand. The upper part of the subsoil, to a depth of 76 inches, is dark grayish brown loamy fine sand. The lower part to a depth of 80 inches or more is dark reddish brown loamy fine sand.

Zolfo soils are somewhat poorly drained. Typically, the surface layer is very dark gray fine sand about 6 inches thick. The upper part of the subsurface layer, to a depth of 53 inches, is pale brown, very pale brown, and light gray fine sand. The lower part, to a depth of 64 inches, is dark grayish brown fine sand. The subsoil to a depth of 80 inches or more is dark reddish brown fine sand.

The soils of minor extent in this map unit are Apopka, Adamsville, Candler, Deland, Electra, Hobe, Immokalee, Orsino, Paola, and St. Johns soils.

Most of the acreage in this map unit is used for residential development and as pine woodlands and improved pasture.

8. Astatula-Tavares

Nearly level to moderately steep, excessively drained and moderately well drained soils that are sandy throughout

The soils in this map unit are on broad, gently rolling uplands that are interspersed with a few relict sinkholes, small lakes, and depressions. This map unit is mostly located west and southwest of Crescent City and southwest of Interlachen.

The natural vegetation consists of turkey oak, bluejack oak, and live oak and a few longleaf pine. The understory vegetation includes pineland threeawn, bluestem, lopsided indiangrass, and scattered sawpalmetto. In a few small areas, rosemary grows in abundance in the western part of Putnam County.

This map unit makes up about 26,676 acres, or 6 percent, of the survey area. It is about 42 percent Astatula soils, 20 percent Tavares soils, and 38 percent soils of minor extent.

Astatula soils are excessively drained. Typically, the surface layer is dark gray fine sand about 4 inches thick. The upper part of the underlying material, to a depth of 12 inches, is pale brown fine sand. The lower part to a depth of 80 inches or more is very pale brown fine sand.

Tavares soils are moderately well drained. Typically, the surface layer is dark grayish brown fine sand about 5 inches thick. The upper part of the underlying material, to a depth of 45 inches, is very pale brown and yellow fine sand. The middle part, to a depth of 67 inches, is very pale brown fine sand and contains masses of white fine sand. The lower part to a depth of 80 inches or more is white fine sand.

The soils of minor extent in this map unit are Orsino, Candler, Paola, Adamsville, Myakka, and Centenary soils.

Most of the acreage in this map unit is in natural vegetation and is used as habitat for wildlife. Many areas are used for residential development, commercial production of pine trees, and improved pasture. Some areas near Crescent City are used for growing ferns.

9. Candler-Tavares-Adamsville

Nearly level to steep, excessively drained, moderately well drained, and somewhat poorly drained soils that are sandy throughout; some have lamellae at a depth of 60 to 80 inches

The soils in this map unit are on broad, rolling uplands that are interspersed with remnant sinkholes and long, narrow hillsides. Lakes and intermittent ponds are common. The water level in the lakes and ponds fluctuates, depending on rainfall and seepage from the surrounding soils and underground aquifers. The largest area of this map unit is located northeast of Interlachen. Smaller areas are in the southwest part of the survey area and north of Crescent City.

The natural vegetation consists of turkey oak and live oak and a few longleaf pine. The understory vegetation includes pineland threeawn, bluestem, lopsided indiangrass, and scattered sawpalmetto. Rosemary grows in some areas of this map unit.

This map unit makes up about 13,338 acres, or 3 percent, of the survey area. It is about 55 percent Candler soils, 15 percent Tavares soils, 10 percent Adamsville soils, and 20 percent soils of minor extent.

Candler soils are excessively drained. Typically, the surface layer is brownish gray fine sand about 4 inches thick. The upper part of the subsurface layer, to a depth of 61 inches, is very pale brown fine sand. The lower part to a depth of 80 inches is very pale brown fine sand that has thin layers of yellowish brown loamy fine sand lamellae.

Tavares soils are moderately well drained. Typically, the surface layer is dark grayish brown fine sand about 5 inches thick. The upper part of the underlying material, to a depth of 45 inches, is very pale brown and yellow fine sand. The middle part, to a depth of 67 inches, is very pale brown fine sand and contains masses of white fine sand. The lower part to a depth of 80 inches or more is white fine sand that has yellowish red mottles.

Adamsville soils are somewhat poorly drained. Typically, the surface layer is grayish brown sand about 6 inches thick. The upper part of the underlying material, to a depth of 42 inches, is very pale brown and light yellowish brown sand. The lower part to a depth of 80 inches or more is light gray sand.

The soils of minor extent in this map unit are Apopka, Millhopper, Sparr, Myakka, Placid, and Samsula soils.

In some areas, the soils in this map unit are used for community development, but a much larger acreage is used for pine production and as improved pasture and hay. Most of the acreage in this map unit is in natural vegetation and is used as habitat for wildlife.

10. Orsino-Astatula-Paola

Nearly level to moderately sloping, moderately well drained and excessively drained soils that are sandy throughout

The soils in this map unit are on low knolls and broad hills and slopes in the upland areas that are interspersed with depressional areas, lakes, and narrow drainageways. Most areas of this map unit are located northwest and southwest of Crescent City and along the St. Johns River west of Satsuma.

The natural vegetation consists of sand pine and live oak and a few longleaf pine. The understory vegetation includes sawpalmetto, greenbrier, bluestem, and pineland threeawn.

This map unit makes up about 8,892 acres, or 2 percent, of the survey area. It is about 32 percent Orsino soils, 25 percent Astatula soils, 20 percent Paola soils, and 23 percent soils of minor extent.

Orsino soils are moderately well drained. Typically, the surface layer is gray fine sand about 6 inches thick. The subsurface layer, to a depth of 24 inches, is light gray fine sand. The subsoil, to a depth of 64 inches, is brownish yellow and yellowish brown fine sand. Tongues of light gray fine sand are in the upper part of the subsoil. The substratum to a depth of 80 inches or more is light gray fine sand.

Astatula soils are excessively drained. Typically, the surface layer is dark gray fine sand about 4 inches thick. The upper part of the underlying material, to a depth of 12 inches, is pale brown fine sand. The lower part to a depth of 80 inches or more is very pale brown fine sand.

Paola soils are excessively drained. Typically, the surface layer is dark gray fine sand about 3 inches thick. The subsurface layer, to a depth of 27 inches, is light gray fine sand. The upper part of the subsoil, to a depth of 52 inches, is yellow fine sand. The lower part to a depth of 80 inches or more is very pale brown fine sand.

The soils of minor extent in this map unit are Cassia, Centenary, Deland, Electra, Hobe, and Tavares soils.

Most of the acreage in this map unit is in natural vegetation and is used as habitat for wildlife. A few areas along the St. Johns River are used for homesites and urban development. Some areas are used as improved pasture and hay crops.

Soils in the Broad Swamps and Marshes

The two general soil map units in this group consist of organic soils that are nearly level and very poorly drained. Some of the soils are organic to a depth of 16 to 51 inches and are sandy or loamy below. Some are organic to a depth of more than 51 inches. The soils in these map units are located mostly north of Interlachen in the northwest part of Putnam County and west of Crescent Lake.

11. Samsula-Hontoon-Tomoka

Nearly level, very poorly drained organic soils; some are organic to a depth of 16 to 51 inches and are sandy or loamy below; and some are organic to a depth of more than 51 inches

The soils in this map unit are mostly in swamps and depressions on the flatwoods and in the upland areas. The largest area of this map unit is located in the northwestern part of Putnam County from the area north of Florahome south to near Interlachen. Some smaller areas are near Bostwick in the northeastern part of

Putnam County. Other small areas are in the southeastern part of the county west of Crescent City.

Except in areas where these soils have been drained and used for agriculture, the natural vegetation consists of red bay, cypress, red maple, and other hardwoods. Some areas have a marsh vegetation of sawgrass, maidencane, and other hydrophytic plants.

This map unit makes up about 22,230 acres, or about 5 percent, of the survey area. It is about 55 percent Samsula soils, 20 percent Hontoon soils, 15 percent Tomoka soils, and about 10 percent soils of minor extent.

Typically, Samsula soils have a surface layer of dark reddish brown and black muck about 29 inches thick. The upper part of the underlying material, to a depth of 40 inches, is black fine sand. The middle part, to a depth of 50 inches, is gray fine sand. The lower part to a depth of 80 inches or more is light brownish gray fine sand.

Typically, the upper part of the surface layer of Hontoon soils is black muck about 20 inches thick. The lower part to a depth of 80 inches or more is dark reddish brown muck.

Typically, the upper part of the surface layer of Tomoka soils is black muck about 12 inches thick. The lower part, to a depth of 24 inches, is dark reddish brown muck. The upper part of the underlying material, to a depth of 28 inches, is black fine sand. The middle part, to a depth of 31 inches, is light gray fine sand. The lower part to a depth of 80 inches or more is grayish brown and gray fine sandy loam.

The soils of minor extent in this map unit are Ona, Placid, St. Johns, and Surrency soils.

Most of the acreage in this map unit is in natural vegetation and is used as habitat for wildlife. Some areas near Florahome have been drained and are used for cultivated crops.

12. Okeechobee-Samsula

Nearly level, very poorly drained organic soils; some are organic to a depth of more than 51 inches; and some

Figure 5.—Typical vegetation in an area of the Terra Ceia-Shenks general soil map unit. These soils are frequently flooded.

are organic to a depth of 16 to 51 inches and are sandy below.

The soils in this map unit are in the freshwater marshes or on the prairies and in large depressions on the uplands. Most of the map unit is located in Fowler's Prairie, Levy's Prairie, Ashley's Prairie, and Goodson's Prairie in the northwest part of the county.

The natural vegetation consists of hydrophytic plants, such as cattails, sawgrass, maidencane, pickerelweed, and buttonwood and many hydrophytic grasses, sedges, and reeds.

This map unit makes up about 8,892 acres, or about 2 percent, of the survey area. It is about 32 percent Okeechobee soils, 30 percent Samsula soils, and 38 percent soils of minor extent.

Typically, the upper part of the surface layer of Okeechobee soils is black muck about 25 inches thick. Below that layer, to a depth of 46 inches, is brown mucky peat. The lower part to a depth of 80 inches or more is dark reddish brown muck.

Typically, Samsula soils have a surface layer of dark reddish brown and black muck about 29 inches thick. The upper part of the underlying material, to a depth of 40 inches, is black fine sand. The middle part, to a depth of 50 inches, is gray fine sand. The lower part to a depth of 80 inches or more is light brownish gray fine sand.

The soils of minor extent in this map unit are Hontoon, Ona, and Placid soils.

Most of the acreage in this map unit is in natural vegetation and is used as habitat for wildlife.

Soils on the Flood Plains

The one general soil map unit in this group consists of nearly level, very poorly drained, frequently flooded soils. Some of these soils are organic to a depth of more than 51 inches, and some are organic to a depth of 16 to 51 inches and are clayey below. These soils are mostly along the major rivers and streams in the southern part of Putnam County.

13. Terra Ceia-Shenks

Nearly level, very poorly drained, frequently flooded soils; some are organic to a depth of more than 51 inches; and some are organic to a depth of 16 to 51 inches and are clayey below

The soils in this map unit are mostly in broad, swampy areas on the flood plains along major rivers and streams. This map unit is mostly along the Oklawaha River, the southern part of the St. Johns River, and Dunn's Creek. Other areas are along the northeastern edge of Lake George and Crescent Lake.

The natural vegetation includes cypress, sweetgum, maple, and loblolly bay (fig. 5). The understory vegetation consists of hydrophytic grasses, reeds, and sedges and other aquatic plants, such as lilies, cattails, and ferns.

This map unit makes up about 26,676 acres, or 6 percent, of the survey area. It is about 65 percent Terra Ceia soils, 8 percent Shenks soils, and 27 percent soils of minor extent.

Typically, the upper part of the surface layer of Terra Ceia soils is dark reddish brown muck about 28 inches thick. The lower part to a depth of 80 inches or more is black muck.

Typically, Shenks soils have a surface layer of dark reddish brown muck about 18 inches thick. The upper part of the underlying material, to a depth of 60 inches, is black clay. The middle part, to a depth of 70 inches, is very dark gray loamy sand. The lower part to a depth of 80 inches or more is dark gray sand.

The soils of minor extent in this map unit are Astor, Bluff, Holopaw, Hontoon, Pompano, and Riviera soils.

Most of the acreage in this map unit is in natural vegetation and is used as habitat for wildlife.

Detailed Soil Map Units

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

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

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

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

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Candler fine sand, 0 to 5 percent slopes, is one of several phases in the Candler series.

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

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

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

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

Table 3 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

1—Candler fine sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and excessively drained. It is on ridges and knolls on the broad uplands. The mapped areas are irregular in shape and range from 10 to 4,000 acres.

Typically, this soil has a surface layer of brownish gray fine sand about 4 inches thick. The upper part of the subsurface layer, to a depth of 61 inches, is very pale brown fine sand. The lower part to a depth of 80 inches is very pale brown fine sand and a series of layers of yellowish brown loamy fine sand.

Included with this soil in mapping are small areas of Apopka, Astatula, Deland, Millhopper, and Tavares soils. These soils are in similar positions on the landscape as Candler soil or in slightly lower positions. Also included are small areas of soils that are similar to Candler soil, but they have gravel-size quartz pebbles mixed throughout. The included soils make up about 15 percent of this map unit.

This soil has a high water table at a depth of more than 80 inches. The available water capacity is very low in the surface layer and the upper part of the subsurface layer, and it is low in the lower part of the subsurface layer. The permeability is rapid. Natural fertility is low.

Some of the Candler soil is used for citrus crops in the area near Crescent City. Most of the acreage of this soil is in natural vegetation that includes turkey oak, live oak, longleaf pine, threeawn, and bluestem.

This Candler soil is not suitable for most cultivated crops. Droughtiness and poor soil quality are severe limitations to use for cultivated crops. Plant nutrients are rapidly leached from this soil. Conservation tillage helps

conserve moisture and controls erosion if the soil is cultivated. Close-growing plants should be included in the rotation system at least three-fourths of the time. Crop residue left on or in the soil controls erosion and improves soil quality. This soil is well suited to citrus crops if cold temperatures are not a problem.

This soil is moderately well suited to pasture and hay crops. Deep-rooted plants, such as bermudagrass and bahiagrass, are well suited to this soil. Regular applications of fertilizer and lime are needed, and grazing should be controlled to maintain plant vigor.

The potential of this soil for the production of pine trees is medium. Slash, longleaf, and sand pines are the better suited trees to plant for commercial woodland production. Use of equipment, seedling mortality, and plant competition are concerns in management. This soil is droughty; and during long, dry periods, adequate moisture for plant growth is not available. Using special planting stock that is larger than usual or that is containerized reduces seedling mortality. The loose, sandy surface of this soil is a limitation to use of equipment. Machinery equipped with large, low-pressure tires or tracks will help overcome this limitation. Plant competition from hardwoods, mostly oaks, can be reduced if herbicides are used during site preparation. Although runoff is slow, logging and site preparation operations can increase and concentrate water movement on this soil and cause soil erosion. These activities should be avoided in and adjacent to drainageways. Special design and proper placement of roads, skid trails, and stream crossings reduce soil erosion. During site preparation and thinning and harvesting operations, as much plant debris as possible should be left on the surface of the soil to help conserve organic matter.

This soil has slight limitations for urban uses, such as septic tank absorption fields and for dwellings and local roads and streets. In areas where septic tank absorption fields are concentrated, ground water contamination is a hazard.

The sandy surface layer is a severe limitation for recreational development. The surface layer should be stabilized by adding suitable fill material or by paving the area to help overcome this limitation.

This Candler soil is in capability subclass IVs. The woodland ordination symbol is 8S.

2—Candler fine sand, 5 to 8 percent slopes. This soil is sloping and excessively drained. It is on ridges and knolls on the broad uplands. The mapped areas are irregular in shape and range from 5 to 300 acres.

Typically, this soil has a surface layer of dark grayish brown fine sand about 4 inches thick. The upper part of the subsurface layer, to a depth of 65 inches, is yellowish brown and brownish yellow fine sand. The lower part to a depth of more than 80 inches is very pale brown fine sand and a series of layers of strong brown fine sandy loam.

Included with this soil in mapping are small areas of Apopka, Astatula, Millhopper, and Tavares soils. These soils are in similar positions on the landscape as Candler soil or in slightly lower positions. Also included are small areas of soils that are similar to Candler soil, but some of these soils are moderately well drained, and others have gravel-size quartz pebbles mixed throughout. The included soils make up about 10 percent of this map unit.

This soil has a high water table at a depth of more than 80 inches. The available water capacity is very low in the surface layer and the upper part of the subsurface layer, and it is low in the lower part of the subsurface layer. The permeability is very rapid. Natural fertility is low.

This soil is used for citrus crops in an area near Crescent City. Large acreages of this soil is in natural vegetation that mostly includes turkey oak and scrub live oak and a few longleaf pine. The understory vegetation includes threeawn and bluestem.

This Candler soil is not suitable for most cultivated crops. Droughtiness and poor soil quality are severe limitations to use for cultivated crops. Water drains rapidly from this soil along with the plant nutrients. Conservation tillage helps conserve moisture and controls erosion if this soil is cultivated. Close-growing cover crops should be included in the rotation system at least three-fourths of the time. Crop residue should be left on or in the soil to help control erosion and improve soil quality. This soil is well suited to citrus crops if cold temperatures are not a problem.

This soil is moderately well suited to pasture and hay crops. Even when fertilized, deep-rooted plants, such as bermudagrass and bahiagrass, produce only moderate yields. Periodic drought severely limits plant growth.

The potential of this soil for the production of pine trees is medium. Slash, longleaf, and sand pines are the better suited trees to plant for commercial woodland production. Use of equipment, seedling mortality, and plant competition are concerns in management. This soil is droughty; and during long, dry periods, the soil does not retain enough moisture to sustain plant growth. Using special planting stock that is larger than usual or that is containerized reduces seedling mortality. The loose, sandy surface of this soil is a limitation to use of equipment. Machinery equipped with large, low-pressure tires or tracks can help overcome this limitation. Plant competition from hardwoods, mostly oaks, can be reduced if herbicides are used during site preparation. Although runoff is slow, logging and site preparation operations can increase and concentrate water movement on this soil and cause soil erosion. These activities should be avoided in and adjacent to drainageways. Special design and proper placement of roads, skid trails, and stream crossings can reduce soil

loss. During site preparation and thinning and harvesting operations, as much plant debris as possible should be left on the surface of this soil to help conserve organic matter.

This soil has slight limitations for urban uses (fig. 6), such as septic tank absorption fields, dwellings, and local roads and streets. In areas where septic tank absorption fields are concentrated, ground water contamination is a hazard.

The sandy surface of this soil is a severe limitation for most recreational development. The surface layer should be stabilized for recreational uses by adding a suitable fill material or by paving the area to help overcome these limitations.

This Candler soil is in capability subclass VIs. The woodland ordination symbol is 8S.

3—Myakka fine sand. This soil is nearly level and poorly drained. It is on the flatwoods. The mapped areas are irregular in shape and range from 10 to 2,000 acres. The slopes range from 0 to 2 percent.

Typically, this soil has a surface layer of black and dark gray fine sand about 8 inches thick. The subsurface layer, to a depth of 21 inches, is gray fine sand. The upper part of the subsoil, to a depth of about 38 inches, is black and very dark gray fine sand. Below that layer, to a depth of about 42 inches, is gray fine sand. The lower part of the subsoil, to a depth of about 60 inches, is very dark gray fine sand. The substratum to a depth of 80 inches is dark gray fine sand.

Included with this soil in mapping are small areas of Cassia, Immokalee, Placid, and St. Johns soils. Also included are small areas of soils that are similar to Myakka soil, but some of these soils have a subsoil at a

Figure 6.—This golf course is in an area of Candler fine sand, 5 to 8 percent slopes.

depth of less than 20 inches, and others have a thin, weakly developed subsoil. The included soils make up about 10 percent of this map unit.

In most years, this soil has a high water table at a depth of less than 12 inches for 1 month to 4 months and at a depth of more than 40 inches during dry periods. The available water capacity is very low in the surface and subsurface layers, medium in the subsoil, and low in the substratum. The permeability is rapid in the surface and subsurface layers, moderate or moderately rapid in the subsoil, and rapid in the substratum. Natural fertility is low.

Most of the acreage of this soil is used for the commercial production of slash pine. A small acreage is used for improved pasture and hay crops. The natural vegetation includes slash pine and longleaf pine. The understory vegetation includes sawpalmetto, gallberry, waxmyrtle, pineland threeawn, and bluestem.

Wetness and poor soil quality are severe limitations to use of this Myakka soil for cultivated crops. The root zone is limited by a high water table that is within 12 inches of the surface during long periods of wetness. If a water control system is established and maintained, this soil is suited to many vegetable crops. The water control system should remove excess water during wet periods and provide for subsurface irrigation during dry periods. Close-growing cover crops should be included in the cropping system when the soil is not cultivated. Crop residue left on the soil helps to control erosion, maintains organic matter, and improves soil quality. Seedbed preparation should include bedding of the rows. Fertilizer and lime should be applied according to the needs of the crop.

This soil is well suited to improved pasture and hay crops. Bermudagrass, bahiagrass, and clover are well adapted to this soil. A water control system is needed to remove excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Grazing should be controlled to prevent overgrazing, to help maintain plant vigor, and to obtain maximum yields.

The potential of this soil for the production of pine trees is medium. Slash and longleaf pines are the better suited trees to plant for commercial woodland production. The major concerns in management are the use of equipment, seedling mortality, plant competition, and the hazard of windthrow. Seasonal wetness is a limitation to use of equipment on this soil. Timely scheduling of site preparation and planting, thinning, and harvesting operations can help overcome this wetness limitation. Field work generally can be done during the wet periods if machinery is equipped with large, low-pressure rubber tires or tracks. Proper site preparation reduces seedling mortality and helps to control plant competition. Bedding helps to establish seedlings, increases early growth, and reduces seedling mortality. Chopping helps control plant competition, reduces debris, and facilitates planting operations. The use of logging systems that leave residual biomass well distributed on the surface of the soil helps to conserve organic matter. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Excessive wetness during rainy periods is a severe limitation to use of this soil for urban development. The high water table can interfere with the proper functioning of septic tank absorption fields. If septic tank absorption fields are elevated by adding a suitable fill material, the soil is suited to this use. The use of this soil for building sites and for local roads and streets also requires that measures be taken to overcome the wetness limitation. If adequate water outlets are available, a drainage system should be installed to help keep the high water table at an effective depth. The use of fill material to elevate building sites and roadbeds will also help keep the high water table at an effective depth.

Excessive wetness and the sandy surface layer of this soil are severe limitations for recreational uses. The wetness limitation can be overcome by establishing a water control system that will help keep the high water table at an effective depth. In areas of intensive foot traffic, the surface should be stabilized by adding suitable fill material or by paving the area.

This Myakka soil is in capability subclass IVw. The woodland ordination symbol is 8W.

4—Zolfo fine sand. This soil is nearly level and somewhat poorly drained. It is on low ridges and knolls on the flatwoods and on low side slopes on the uplands. The mapped areas are irregular in shape and range from 10 to 250 acres. The slopes range from 0 to 2 percent.

Typically, this soil has a surface layer of very dark gray fine sand about 6 inches thick. The upper part of the subsurface layer, to a depth of 53 inches, is pale brown, very pale brown, and light gray fine sand. The lower part, to a depth of 64 inches, is dark grayish brown fine sand. The subsoil to a depth of 80 inches or more is dark reddish brown fine sand.

Included with this soil in mapping are small areas of Adamsville, Centenary, Narcoossee, and Tavares soils. Also included are small areas of soils that are in similar positions on the landscape as Zolfo soil, but some of these soils have a brownish yellow or yellowish brown subsoil, some have a weakly cemented subsoil, and some have a subsoil at a depth of less than 50 inches. In addition, there are small areas of a soil that is similar to Zolfo soil, but it is in a slightly lower position on the landscape and is poorly drained. The included soils make up about 10 percent of this map unit.

In most years, this soil has a high water table at a depth of 24 to 40 inches for 2 to 6 months. In some years, the high water table is at a depth of 10 to 24 inches for about 2 weeks. The available water capacity is medium in the surface layer, very low or low in the subsurface layer, and medium to high in the subsoil. The

permeability is rapid in the surface and subsurface layers and moderate in the subsoil. Natural fertility is low.

Most of the acreage of this soil is in natural vegetation that includes turkey oak, live oak, longleaf pine, and slash pine. The understory vegetation is sparse. It consists of scattered wiregrass, bluestem, and sawpalmetto.

Periodic wetness is a severe limitation to use of this Zolfo soil for cultivated crops. This soil is droughty. The adapted crops that can be grown on this soil are limited if intensive water control measures are not used. If a water control system is established and maintained to remove excess water in wet periods and to provide for subsurface irrigation in dry periods, this soil can be used for potatoes and other vegetables. When the soil is not cultivated, close-growing cover crops should be included in the rotation system to help maintain soil quality and protect the soil from wind erosion.

This soil is moderately well suited to pasture and hay crops. Bermudagrass and bahiagrass are well adapted to this soil. A water control system is needed to remove excess surface water during heavy rains. Regular applications of lime and fertilizer are required. Grazing should be controlled to help maintain plant vigor and obtain maximum yields.

The potential of this soil for the production of pine trees is medium to high. Slash and longleaf pines are the better suited trees to plant for commercial woodland production. An adequate supply of phosphorus is needed for maximum growth. The major concerns in management are the restricted use of equipment on this soil, seedling mortality, and plant competition. Seasonal wetness and periods of droughtiness limit the use of equipment and increase seedling mortality. Site preparation, such as harrowing and bedding, helps to establish seedlings, reduces seedling mortality, and increases early growth. Chopping and bedding reduce debris, control competing vegetation, and facilitate planting operations. Machinery equipped with high flotation rubber tires or tracks can help overcome the limitations to use of equipment, can reduce soil compaction, and can also reduce root damage during thinning operations. Site preparation and planting and harvesting operations should be scheduled during dry periods to help overcome the wetness limitations to use of equipment. The use of logging systems that leave residual biomass well distributed on the surface of the soil increases the content of organic matter and residual fertility of the soil. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Wetness and poor filtering capacity are severe limitations to use of this soil as septic tank absorption fields. Wetness is a moderate limitation for dwellings and for local roads and streets. Adding suitable fill material to help keep the high water table at an effective depth will help overcome the wetness limitation. If outlets are available, a surface drainage system can be installed to maintain the high water table at an effective depth.

The sandy surface layer of this soil is a severe limitation for recreational uses. The surface layer should be stabilized by adding a fill material and using a vegetation cover or a hard surface material to help overcome this limitation.

This Zolfo soil is in capability subclass IIIw. The woodland ordination symbol is 10W.

5—Placid fine sand, depressional. This soil is nearly level and very poorly drained. It is in depressional areas on the flatwoods and uplands. The mapped areas are irregular in shape to circular and range from 4 to 200 acres. The slopes are concave and are less than 2 percent.

Typically, this soil has a surface layer of black and very dark gray fine sand about 14 inches thick. The upper part of the underlying material, to a depth of 26 inches, is dark grayish brown fine sand. The lower part to a depth of 80 inches or more is grayish brown and light gray fine sand.

Included with this soil in mapping are small areas of Myakka, Ona, Samsula, and St. Johns soils. These soils are in similar positions on the landscape as Placid soil. Also included are small areas of soils that are similar to Placid soil, but some of these soils have a surface layer of muck that is 4 to 10 inches thick, some are frequently flooded, and others have a very dark gray or black surface layer more than 24 inches thick. The included soils make up about 10 percent of this map unit.

In most years, this soil has a high water table above the surface for more than 6 months. The available water capacity is high in the surface layer, and it is low in the underlying material. The permeability is rapid. Natural fertility is moderate.

Several large areas have been drained, and this soil is used for growing grain and vegetables or for pasture or hay production. Some areas of this soil is in natural vegetation that includes cypress, sweetgum, blackgum, bay, red maple, and waxmyrtle. Some areas have marsh vegetation consisting mostly of maidencane, sawgrass, and other water-tolerant plants.

This Placid soil is not suitable for cultivated crops if a properly designed water control system is not established and maintained. The soil surface is ponded for long periods during the growing season. Outlets for needed water control systems are often not available or are difficult and expensive to install. If a water control system can be established, this soil is well suited to grain and vegetable crops. Management practices should include close-growing cover crops in the rotation system when the soil is not cultivated. Crop residue should be left on the surface to help control erosion and maintain soil quality. Regular applications of fertilizer and lime are needed.

This soil is too wet for most improved grasses and legumes. If an adequate water control system is established and maintained, this soil is well suited to bermudagrass, bahiagrass, and clover. A water control system is needed to keep the high water table from rising above the surface during wet periods. Plants grow well when fertilized and limed. Grazing must be controlled to maintain maximum plant vigor and obtain maximum yields.

This soil generally is not used for the commercial production of pine trees. The potential of this soil for the production of pine trees is low because the high water table is above the surface for long periods. Seedling mortality and the restricted use of equipment on this soil are concerns in management.

This soil has severe limitations for urban development because the surface is ponded for long periods. Adequate water outlets to drain areas for building site development, for construction of roadways, or for installing a septic tank absorption field are generally not available. Adding fill material to elevate these areas can help overcome this limitation. Large amounts of fill material are needed to maintain the high water table at an effective depth.

Because of ponding and the sandy surface layer, this soil has severe limitations for recreational development. If a water control system is established to maintain the high water table at an effective depth, this soil is suited to recreational uses, such as campgrounds, picnic areas, playgrounds, and paths and trails. The surface should be stabilized for recreational uses by adding suitable fill material or by paving the areas that are subject to intensive foot traffic.

This Placid soil is in capability subclass VIIw (undrained). The woodland ordination symbol is 6W.

6—Tavares fine sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and moderately well drained. It is on the uplands and on knolls and ridges on the flatwoods. The mapped areas are irregular in shape and range from 10 to 400 acres. The slopes are convex.

Typically, this soil has a surface layer of dark grayish brown fine sand about 5 inches thick. The upper part of the underlying material, to a depth of 45 inches, is very pale brown and yellow fine sand. The next layer, to a depth of 67 inches, is very pale brown fine sand and contains masses of white fine sand. The lower part to a depth of 80 inches or more is white fine sand that has yellowish red mottles.

Included with this soil in mapping are small areas of Adamsville, Candler, Centenary, Narcoossee, Sparr, and Zolfo soils. Also included are small areas of soils that are similar to Tavares soil, but some of these soils have a thin, light gray or white surface layer; some have thin bands of fine sandy loam at a depth of more than 50 inches; and others have a sand or coarse sand surface and subsurface layer. In addition, included in mapping are small areas of Tavares soils that have slopes of more than 5 percent. The included soils make up less than 20 percent of this map unit.

In most years, this soil has a high water table between depths of 40 and 80 inches for more than 6 months. The water table recedes to a depth of more than 80 inches during dry periods. The available water capacity is low in the surface layer, and it is very low in the underlying material. The permeability is rapid or very rapid. Natural fertility is low.

Some areas of this soil are used as improved pasture. Most of the acreage of this soil is in natural vegetation that includes turkey oak, longleaf pine, and scattered live oak. The understory vegetation consists of threeawn, bluestem, panicum, and scattered sawpalmetto.

Droughtiness and rapid leaching of nutrients are severe limitations to use of this Tavares soil for cultivated crops. If this soil is cultivated, row crops should be planted on the contour, and close-growing cover crops should be grown in rotation with row crops. Crop residue should be left on the surface to help control erosion and improve soil quality. It is feasible to grow high-value crops if irrigation water is readily available.

This soil is well suited to pasture and hay. Coastal bermudagrass and bahiagrass are well suited to this soil, but yields are reduced by periodic drought. Grazing should be controlled to maintain plant vigor.

The potential of this soil for the production of pine trees is medium. Slash pine is the better suited tree to plant for commercial woodland production. Use of equipment, seedling mortality, and plant competition are the main concerns in management. This soil is droughty and does not retain enough moisture for plant growth during long, dry periods. Using special planting stock that is larger than usual or that is containerized reduces seedling mortality. The loose, sandy surface of this soil is a limitation to use of equipment. Machinery equipped with large, low-pressure tires or tracks will help overcome this limitation. Plant competition from hardwoods, mostly oaks, can be reduced if herbicides are used during site preparation. Although runoff is slow, logging and site preparation operations can increase and concentrate water movement on this soil and cause soil erosion. These activities should be avoided in and adjacent to drainageways. Special design and proper placement of roads, skid trails, and stream crossings reduce soil loss. During site preparation and thinning and harvesting operations, as much of the plant debris as possible should be left on the surface of the soil to help conserve organic matter.

Wetness is a moderate limitation to the use of this soil as septic tank absorption fields. Fill material may be needed to elevate the septic tank absorption field for proper functioning of the system. The thick, sandy texture of these soils may not adequately filter the effluent in the septic tank absorption field. The poor

filtering capacity of the soil may result in the contamination of ground water in areas where septic tank absorption fields are concentrated. This soil has slight limitations for dwellings without basements, small commercial buildings, and local roads and streets.

The sandy surface layer of this soil is a severe limitation for recreational uses. In areas of intensive foot traffic, the surface should be stabilized for recreational uses by adding suitable fill material, using a vegetation cover, or paving the area to reduce or overcome this limitation.

This Tavares soil is in capability subclass IIIs. The woodland ordination symbol is 10S.

7—Immokalee fine sand. This soil is nearly level and poorly drained. It is on broad flatwood areas and in long, narrow areas bordering drainageways. The mapped areas are irregular in shape and range from 10 to 250 acres. The slopes range from 0 to 2 percent.

Typically, this soil has a surface layer of black and dark gray fine sand about 7 inches thick. The subsurface layer, to a depth of 35 inches, is light gray fine sand. The upper part of the subsoil, to a depth of 48 inches, is black and dark reddish brown fine sand. The lower part, to a depth of 68 inches, is dark yellowish brown fine sand. The substratum to a depth of 80 inches or more is dark gray fine sand.

Included with this soil in mapping are small areas of Cassia, Myakka, and St. Johns soils. Also included are small areas of soils that are similar to Immokalee soil, but some of these soils have a subsoil at a depth of more than 50 inches, others have a thin, very weakly developed subsoil, and others are better drained than Immokalee soil. The included soils make up about 15 percent of this map unit.

In most years, this soil has a high water table at a depth of less than 12 inches for about 2 months and between depths of 12 and 40 inches for more than 8 months. The available water capacity is low in the surface layer, very low in the subsurface layer, medium to high in the subsoil, and low in the substratum. The permeability is rapid in the surface and subsurface layers and in the substratum, and it is moderate in the subsoil. Natural fertility is low.

Some areas of this soil are used for commercial production of slash pine. Most of the acreage of this soil is in natural vegetation that includes slash and longleaf pine. The understory vegetation includes sawpalmetto, gallberry, waxmyrtle, lopsided indiangrass, pineland threeawn, and bluestem.

Wetness and poor soil quality are severe limitations to use of this Immokalee soil for cultivated crops. If a water control system is established and maintained, this soil is suitable for many vegetable crops. The water control system must remove excess water in wet periods and provide for subsurface irrigation in dry periods. Management practices should include soil-improving measures. Close-growing cover crops should be included in the rotation system when the soil is not cultivated. Seedbed preparation should include bedding of the rows. Crop residue should be left on the surface to control erosion, to help maintain the content of organic matter, and to maintain tilth. Fertilizer and lime are needed.

This soil is well suited to improved pasture and hay crops. Bermudagrass, bahiagrass, and clover are well adapted to this soil. A water control system is needed to remove excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Grazing should be controlled to prevent overgrazing, to help maintain plant vigor, and to obtain maximum yields.

The potential of this soil for the production of pine trees is medium. Slash and longleaf pines are the better suited trees to plant for commercial woodland production. The major concerns in management are the use of equipment, seedling mortality, plant competition, and the hazard of windthrow. Seasonal wetness limits the use of equipment on this soil. Timely scheduling of site preparation and planting, thinning, and harvesting operations can help overcome this wetness limitation. Field work generally can be done during the wet periods if machinery is equipped with large, low-pressure rubber tires or tracks. Proper site preparation reduces seedling mortality and helps to control plant competition. Bedding helps to establish seedlings, increases early growth, and reduces seedling mortality. Chopping helps to control competing vegetation, reduces debris, and facilitates planting operations. The use of logging systems that leave residual biomass well distributed on the surface of the soil helps to conserve organic matter. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Excessive wetness during rainy periods is a severe limitation to use of this soil for urban development. The high water table can interfere with the proper functioning of septic tank absorption fields. If septic tank absorption fields are elevated by adding a suitable fill material, this soil is suited to this use. The use of this soil for building sites and for local roads and streets also requires that measures be taken to overcome the wetness limitation. If adequate water outlets are available, a drainage system should be installed to help keep the high water table at an effective depth. The use of fill material to elevate building sites and roadbeds will also help keep the high water table at an effective depth.

Excessive wetness and the sandy surface layer of this soil are severe limitations for recreational uses. The wetness limitation can be overcome by establishing a water control system that will maintain the high water table at an effective depth. In areas of intensive foot traffic, the surface should be stabilized by adding suitable fill material or by paving the recreation areas.

This Immokalee soil is in capability subclass IVw. The woodland ordination symbol is 8W.

8—Arents, 0 to 2 percent slopes. Arents consists of heterogeneus soil materials that were removed from other soils and used in land-leveling operations, as fill material, or as a cover for sanitary landfills. This material is a mixture of fine sand or sand and fragments of loamy subsoil material. Areas of this soil occur throughout the county. The mapped areas are square or rectangular or are irregular in shape. These areas range from 3 to 80 acres.

Arents do not have an orderly sequence of soil layers. In most areas, the upper 20 to 40 inches is variable and contains discontinuous lenses, pockets, and streaks of light gray, gray, grayish brown, brown, and yellowish brown sand. The average thickness of the fill material is about 30 inches. It has few to common light gray, pale brown, grayish brown, or yellowish brown loamy subsoil fragments. Below that depth is an undisturbed soil that is generally sandy.

In some areas, large cells of solid waste refuse are at a depth of more than 2 to 4 feet. This refuse consists of plastic, wood, glass, concrete, metal, and other materials that range from 2 to 10 feet in thickness. The refuse generally is stratified with layers of soil material that was used for daily cover. A final layer of soil material is spread on top of the refuse and smoothed. These sanitary landfill areas are identified on the soil map by the words "sanitary landfill" or in small areas by the letters "SLF" and by the map symbol.

Included with this soil in mapping are a few areas in which the mixed material has fragments of black or dark reddish brown sandy soil material. A few small areas have shell fragments or loamy subsoil fragments that are slightly acid to moderately alkaline. In some spots, the fill material is less than 20 inches thick, and in other areas, about 40 inches of fill material is underlain by muck. Some areas along the Cross Florida Barge Canal have slopes up to 20 percent.

The high water table is at a depth of 20 to 40 inches for 2 to 6 months. In sanitary landfill areas, the high water table is controlled by perimeter drainage ditches or other water control measures. The available water capacity is very low or low. The permeability is rapid. Natural fertility and the content of organic matter are low.

The natural vegetation consists of waxmyrtle, inkberry, sawpalmetto, longleaf pine, and slash pine. The understory vegetation is bluestem, panicum, and pineland threeawn.

This soil generally is not suited to vegetable crops because of the extreme variability of soil properties and poor soil quality.

In some areas, improved pasture grasses can be grown on this soil. Deep-rooted plants, such as bahiagrass, should be grown. Large amounts of fertilizer are needed.

The potential of this soil for the production of pine trees is low. In many areas, this soil is not suited for this use because of the wide range of soil properties.

This Arents soil has severe limitations for community development. The areas that have less than 2 feet of fill material may require additional elevation of building foundation sites and subgrades for local roads and streets. Areas that have less than 3 feet of fill material may require additional fill material to elevate the septic tank absorption field. Sanitary landfill areas are not suited to community development. Differential settling of the buried refuse severely limits the use of this soil for dwellings without basements and for local roads and streets in these areas. Sanitary landfill areas are not suitable for septic tank absorption fields. Refuse cells would not provide adequate filtering capacity of effluents. Differential settling would cause the septic tank absorption fields to cease functioning.

This soil has a severe limitation for recreational development because the surface is too sandy. The surface layer can be stabilized by adding suitable fill material or by paving the high traffic areas to help overcome this limitation.

Arents has not been assigned to a capability subclass or to a woodland group.

9—Pomona fine sand. This soil is nearly level and poorly drained. It is in broad flatwood areas. The mapped areas are irregular in shape and range from 80 to 400 acres. The slopes range from 0 to 2 percent.

Typically, this soil has a surface layer of black fine sand about 6 inches thick. The subsurface layer, to a depth of 20 inches, is gray and light gray fine sand. The upper part of the subsoil, to a depth of 28 inches, is dark reddish brown loamy fine sand. Below that layer, to a depth of 42 inches, is dark brown and light brownish gray fine sand. The lower part, to a depth of 73 inches, is gray and light gray fine sandy loam. The substratum to a depth of 80 inches is greenish gray fine sandy loam.

Included with this soil in mapping are small areas of Myakka, Palmetto, Pomona fine sand, depressional, and Wauchula soils. Also included are small areas of soils that are similar to Pomona soil, but, in some soils, the upper part of the subsoil is more than 30 inches deep, some soils are slightly acid to moderately alkaline in the lower part of the subsoil, and some are weakly cemented in the upper part of the susboil. The included soils make up about 15 percent of this map unit.

In most years, this soil has a high water table at a depth of less than 12 inches for 1 month to 3 months and between depths of 12 and 40 inches for more than 6 months. The available water capacity is very low or low in the surface and subsurface layers, and it is medium or high in the subsoil. The permeability is rapid or very rapid in the surface layer and rapid in the subsurface layer, and it is moderate to rapid in the upper part of the

subsoil and moderately slow to moderate in the lower part. Natural fertility is low.

Large areas of this soil are used for commercial production of slash pine; and in some areas, the soil is used for vegetable crops. Most of the acreage of this soil is in natural vegetation that includes slash and longleaf pine. The understory vegetation includes sawpalmetto, gallberry, threeawn, bluestem, and lopsided indiangrass.

This Pomona soil has severe limitations for cultivated crops because of wetness. The number of adapted crops that can be grown on this soil are limited unless intensive management practices are used. If an adequate water control system is established and maintained, this soil is well suited to many vegetable crops, including cabbage and Irish potatoes. The water control system should be designed to remove excess surface water after intense rains and to provide for subsurface irrigation during dry periods. Close-growing cover crops should be included in the rotation system when the soil is not cultivated. Management practices should include leaving crop residue on the soil and using conservation tillage to help control wind erosion, to conserve moisture, and to maintain soil quality.

This soil is well suited to pasture and hay crops. Bermudagrass and bahiagrass grow well when properly managed. A water control system is needed to remove excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Grazing should be controlled to help maintain plant vigor.

The potential of the soil for the production of pine trees is medium to high. Slash, loblolly, and longleaf pines are the better suited trees to plant for commercial woodland production. The major concerns in management are the restricted use of equipment on this soil, rate of seedling mortality, and plant competition. Seasonal wetness and periods of droughtiness limit the use of equipment and increase the rate of seedling mortality. Site preparation activities, such as harrowing and bedding, helps to establish seedlings, reduce seedling mortality, and increase early growth. Chopping and bedding reduce debris, control competing vegetation, and facilitate planting operations. Machinery equipped with high flotation rubber tires or tracks helps to overcome the limitations to use of equipment, reduces soil compaction, and also reduces root damage during thinning operations. Site preparation and planting and harvesting operations should be scheduled during dry periods to help overcome the wetness limitations to use of equipment. The use of logging systems that leave residual biomass well distributed on the surface of the soil increases the content of organic matter and residual fertility of the soil. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Wetness is a severe limitation of this soil for dwellings and local roads and streets. Wetness, poor filtering capacity, and the slow percolation in the lower part of the subsoil are severe limitations to use as septic tank absorption fields. A water control system should be installed or building sites, roadways, and septic tank absorption fields should be elevated to help overcome the wetness limitation.

Excessive wetness and the sandy surface layer of this soil are severe limitations for recreational development. A water control system is needed to help overcome the wetness limitation by maintaining the seasonal high water table at an effective depth. In areas of intensive foot traffic, the sandy surface layer should be stabilized by adding suitable fill material or by paving the recreation areas.

This Pomona soil is in capability subclass IVw. The woodland ordination symbol is 10W.

10—Pompano fine sand. This soil is nearly level and poorly drained. It is in broad, low flatwood areas and narrow areas along drainageways. The mapped areas are irregular in shape to elongated and range from 10 to 200 acres. The slopes range from 0 to 2 percent.

Typically, this soil has a surface layer of very dark gray and dark grayish brown fine sand about 19 inches thick. The underlying material to a depth of 80 inches or more is gray and light gray fine sand.

Included with this soil in mapping are small areas of Holopaw, Malabar, and Palmetto soils. Also included are small areas of soils that are similar to Pompano soil, but some of these soils have a dark brown subsurface layer, some are on flood plains and are frequently flooded, and others have a subsurface layer of loamy fine sand. The included soils make up about 20 percent of this map unit.

In most years, this soil has a high water table at a depth of less than 12 inches for 2 to 6 months. The available water capacity is very low. The permeability is rapid. Natural fertility is low.

Most of the acreage of this soil is in natural vegetation that includes slash and longleaf pine and scattered gum and maple. The understory vegetation includes waxmyrtle, gallberry, scattered sawpalmetto, pineland threeawn, and bluestem.

Wetness and poor soil quality are severe limitations to use of this Pompano soil for cultivated crops. The root zone is limited by a high water table that is near the surface for long periods. Intensive management practices must be used to grow crops. A water control system is needed to remove excess water in wet periods and to provide for subsurface irrigation during dry periods. When the soil is not cultivated, close-growing cover crops should be included in the rotation system to help maintain the content of organic matter in the soil, maintain tilth, and improve soil quality. Seedbed preparation should include bedding of the rows. Regular applications of fertilizer and lime are needed.

This soil is well suited to pasture and hay crops. Bermudagrass and bahiagrass grow well with proper

management. A water control system is needed to remove excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

The potential of this soil for the production of pine trees is medium to high. Slash pine is the better suited tree to plant for commercial woodland production. Seedling mortality is a major concern in management. This soil is droughty and does not retain enough moisture to sustain plant growth during long, dry periods. Excessive wetness during rainy periods can increase the rate of seedling mortality. Site preparation activities that include bedding of the rows, furrowing, and surface drainage help establish seedlings and increase early growth. The use of equipment, seedling mortality, and plant competition are the main concerns in management. Site preparation and planting, thinning, and harvesting operations should be scheduled to avoid seasonal limitations. Forest management operations can generally be carried out during wet periods if machinery is equipped with large tires or tracks. Harrowing and chopping reduce plant competition. The surface layer of this soil is generally low in organic matter. During site preparation and harvesting operations, as much plant residue as possible should be left on the surface of the soil to help conserve organic matter. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Wetness is a severe limitation for urban uses, such as septic tank absorption fields, building sites, and local roads and streets. To help overcome this wetness limitation, a water control system should be established and maintained to remove excess water and to maintain the high water table at an effective depth. The poor filtering capacity of this soil is a severe limitation to use as septic tank absorption fields. Because of the low position of this soil, adequate outlets for water removal are not available or are difficult to install. The high water table can be maintained at an effective depth by adding suitable fill material to elevate septic tank absorption fields, building sites, and roadways.

Excessive wetness and the sandy surface of the soil are severe limitations for recreational development. A water control system is needed to help overcome the wetness limitation and to keep the high water table at an effective depth. If this soil is used for camp areas, picnic areas, or playgrounds, the high water table should be kept at a depth of about 2.5 feet or more; and if it is used for paths and trails, it should be kept at a depth of 2 feet or more. The surface should be stabilized by adding suitable fill material or by paving the areas that are subject to intensive foot traffic.

This Pompano soil is in capability subclass IVw. The woodland ordination symbol is 8W.

11—Udorthents, excavated. Udorthents, excavated, consist of excavated areas from which soil and geologic material have been removed mainly for use in road construction and as fill material. These are commonly referred to as borrow pits. Most of these areas have been excavated to a depth of 6 feet or more.

Included in this map unit is spoil material that is mostly a mixture of sand and sandy loam, which has been scattered around the edge of the pits. These soils have little or no agricultural or woodland value. Wildlife or recreational areas can be developed after excavation operations are discontinued.

Udorthents has not been assigned to a capability subclass or to a woodland group.

12—Electra fine sand. This soil is nearly level and somewhat poorly drained. It is on low knolls and slopes along well defined drainageways on the flatwoods and on low ridges, knolls, and side slopes on the uplands. The mapped areas are irregular in shape and range from 5 to 150 acres. The slopes range from 0 to 2 percent.

Typically, this soil has a surface layer of dark gray fine sand about 8 inches thick. The subsurface layer, to a depth of 48 inches, is light gray and light brownish gray fine sand. The upper part of the subsoil, to a depth of 64 inches, is black and dark reddish brown fine sand. The lower part to a depth of 80 inches or more is brown fine sandy loam.

Included with this soil in mapping are small areas of Adamsville, Cassia, Hobe, Newnan, and Sparr soils. Also included are small areas of soils that are similar to Electra soil, but some of these soils have a thick, dark surface layer. In some of these soils, the lower part of the subsoil is slightly acid to mildly alkaline; and in others, the upper part of the subsoil is weakly cemented. The included soils make up about 15 percent of this map unit.

In most years, this soil has a high water table between depths of 25 and 40 inches for about 4 months, and it recedes to a depth of more than 40 inches during dry periods. The available water capacity is low in the surface layer, very low in the subsurface layer, and medium in the subsoil. The permeability is rapid in the surface and subsurface layers, and it is moderate in the upper part of the subsoil and slow or very slow in the lower part. Natural fertility is low.

Most of the acreage of this soil is in natural vegetation that includes laurel oak, live oak, and scrub live oak. The understory vegetation is sparse. It includes sawpalmetto, grassleaf goldaster, and bluestem.

This Electra soil has severe limitations for cultivated crops. Very poor soil quality is caused by droughtiness and rapid leaching of plant nutrients. The root zone is limited by a high water table during wet periods. A water control system is needed to remove excess water during rainy periods if this soil is cultivated, and an irrigation system is needed during the dry periods. Soil-improving cover crops should be included in the rotation system when the soil is not cultivated. Returning crop residue to

the soil and using conservation tillage help to conserve moisture and control erosion.

This soil has moderate limitations for pasture. Poor soil quality and periodic drought reduce yields. Bermudagrass and bahiagrass are well adapted to this soil. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor and to keep a good ground cover on the soil.

The potential of this soil for the production of pine trees is medium to high. Slash, loblolly, and longleaf pines are the better suited trees to plant for commercial woodland production. The major concerns in management are the restricted use of equipment on this soil, high rate of seedling mortality, and plant competition. Seasonal wetness and periods of droughtiness severely limit the use of equipment and cause seedling mortality. Site preparation activities, such as harrowing and bedding, help establish seedlings, reduce seedling mortality, and increase early growth. Chopping and bedding reduce debris, control competing vegetation, and facilitate planting operations. Machinery equipped with high flotation rubber tires or tracks helps to overcome the limitations to use of equipment, reduces soil compaction, and also reduces root damage during thinning operations. Site preparation and planting and harvesting operations should be scheduled during dry periods to help overcome the wetness limitations to use of equipment. The use of logging systems that leave residual biomass well distributed on the surface of the soil increases the content of organic matter and residual fertility of the soil. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

The seasonal high water table and poor filtering capacity are severe limitations to use of this soil as septic tank absorption fields. If adequate water outlets are available, a water control system should be established to maintain the high water table at an effective depth. If water outlets are not available, the septic tank absorption field should be elevated to help keep the high water table at an effective depth. Wetness is a moderate limitation for building sites and for local roads and streets. Special measures, such as installing a water control system or elevating building sites and roadways, will help to overcome this wetness limitation.

The sandy surface layer of this soil is a severe limitation for recreational development. To reduce or overcome this limitation, the surface layer should be stabilized by adding suitable fill material or paving the areas that are subject to intensive foot traffic. Establishing a good vegetation cover on this soil is difficult.

This Electra soil is in capability subclass VIs. The woodland ordination symbol is 8S.

13—St. Johns fine sand, depressional. This soil is nearly level and very poorly drained. It is in depressional areas on the flatwoods and uplands. The mapped areas are circular to irregular in shape and range from 4 to 300 acres. The slopes are less than 2 percent.

Typically, this soil has a surface layer of black fine sand about 12 inches thick. The subsurface layer, to a depth of 28 inches, is gray fine sand. The upper part of the subsoil, to a depth of 50 inches, is black fine sand. The lower part, to a depth of about 55 inches, is dark brown fine sand. The underlying material to a depth of 80 inches is dark gray fine sand.

Included with these soils in mapping are small areas of Myakka, Ona, Placid, Pomona, and Samsula soils. Also included are small areas of soils that are similar to St. Johns soil, but some of these soils have a subsoil at a depth of more than 30 inches, some have a surface layer of muck that is 4 to 8 inches thick, and others have a very weakly developed subsoil. The included soils make up about 20 percent of this map unit.

In most years, this soil has a high water table that is 1 foot to 2 feet above the surface for 6 months or more. The available water capacity is medium in the surface layer, very low or low in the subsurface layer and substratum, and medium to very high in the subsoil. The permeability is rapid in the surface and subsurface layers and in the substratum, and it is moderately slow or moderate in the subsoil. Natural fertility is low.

Most of the acreage of this soil is in natural vegetation that includes bay, cypress, waxmyrtle, scattered gum, and maple. Some areas have marsh vegetation that includes maidencane, St.-Johnswort, chalky bluestem, and panicum.

This St. Johns soil is not suitable for cultivated crops. The surface is ponded for long periods, which inhibits plant growth and interferes if the soil is cultivated. This soil is in low-lying, depressional areas. Adequate outlets to remove excess water are generally not available or are difficult to install and maintain.

This soil is not suited to improved pasture and hay crops. The surface is ponded for long periods, which severely limits growth of improved pasture plants. Adequate water outlets for surface drainage systems are generally not available.

This soil generally is not used for commercial production of pine trees because of ponding. The potential of this soil for the production of pine trees is moderate if this soil has adequate surface drainage. Slash pine is the better suited tree to plant for commercial woodland production. The use of equipment and seedling mortality are the main concerns in management. This soil is rarely drained for commercial woodland production.

This soil has severe limitations for urban development. Ponding restricts the use of this soil for building sites, for local roads and streets, and as septic tank absorption fields. Adequate drainage outlets to remove excess water are generally not available. If this soil is used for urban development, large quantities of fill material would be required to elevate the building sites, roadways, and

septic tank absorption fields and to maintain the high water table at an effective depth.

Because of the sandy surface layer and ponding for long periods, this soil has severe limitations for recreational development. If outlets to remove excess water are available, this soil can be used for camp and picnic areas, playgrounds, and paths and trails. The surface should be stabilized by adding suitable fill material or by paving the areas that are subject to intensive foot traffic.

This St. Johns soil is in capability subclass VIIw. The woodland ordination symbol is 2W.

14—Cassia fine sand. This soil is nearly level and somewhat poorly drained. It is on small knolls on the flatwoods and in low positions on the uplands. The mapped areas are irregular in shape and range from 5 to 150 acres. The slopes range from 0 to 2 percent.

Typically, this soil has a surface layer of gray fine sand about 4 inches thick. The subsurface layer, to a depth of 28 inches, is light gray, white, and gray fine sand. The subsoil, to a depth of 46 inches, is very dark grayish brown and dark brown fine sand. The substratum to a depth of 80 inches is pale brown and light gray fine sand.

Included with this soil in mapping are small areas of Adamsville, Myakka, Narcoossee, and Zolfo soils. Also included are small areas of a soil that is similar to Cassia soil, but it is moderately well drained and has a subsoil at a depth of more than 30 inches. The included soils make up about 20 percent of this map unit.

In most years, this soil has a high water table at a depth of 15 to 40 inches for about 6 months. It is at a depth of more than 40 inches during extended dry periods. The available water capacity is very low or low in the surface and subsurface layers and in the substratum, and it is medium in the subsoil. The permeability is rapid in the surface and subsurface layers and in the substratum, and it is moderate or moderately rapid in the subsoil. Natural fertility is very low.

In a few areas, this soil has been planted to slash pine. Most of the acreage of this soil is in natural vegetation that includes slash pine, live oak, water oak, sawpalmetto, bluestem, and pineland threeawn.

This Cassia soil has severe limitations for cultivated crops. Very poor soil quality is caused by droughtiness and rapid leaching of plant nutrients. The root zone is limited by a high water table during wet periods. A water control system is needed to remove excess water during rainy periods if this soil is cultivated, and an irrigation system is needed during the dry periods. Soil-improving crops should be included in the rotation system at least two-thirds of the time. Returning crop residue to the soil and using conservation tillage help conserve moisture and control erosion.

This soil has moderate limitations for pasture. Poor soil quality and periodic drought reduce yields. Bermudagrass and bahiagrass are well adapted to this soil. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor and to help keep a good ground cover on the soil.

The potential of this soil for the production of pine trees is medium. Slash and longleaf pines are the better suited trees to plant for commercial woodland production. The major concerns in management are the use of equipment on this soil, seedling mortality, and plant competition. Seasonal wetness and periods of droughtiness are moderate limitations to use of equipment and severely reduce the rate of seedling survival. Site preparation activities, such as harrowing and bedding, help to establish seedlings, reduce seedling mortality, and increase early growth. Chopping and bedding reduce debris, control competing vegetation, and facilitate planting operations. Machinery equipped with high flotation rubber tires or tracks helps to overcome the limitation to use of equipment, reduces soil compaction, and also reduces root damage during thinning operations. Site preparation and planting and harvesting operations should be scheduled during dry periods to help overcome the wetness limitations to use of equipment. The use of logging systems that leave residual biomass well distributed on the surface of the soil increases the content of organic matter and residual fertility of the soil. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

A seasonal high water table is a severe limitation to use of this soil as septic tank absorption fields. A water control system should be established to maintain the high water table. The septic tank absorption fields should be elevated by adding suitable fill material to help keep the high water table at an adequate depth and to improve infiltration. Limitations are moderate for building sites and local roads and streets. Installing a water control system or elevating roadways will help to overcome these limitations.

The loose, sandy surface layer of this soil is a severe limitation for recreational development. The surface layer should be stabilized by adding suitable fill material or by paving the area to help overcome this limitation.

This Cassia soil is in capability subclass VIs. The woodland ordination symbol is 8S.

15—Apopka sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and well drained. It is on ridges and side slopes on the uplands. The mapped areas are irregular in shape and range from 10 to 300 acres.

Typically, this soil has a surface layer of dark grayish brown sand about 7 inches thick. The upper part of the subsurface layer, to a depth of 40 inches, is pale brown and very pale brown sand. The lower part, to a depth of about 43 inches, is brownish yellow sand. The subsoil to a depth of 80 inches or more is yellowish red sandy clay

loam that has red, brownish yellow, and reddish yellow mottles.

Included with this soil in mapping are small areas of Bonneau, Candler, Millhopper, and Sparr soils. Also included are small areas of soils that are similar to Apopka soil, but some of these soils have a subsoil at a depth of less than 40 inches, some are on steeper slopes than Apopka soil, and others have a surface texture that is more coarse than fine sand, and others have gravel-size quartz pebbles mixed throughout. The soils that have gravel-size quartz pebbles are mostly in the area between Interlachen and Grandin. The included soils make up about 25 percent of this map unit.

This soil has a high water table at a depth of more than 80 inches. The available water capacity is very low in the surface and subsurface layers, and it is medium or high in the subsoil. The permeability is rapid in the surface and subsurface layers, and it is moderate in the subsoil. Natural fertility is low.

In a few areas, this soil is used for improved pasture and hay crops. Most of the acreage of this soil is in natural vegetation that includes turkey oak and a few longleaf pine. The understory vegetation is sparse and includes bluestem, threeawn, and lopsided indiangrass.

Droughtiness and rapid leaching of plant nutrients are severe limitations to use of this Apopka soil for cultivated crops. The available water capacity is very low or low in the root zone. Rainfall is rapidly absorbed, and this soil has little runoff. This soil requires special measures when cultivated crops are grown. Close-growing cover crops should be included in the cropping system when the soil is not cultivated. Crop residue should be left on the soil to control erosion and increase the content of organic matter. If adequate water is available, irrigation of high value crops is practical. Frequent applications of fertilizer and lime are necessary.

This soil is well suited to pasture and hay crops. Deep-rooted plants, such as bermudagrass and bahiagrass, are well adapted to this soil, and high yields can be obtained if the soil is well fertilized and limed. Yields are reduced by extended periods of drought. Grazing should be controlled to maintain plant vigor and obtain maximum yields.

The potential of this soil for the production of pine trees is medium to high. Slash, loblolly, and longleaf pines are the better suited trees to plant for commercial woodland production. The use of equipment, seedling mortality, and plant competition are the main concerns in management. This soil is droughty, and seasonal dry periods and very low available water capacity in the root zone cause excessive seedling mortality and inhibit plant growth. Plant competition from hardwoods, mostly oaks, can be reduced if herbicides are used during site preparation. Site preparation activities should include chopping, which helps control competing vegetation, reduces debris, and facilitates planting operations. The loose, sandy surface of this soil is a limitation to use of equipment. Machinery equipped with large tires or tracks can help overcome this limitation. Using special planting stock that is larger than usual or that is containerized reduces seedling mortality. Scheduling planting operations during seasons when rainfall is heavier and more frequent increases plant growth and the rate of seedlings survival. Logging, site preparation, and planting activities increase and concentrate water runoff on this soil and cause soil erosion. These activities should be avoided in and adjacent to stream beds. Special design and proper placement of roads, skid trails, and stream crossings reduce soil erosion. During site preparation and thinning and harvesting operations, as much plant debris as possible should be left on the surface of the soil to help conserve organic matter. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

This soil has slight limitations for most urban uses. It can be used as septic tank absorption fields, for dwellings, and for local roads and streets.

The sandy surface layer of this soil is a severe limitation for recreational development. The surface should be stabilized by adding suitable fill material or by paving areas to help overcome this limitation.

This Apopka soil is in capability subclass IIIs. The woodland ordination symbol is 10S.

16—Adamsville sand. This soil is nearly level and somewhat poorly drained. It is on low knolls on the flatwoods and on low side slopes on the uplands. The mapped areas range from 30 to 120 acres. The slopes range from 0 to 2 percent.

Typically, this soil has a surface layer of grayish brown sand about 6 inches thick. The upper part of the underlying material, to a depth of 42 inches, is very pale brown and light yellowish brown sand. The lower part to a depth of 80 inches is light gray sand.

Included with this soil in mapping are small areas of Cassia, Narcoossee, Tavares, and Zolfo soils. Also included are small areas of a soil that is similar to Adamsville soil, but it has a surface layer of black or very dark gray sand that is more than 10 inches thick. The included soils make up less than 10 percent of this map unit.

In most years, this soil has a high water table at a depth of 20 to 40 inches for 2 to 6 months. In some years, the high water table is at a depth of 10 to 20 inches for about 2 weeks. The permeability is rapid. The available water capacity is low in the surface layer and is very low to low in the underlying material. Natural fertility is low.

A small acreage of this soil is used for improved pasture and hay crops and for commercial production of slash pine. Most of the acreage is in natural vegetation of water oak, laurel oak, and live oak and a few longleaf pine and slash pine. The sparse understory vegetation

includes pineland threeawn, lopsided indiangrass, and bluestem.

Periodic wetness is a severe limitation to use of this Adamsville soil for cultivated crops. If a water control system is installed to remove excess water during wet periods and provide irrigation during dry periods, this soil is well suited to a variety of vegetable crops. Management should include close-growing cover crops when the soil is not cultivated. Crop residue should be left on the ground to help control erosion, to increase the content of organic matter, and to maintain soil tilth. Regular applications of fertilizer and lime are needed but should be applied according to the needs of the crop.

This soil is moderately well suited to pasture and hay crops. A water control system is needed to remove excess water during heavy rains. Applications of fertilizer and lime are needed, and grazing must be controlled to maintain plant vigor and obtain maximum yields.

The potential of this soil for the production of pine trees is medium to high. Slash and longleaf pines are the better suited trees to plant for commercial woodland production. The main concerns in management are the use of equipment, seedling mortality, and plant competition. Seasonal wetness and periods of droughtiness are moderate limitations to use of equipment on this soil and increase the rate of seedling mortality. Site preparation activities, such as harrowing and bedding, help establish seedlings, reduce seedling mortality, and increase early growth; and chopping and bedding reduce debris, control competing vegetation, and facilitate planting operations. The use of machinery equipped with high flotation rubber tires or tracks will help overcome the wetness limitation to use of equipment, reduce soil compaction, and also reduce root damage during thinning operations. Site preparation and planting and harvesting operations should be scheduled during dry periods to help overcome the limitations to use of equipment on this soil. The use of logging systems that leave residual biomass well distributed on the surface of the soil increases the content of organic matter and residual fertility of the soil. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Wetness and poor filtering capacity are severe limitations to use of this soil as septic tank absorption fields. This limitation can be overcome by using fill material to elevate the septic tank absorption field and to help keep the high water table at an effective depth. Wetness is a moderate limitation for dwellings and for local roads and streets. To help overcome this limitation, a water control system should be established to help maintain the high water table at an effective depth if adequate water outlets are available. The use of fill material to elevate building sites and roadways may be needed if an effective water control system cannot be established.

This soil has a severe limitation for recreational development because the surface layer is too sandy. The surface should be stabilized by adding suitable fill material or by paving the area to minimize the effects of this limitation.

This Adamsville soil is in capability subclass IIIw. The woodland ordination symbol is 10W.

17—Millhopper sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and moderately well drained. It is on ridges and side slopes on the uplands. The mapped areas are irregular in shape and range from 30 to 120 acres.

Typically, this soil has a surface layer of grayish brown sand about 3 inches thick. The subsurface layer, to a depth of 66 inches, is light yellowish brown, very pale brown, and light gray sand. The upper part of the subsoil, to a depth of 70 inches, is brown fine sandy loam. The lower part to a depth of 80 inches is gray sandy clay loam.

Included with this soil in mapping are small areas of Apopka, Candler, Sparr, and Tavares soils. Also included are small areas of soils that are similar to Millhopper soil, but some of these soils have a surface layer of fine sand, some have a thick, dark surface layer, and others have a slightly acid or neutral subsoil. The included soils make up about 15 percent of this map unit.

In most years, this soil has a high water table at a depth of 40 to 60 inches for 1 month to 4 months. It can be at a depth of 30 to 40 inches for a few days after heavy rains. The available water capacity is low in the surface and subsurface layers, and it is medium in the subsoil. The permeability is rapid in the surface and subsurface layers, and it is moderate to slow in the subsoil. Natural fertility is low.

In a few small areas, this soil is used for improved pasture, hay, or vegetable crops. Most of the acreage of this soil is in natural vegetation that includes turkey oak and longleaf pine. The understory vegetation is sparse. It includes pineland threeawn, lopsided indiangrass, and bluestem.

This Millhopper soil has severe limitations for most cultivated crops. It is droughty, and plant nutrients are rapidly leached from the root zone. The plants that can be grown on this soil are limited. If this soil is cultivated, management practices that control erosion and improve soil quality should be used. These practices include using conservation tillage and leaving crop residue on the soil. Close-growing cover crops should be included in the cropping system when the soil is not cultivated. Regular applications of fertilizer and lime are needed. It is feasible to grow high-value crops on this soil if irrigation water is readily available.

This soil is moderately well suited to improved pasture and hay crops. Deep-rooted plants, such as bermudagrass and bahiagrass, are well adapted to this soil, and high yields can be obtained if this soil is

fertilized and limed. Yields are reduced by periodic drought. Grazing should be controlled to maintain plant vigor and to help keep a good ground cover on the soil.

The potential of this soil for the production of pine trees is medium to high. Slash, loblolly, and longleaf pines are the better suited trees to plant for commercial woodland production. The use of equipment, seedling mortality, and plant competition are the main concerns in management. This soil is droughty, and seasonal dry periods and very low available water capacity in the root zone cause excessive seedling mortality and inhibit plant growth. Plant competition from hardwoods, mostly oaks, can be reduced if herbicides are used during site preparation. Site preparation activities should include chopping and applications of herbicides to help control competing vegetation, reduce debris, and facilitate planting operations. The loose, sandy surface of this soil is a limitation to use of equipment. Machinery equipped with large tires or tracks can help overcome this limitation. Using special planting stock that is larger than usual or that is containerized reduces seedling mortality. Scheduling planting operations during seasons when rainfall is heavier and more frequent increases the rate of seedling survival and sustains plant growth. Logging, site preparation, and planting activities increase and concentrate water runoff on this soil and cause soil erosion. These activities should be avoided in and adjacent to stream beds. Special design and proper placement of roads, skid trails, and stream crossings reduce soil erosion. During site preparation and thinning and harvesting operations, as much plant debris as possible should be left on the surface of the soil to help conserve organic matter. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Wetness is a moderate or slight limitation to use of this soil for urban development. It is a moderate limitation to use as septic tank absorption fields. This limitation can be overcome by adding fill material to slightly elevate the septic tank absorption field. Limitations to use of this soil for dwellings and for local roads and streets are slight. The soil is well suited to these uses, and special measures are not needed to overcome the wetness limitation.

The sandy surface layer of this soil is a severe limitation for recreational development. The surface layer should be stabilized by adding suitable fill material or by paving the areas to help overcome this limitation.

This Millhopper soil is in capability subclass IIIs. The woodland ordination symbol is 10S.

18—Lochloosa sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and somewhat poorly drained. It is on low knolls and ridges on the uplands. The mapped areas are irregular in shape and range from 30 to 200 acres.

Typically, this soil has a surface layer of dark gray sand about 5 inches thick. The subsurface layer, to a depth of 27 inches, is brown grading to pale brown sand. The upper part of the subsoil, to a depth of 32 inches, is yellowish brown loamy sand. The next layer, to a depth of 44 inches, is light brownish gray sandy clay loam. The next layer, to a depth of 62 inches, is light gray sandy clay loam. The lower part to a depth of 80 inches or more is light gray fine sandy loam.

Included with this soil in mapping are small areas of Apopka, Bonneau, Millhopper, and Sparr soils. Also included are small areas of soils that are similar to Lochloosa soil, but some of these soils are poorly drained, and some have a surface layer of fine sand. The included soils make up about 10 percent of this map unit.

In most years, this soil has a high water table between depths of 30 and 60 inches for 1 month to 4 months. During rainy periods, it is at a depth of about 15 inches for 1 week to 3 weeks. The available water capacity is medium. The permeability is rapid to moderately rapid in the surface and subsurface layers, moderate to moderately rapid in the upper part of the subsoil and moderate or moderately slow in the lower part, and slow in the substratum. Natural fertility is low.

A large acreage of this soil is used for commercial production of slash pine. Natural vegetation includes turkey oak, live oak, longleaf pine, and slash pine. The understory vegetation consists of bluestem, lopsided indiangrass, and threeawn.

Wetness is a moderate limitation to use of this Lochloosa soil for cultivated crops. The root zone is limited by the high water table during wet periods. A water control system is needed to obtain maximum yields from corn or peanuts. Close-growing cover crops should be included in the cropping system when the soil is not cultivated. Cover crops should be planted and crop residue should be left on the soil to help maintain the content of organic matter and soil tilth. Seedbed preparation and applications of fertilizer and lime are needed to ensure maximum yields.

This soil is well suited to pasture and hay crops. Bermudagrass and bahiagrass are well adapted to this soil, and high yields can be obtained if the soil is properly managed. Management practices should include applications of fertilizer and lime and controlled grazing.

The potential of this soil for the production of pine trees is high. Slash, loblolly, and longleaf pines are the better suited trees to plant for commercial woodland production. An adequate supply of phosphorus is needed for maximum growth. The major concerns in management are the use of equipment on this soil and seedling mortality. The loose, sandy surface layer of this soil is a limitation to use of equipment. Machinery equipped with large, low-pressure tires or tracks helps to overcome this limitation and also helps to prevent soil compaction. The available water capacity is low in the

root zone. During long, dry periods, this soil does not retain enough moisture in the root zone to sustain plant growth. Using special planting stock that is larger than usual or that is containerized reduces seedling mortality. Planting activities should be scheduled during periods when rainfall is heavier and more frequent. Logging, site preparation, and planting operations can increase and concentrate water runoff on this soil and cause soil erosion. Special design and proper placement of roads, skid trails, and stream crossings reduce soil erosion. Applications of nitrogen fertilizer with phosphorus and potassium provide excellent growth response.

Wetness is a severe limitation to use of this soil as septic tank absorption fields. A water control system is needed to help overcome this limitation by slightly lowering the high water table to an effective depth. Adding suitable fill material to elevate the septic tank absorption field can also help to overcome the wetness limitation. Limitations for dwellings and for local roads and streets are slight. Special measures are not needed for these uses.

The sandy surface layer of this soil is a severe limitation for recreational development. In areas of intensive foot traffic, the surface should be stabilized for recreational uses by adding suitable fill material or by paving the area to help overcome this limitation.

This Lochloosa soil is in capability subclass IIw. The woodland ordination symbol is 11A.

19—Pomona fine sand, depressional. This soil is nearly level and very poorly drained. It is in depressional areas on the flatwoods. The mapped areas are irregular in shape to circular and range from 3 to 250 acres. The slopes are concave and are less than 2 percent.

Typically, this soil has a surface layer of black fine sand about 5 inches thick. The subsurface layer, to a depth of 25 inches, is gray and light gray fine sand. The upper part of the subsoil, to a depth of 31 inches, is dark brown and dark yellowish brown fine sand. Below that layer, to a depth of 53 inches, is brown and light gray fine sand. The lower part of the subsoil to a depth of 80 inches or more is light gray fine sandy loam and gray sandy clay loam.

Included with this soil in mapping are small areas of Placid and Tomoka soils. Also included are small areas of soils that are similar to Pomona soil, but some of these soils have a thick, dark surface layer and have a subsoil at a depth of about 31 inches or more, and some are slightly acid to moderately alkaline in the lower part of the subsoil. The included soils make up about 20 percent of this map unit.

In most years, this soil has a high water table that is 1 foot to 2 feet above the surface for 6 to 9 months. The available water capacity is low in the surface layer, very low or low in the subsurface layer, and medium or high in the subsoil. The permeability is rapid or very rapid in the surface layer and rapid in the subsurface layer. It is moderate to rapid in the upper part of the subsoil and moderately slow to moderate in the lower part. Natural fertility is low.

Most of the acreage of this soil is in natural vegetation that includes cypress, sweetgum, red maple, and bay. In areas with dense tree growth, the understory vegetation is sparse. If the canopy cover is thin, the understory vegetation includes maidencane, cordgrass, and other water-tolerant plants.

Ponding is a severe limitation to use of this Pomona soil for cultivated crops or improved pasture. The water table is above the surface during long periods of wetness. A water control system is needed and is difficult to establish because of the low position of this soil on the landscape. Adequate outlets to remove excess water are generally not available or are difficult to install and maintain.

This soil is not suited to commercial woodland production because the surface is ponded for long periods.

This soil has severe limitations for urban uses, such as septic tank absorption fields, dwellings, and local roads and streets. The surface is ponded for long periods during rainy seasons. This limitation is very difficult to overcome. A water control system is difficult to establish because of the low position of this soil on the landscape and because water outlets are generally not available. If septic tank absorption fields, building sites, and roadways are elevated, the high water table can be maintained at an effective depth. Large amounts of fill material would be needed to elevate these areas.

Because of ponding during rainy periods and the sandy surface layer, this soil has severe limitations for recreational development. A water control system is needed to remove excess water and to maintain the high water table at an effective depth. This ponding limitation is not easily overcome. A water control system is difficult to establish because of the low position of this soil on the landscape and because water outlets needed to install the system are generally not available.

This Pomona soil is in capability subclass VIIw. The woodland ordination symbol is 2W.

20—Bluff sandy clay loam, frequently flooded. This soil is nearly level and very poorly drained. It is in drainageways on the flatwoods. The mapped areas are generally broad to narrow and elongated. These areas range from 5 to 1,000 acres. The slopes range from 0 to 2 percent.

Typically, the upper part of the surface layer of this soil is black sandy clay loam about 16 inches thick, and the lower part, to a depth of 19 inches, is very dark gray sandy clay loam. The upper part of the subsoil, to a depth of 39 inches, is dark gray sandy clay loam. The middle part, to a depth of 49 inches, is gray sandy clay. The lower part, to a depth of 60 inches, is olive gray sandy clay. The substratum to a depth of 80 inches or

more is light gray sandy clay loam mixed with soft calcium carbonate accumulations and hard calcium carbonate nodules.

Included with this soil in mapping are small areas of Holopaw and Riviera soils. Also included are small areas of soils that are similar to Bluff soil, but some of these soils have a surface layer that is more than 24 inches thick, some are strongly acid to extremely acid throughout, some have a muck surface layer that is 5 to 10 inches thick, and some soils in depressional areas are ponded for very long periods. The included soils make up about 25 percent of this map unit.

In most years, this soil has a high water table at a depth of less than 12 inches for more than 6 months. This soil is frequently flooded for long periods during rainy seasons. The available water capacity is high in the surface layer, and it is medium or high in the subsoil and substratum. The permeability is moderately slow in the subsoil and substratum. Natural fertility is moderate.

Most of the acreage of this soil is in natural vegetation that includes sweetgum, red maple, hickory, bay, water oak, cabbage palm, and cypress. The understory vegetation is sparse. It consists of maidencane, flags, and scattered waxmyrtle.

This Bluff soil is not suited to cultivated crops, improved pasture, or hay crops because of excessive wetness and flooding. The root zone is limited by the high water table. This soil is flooded during wet periods.

This soil generally is not used for growing pine trees because of flooding. The potential of this soil for the production of pine trees is high, but trees can be grown if an adequate water control system is established and maintained. The water control system is needed to help control flooding and to remove excess surface water after heavy rains. The use of equipment on this soil and seedling mortality are the main concerns in management.

This soil has severe limitations for urban uses, such as septic tank absorption fields, building sites, and local roads and streets. The use of this soil as septic tank absorption fields is limited because of flooding, a high water table, and slow permeability. The use of this soil for building sites is limited by flooding, a high water table, and the high clay content. The clay expands when wet and contracts when dry, which causes the support for building foundations to be unstable. The use of this soil for local roads and streets is limited by low soil strength, a high water table, and flooding. The limitations for urban uses are difficult to overcome. It is difficult to control flooding and to remove excess water because of the low position of this soil on the landscape. The use of fill material to elevate septic tank absorption fields, building sites, and roadways helps to overcome these limitations. Unsuitable soil material should be excavated and backfilled with a more suitable soil material.

Wetness is a severe limitation to use of this soil for recreational development. The hazard of flooding is severe. This soil is suitable for recreational uses if a water control system is established to help control flooding. The water control system should maintain the high water table at an effective depth.

This Bluff soil is in capability subclass Vw. The woodland ordination symbol is 6W.

21—Apopka sand, 5 to 8 percent slopes. This soil is sloping and well drained. It is on the uplands. The mapped areas are irregular in shape and range from 2 to 125 acres.

Typically, this soil has a surface layer of dark grayish brown sand about 7 inches thick. The subsurface layer, to a depth of 55 inches, is light yellowish brown and very pale brown sand. The subsoil to a depth of 80 inches or more is brownish yellow and red sandy loam.

Included with this soil in mapping are small areas of Bonneau, Candler, Millhopper, and Sparr soils. Also included are small areas of soils that are similar to Apopka soil, but some of these soils are on steeper slopes than Apopka soil, some have a surface layer of fine sand, and some soils that are mostly in the area between Interlachen and Grandin have gravel-size, rounded, quartz pebbles mixed throughout. The included soils make up about 10 percent of this map unit.

This soil has a high water table at a depth of more than 80 inches at all times. The available water capacity is very low in the surface and subsurface layers, and it is medium to high in the subsoil. The permeability is rapid in the surface and subsurface layers, and it is moderate in the subsoil. Natural fertility is low.

Most of the acreage of this soil is in natural vegetation that includes turkey oak, scattered live oak, longleaf pine, and slash pine. The understory vegetation is sparse. It includes pineland threeawn, bluestem, and lopsided indiangrass.

Poor soil quality and steepness of slope are severe limitations to use of this Apopka soil for cultivated crops. The root zone is deep and well aerated, but it does not retain adequate moisture for crops during periods of drought. Fertilizer is rapidly leached from the soil. If this soil is cultivated, special soil-improving measures should be used, and erosion must be controlled. Conservation tillage should be used. Row crops should be planted on the contour and in alternate strips with close-growing cover crops. Crop residue should be left on the surface to control erosion and improve soil quality. Frequent applications of fertilizer and lime are needed.

This soil is well suited to citrus trees if freezing temperatures are not a problem. A ground cover of close-growing vegetation is needed between trees to help control erosion. High yields can be obtained in most years without irrigation. If adequate water is available, irrigation is generally feasible.

This soil is moderately well suited to pasture and hay crops. Deep-rooted plants, such as bahiagrass and bermudagrass, are well adapted to this soil. Yields are

reduced by extended periods of drought. Applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

The potential of this soil for the production of pine trees is medium to high. Slash, loblolly, and longleaf pines are the better suited trees to plant for commercial woodland production. The use of equipment, seedling mortality, and plant competition are the main concerns in management. This soil is droughty, and seasonal dry periods and a very low available water capacity in the root zone cause an excessive rate of seedling mortality and inhibit plant growth. Plant competition from hardwoods, mostly oaks, can be reduced if herbicides are used during site preparation. Site preparation activities should include chopping and applications of herbicides. The loose, sandy surface of this soil is a limitation to use of equipment. Machinery equipped with large tires or tracks can help overcome this limitation. Using special planting stock that is larger than usual or that is containerized reduces seedling mortality. Scheduling planting operations during periods when rainfall is heavier and more frequent will increase the rate of seedling survival and increase plant growth. Logging, site preparation, and planting activities can increase and concentrate water runoff on this soil and cause soil erosion. These activities should be avoided in and adjacent to stream beds. Special design and proper location of roads, skid trails, and stream crossings reduce soil erosion. During site preparation and thinning and harvesting operations, as much plant debris as possible should be left on the surface of this soil to help conserve organic matter. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

This soil has slight limitations to use as septic tank absorption fields, for dwellings, and for local roads and streets, but it is well suited to these uses.

The sandy surface layer of this soil is a severe limitation for recreational development. Slopes are a severe limitation if this soil is used for playgrounds. The surface layer should be stabilized by adding suitable fill material, paving the area, or smoothing the land to help overcome these limitations.

This Apopka soil is in capability subclass IVs. The woodland ordination symbol is 10S.

22—Tomoka muck. This organic soil is nearly level and very poorly drained. It formed in moderately thick beds of hydrophytic, nonwoody plant remains. This soil is in depressional areas on the flatwoods and in a few upland areas. The mapped areas are irregular in shape to circular and range from 4 to 250 acres. The slopes are concave and are less than 1 percent.

Typically, the upper part of the surface layer of this soil is black muck about 12 inches thick. The lower part, to a depth of 24 inches, is dark reddish brown muck. The upper part of the underlying material, to a depth of 28 inches, is black fine sand. The next layer, to a depth of 31 inches, is light gray fine sand. The lower part to a depth of 80 inches or more is dark grayish brown, grayish brown, and gray fine sandy loam.

Included with this soil in mapping are small areas of Hontoon, Placid, Samsula, and St. Johns soils. Also included are small areas of soils that are similar to Tomoka soil, but they have a muck surface layer that is less than 16 inches thick, and some have a sandy loam layer that is medium acid to mildly alkaline. The included soils make up about 20 percent of this map unit.

This soil has a high water table at or above the surface except during extended dry periods. The available water capacity is very high in the muck layer, low in the sandy layer, and medium in the loamy layer. The permeability is rapid in the muck and sandy layers, and it is moderate or moderately rapid in the loamy layer. Natural fertility is high.

Most areas of this soil are in natural vegetation that includes bay, cypress, maple, and other hardwoods. Some areas have a marsh vegetation of sawgrass, maidencane, and other water-tolerant plants.

Excessive wetness is a severe limitation to use of this Tomoka soil for cultivated crops. In its natural state, the root zone is limited by a high water table that is within 12 inches of the surface. In most areas, this soil is covered by water for long periods. If an adequate water control system is established and maintained, this soil is well suited to vegetable or grain crops. A properly designed and maintained water control system is needed to remove excess water during the growing season. This soil should be saturated when it is not cultivated to keep oxidation of the muck layers to a minimum. Fertilizer that contains phosphate, potash, and minor elements is needed. Regular applications of lime are needed for this acid soil. Crop residue should be left on the soil to help control erosion, maintain moisture, and improve soil quality.

This soil is well suited to pasture and hay crops if a water control system is established and maintained. Bermudagrass, bahiagrass, and clover grow well if the soil is properly managed. To help prevent excessive oxidation of the organic soil layers, the water control system should keep the high water table near the surface. Fertilizer that is high in phosphate, potash, and minor elements is needed. Grazing should be controlled to obtain maximum yields.

This soil is not suited to commercial woodland production. The potential of this soil for the production of pine trees is very low. The use of equipment on this soil, seedling mortality, and low soil strength are concerns in management. Excessive wetness causes a high rate of seedling mortality; and because of the low soil strength, the hazard of windthrow is high.

The rapid permeability and poor filtering capacity are severe limitations to use of this soil as septic tank absorption fields. This soil is saturated for long periods,

and the organic material is rapidly permeable and does not adequately filter the effluent in the septic tank absorption field. This can cause contamination of the ground water. Ponding and the low strength of the organic material are severe limitations to use of this soil for dwellings and for local roads and streets. The organic layers should be removed and the building sites and roadbeds should be elevated to overcome these limitations.

Ponding, low strength, and the high water table are severe limitations to use of this soil for recreational development. Because this soil is in depressional areas, a water control system to maintain the high water table at an effective depth is difficult to establish and maintain. The surface layer has poor trafficability because of the low strength of the organic material.

This Tomoka soil is in capability subclass VIIw (undrained). The woodland ordination symbol is 2W.

23—Palmetto fine sand. This soil is nearly level and poorly drained. It is in broad, low flatwood areas and long, narrow bands bordering streams and drainageways. The mapped areas are irregular in shape and range from 5 to 300 acres. The slopes range from 0 to 2 percent.

Typically, this soil has a surface layer of very dark gray and dark gray fine sand about 10 inches thick. The upper part of the subsurface layer, to a depth of 21 inches, is gray and light gray fine sand. The lower part, to a depth of 26 inches, is gray fine sand mixed with fragments of dark reddish brown fine sand. The upper part of the subsoil, to a depth of about 34 inches, is dark yellowish brown and yellowish brown fine sand. The next layer, to a depth of 52 inches, is light gray fine sand. Below that layer, the subsoil, to a depth of 75 inches, is light gray fine sandy loam and to a depth of 80 inches is gray loamy fine sand.

Included with this soil in mapping are small areas of Holopaw and Pomona soils. Also included are small areas of soils similar to Palmetto soil, but some of these soils do not have dark yellowish brown and yellowish brown fine sand in the upper part of the subsoil; in some, the lower part of the subsoil is neutral to moderately alkaline; and in others, the upper part of the subsoil is at a depth of more than 30 inches. The included soils make up about 15 percent of this map unit.

In most years, this soil has a high water table at a depth of less than 12 inches for 2 to 6 months. The available water capacity is low in the surface and subsurface layers and in the upper part of the subsoil, and it is medium in the lower part of the subsoil. The permeability is rapid in the surface and subsurface layers and in the upper part of the subsoil, and it is moderately slow in the lower part of the subsoil. Natural fertility is low.

Most of the acreage of this soil is in natural vegetation of slash and longleaf pine. The understory vegetation includes waxmyrtle, gallberry, scattered palmetto, threeawn, and bluestem. A large acreage of this soil is used for commercial production of slash pine.

Excessive wetness is a severe limitation to use of this Palmetto soil for cultivated crops. Because of this limitation, the number and kinds of crops that can be grown on this soil are limited. If an adequate water control system is established and maintained, potatoes, cabbage, and many other vegetable crops can be grown. The water control system should remove excess surface water after heavy rains and provide for subsurface irrigation during dry periods. Close-growing cover crops should be included in the rotation system when the soil is not cultivated. Returning crop residue to the soil increases the content of organic matter and maintains soil tilth.

This soil is moderately suited to pasture and hay crops. A water control system is needed to remove excess water during wet periods. Applications of lime and fertilizer are needed. Grazing should be controlled to help maintain plant vigor.

The potential of this soil for the production of pine trees is medium to high. Slash pine is the better suited tree to plant for commercial woodland production. Seedling mortality is a major concern in management. This soil is droughty and does not retain enough moisture to sustain plant growth during long, dry periods. Excessive wetness during rainy periods increases the rate of seedling mortality. Proper site preparation that includes bedding, furrowing, or surface drainage helps to establish seedlings and increases early plant growth. The use of equipment, seedling mortality, and plant competition are the main concerns in management. Site preparation and planting, thinning, and harvesting operations should be scheduled to avoid seasonal limitations. Forest management operations can generally be carried out during wet periods if machinery is equipped with large tires or tracks. Harrowing and chopping reduce plant competition. The surface layer of this soil is generally low in organic matter. During site preparation and harvesting operations, as much plant residue as possible should be left on the surface of the soil to help conserve organic matter. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Excessive wetness is a severe limitation to use of this soil for urban development, such as septic tank absorption fields, dwellings, and local roads and streets. Poor filtering capacity is also a limitation to use of this soil as septic tank absorption fields. A drainage system is needed to remove excess water. Septic tank absorption fields should be elevated by adding fill material. Building foundations and roadbeds should be reinforced and may require special design and construction.

Excessive wetness and the sandy surface layer of this soil are severe limitations for recreational development. A water control system is needed to overcome the

wetness limitation by maintaining the seasonal high water table at an effective depth. In areas of intensive foot traffic, the surface layer should be stabilized by adding suitable fill material or by paving the recreation areas.

This Palmetto soil is in capability subclass IVw. The woodland ordination symbol is 10W.

24—Holopaw fine sand, frequently flooded. This soil is nearly level and poorly drained. It is on broad to narrow flood plains of rivers, streams, and drainageways on the flatwoods. The mapped areas are irregular in shape to long and narrow and range from 4 to 500 acres. The slopes range from 0 to 2 percent.

Typically, this soil has a surface layer of very dark gray fine sand about 3 inches thick. The subsurface layer, to a depth of 54 inches, is gray and dark gray fine sand. The subsoil to a depth of 80 inches or more is dark gray and greenish gray sandy clay loam.

Included with this soil in mapping are small areas of Bluff and Riviera soils. Also included are small areas of soils that are similar to Holopaw soil, but they have a thicker, dark surface layer. The included soils make up about 20 percent of this map unit.

This soil is frequently flooded for long periods during rainy seasons. When this soil is not flooded, the high water table is within 12 inches of the surface. The available water capacity is very low or low in the surface and subsurface layers, and it is medium in the subsoil. The permeability is rapid in the surface and subsurface layers, and it is moderately slow in the subsoil. Natural fertility is low.

Most of the acreage of this soil is in natural vegetation that includes sweetgum, blackgum, red maple, cypress, bay, and cabbage palm. The understory vegetation is generally sparse.

Flooding and wetness severely limit the use of this Holopaw soil for cultivated crops. A water control system is needed to help control flooding and to remove excess surface and internal water if the soil is cultivated. Close-growing cover crops should be included in the rotation system if the soil is not cultivated. Crop residue should be left on the soil to help maintain organic matter and soil tilth. Seedbed preparation should include bedding of the rows.

In its natural state, this soil is not suited to pasture because it is flooded for long periods. If a water control system is established and maintained to control flooding and to quickly remove excess surface water, this soil is well suited to bermudagrass, bahiagrass, and clover. Regular applications of fertilizer are needed, and grazing must be controlled to help maintain plant vigor.

This soil generally is not used for growing pine trees because of flooding. The potential of this soil for the production of pine trees is moderately high. A water control system is needed to help control flooding and to reach potential productivity. Slash pine is the better suited tree to plant for commercial woodland production. Site preparation should include bedding of the rows.

Excessive wetness is a severe limitation for urban uses, such as septic tank absorption fields, dwellings, and local roads and streets. Poor filtering capacity is also a limitation to use of this soil as septic tank absorption fields. The hazard of flooding is severe. It is difficult to control flooding and to remove excess water because of the low position of this soil on the landscape. Large amounts of fill material would be needed to elevate septic tank absorption fields, building sites, and roadbeds. The possibility of ground water contamination because of poor filtering of effluents in septic tank absorption fields when the soil is flooded would continue to exist.

Wetness and the sandy surface are severe limitations for recreational development. Flooding is a severe hazard. A water control system is needed to help control flooding if the soil is used for camp areas and playgrounds. A water control system should help maintain the high water table at an effective depth. In areas of intensive foot traffic, the loose, sandy surface layer should be stabilized by adding a suitable fill material or by paving the recreation areas.

This Holopaw soil is in capability subclass VIw (undrained). The woodland ordination symbol is 6W.

25—Narcoossee fine sand. This soil is nearly level and somewhat poorly drained. It is on slight ridges and knolls on the flatwoods. The mapped areas range from 3 to 160 acres. The slopes range from 0 to 2 percent.

Typically, this soil has a surface layer of very dark gray fine sand about 4 inches thick. The subsurface layer, to a depth of 22 inches, is light gray fine sand. The upper part of the subsoil is discontinuous in some pedons. It is dark reddish brown fine sand to a depth of about 29 inches. The lower part, to a depth of 33 inches, is brown fine sand. The substratum to a depth of 80 inches or more is pale brown and light gray fine sand.

Included with this soil in mapping are small areas of Adamsville and Cassia soils. Also included are small areas of soils that are similar to Narcoossee soil, but some of these soils have a subsoil at a depth of more than 25 inches, some are poorly drained, some have a continuous, well developed subsoil, and others have a gray or light gray surface layer. The included soils make up about 20 percent of this map unit.

In most years, this soil has a high water table at a depth of 24 to 40 inches for 4 to 6 months. The available water capacity is low or very low in the surface and subsurface layers, low in the subsoil, and very low in the substratum. The permeability is rapid in the surface and subsurface layers and in the substratum. It is moderately rapid in the subsoil. Natural fertility is low.

Most of the acreage of this soil is in natural vegetation that includes scrub live oak, laurel oak, sawpalmetto, dwarf huckleberry, pineland threeawn, and bluestem.

Periodic wetness, droughtiness, and poor soil quality are severe limitations to use of this Narcoossee soil for cultivated crops. A water control system is needed to remove excess water during wet periods and provide for subsurface irrigation during dry periods if this soil is used for vegetable crops. Close-growing cover crops should be included in the rotation system when the soil is not cultivated. Returning crop residue to the soil helps to improve soil quality.

This soil is moderately suited to pasture and hay crops. Bahiagrass and bermudagrass grow well. A water control system is needed to remove excess water during rainy periods. Applications of fertilizer and lime are needed. Grazing should be controlled to help maintain plant vigor.

The potential of this soil for the production of pine trees is medium to high. Slash and longleaf pines are the better suited trees to plant for commercial woodland production. The major concerns in management are the restricted use of equipment on this soil, seedling mortality, and plant competition. Seasonal wetness and periods of droughtiness are limitations to use of equipment on this soil and increase the rate of seedling mortality. Site preparation activities, such as harrowing and bedding, help to establish seedlings, reduce seedling mortality, and increase early growth. Chopping and bedding reduce debris, control competing vegetation, and facilitate planting operations. Machinery equipped with high flotation rubber tires or tracks helps to overcome the limitations to use of equipment, reduces soil compaction, and also reduces root damage during thinning operations. Site preparation and planting and harvesting operations should be scheduled during dry periods to help overcome the wetness limitations to use of equipment. The use of logging systems that leave residual biomass well distributed on the surface of the soil increases the content of organic matter and residual fertility of the soil. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Wetness and poor filtering capacity are severe limitations to use of this soil as septic tank absorption fields. Septic tank absorption fields should be elevated to help keep the high water table at an effective depth. Wetness is a moderate limitation to use of this soil for dwellings and for local roads and streets. Establishing a water control system or elevating building foundations and roadbeds is necessary to overcome this wetness limitation.

The sandy surface layer of this soil is a severe limitation for recreational development. In areas of intensive foot traffic, the surface should be stabilized by adding suitable topsoil, establishing vegetation cover, or paving the recreation areas.

This Narcoossee soil is in capability subclass IIIw. The woodland ordination symbol is 10W.

26—Terra Ceia muck, frequently flooded. This soil is nearly level and very poorly drained. It is on broad to narrow flood plains along the St. Johns River and its tributaries. The mapped areas are irregular in shape and range from 20 to 2,000 acres. The slopes are less than 1 percent.

Typically, the upper part of this organic soil is dark reddish brown muck about 28 inches thick. The lower part to a depth of 80 inches or more is black muck.

Included with this soil in mapping are small areas of Bluff, Holopaw, Hontoon, and Riviera soils. Also included are small areas of soils that are similar to Terra Ceia soil, but some of these soils have a muck layer that is less than 52 inches thick and some have a surface layer of sand or fine sand. The included soils make up about 10 percent of this map unit.

This soil has a high water table at the surface except during long, dry periods, and it is flooded during rainy periods. The available water capacity is very high. The permeability is rapid. Natural fertility is moderate.

Most of the acreage of this soil is in natural vegetation that includes sweetgum, red maple, cypress, bay, and cabbage palm. The understory vegetation is sparse.

Wetness and flooding are severe limitations to use of this Terra Ceia soil for cultivated crops. The root zone is limited by the high water table and by water that is above the surface of the soil during rainy periods. If flooding is controlled and an adequate water control system is established and maintained, this soil is suited to many vegetable crops. A properly designed and maintained water control system is needed to remove excess water during the growing season and to keep the soil saturated when it is not cultivated. Fertilizer that contains phosphate, potash, and minor elements are needed. Water-tolerant cover crops should be kept on this soil when it is not cultivated. Returning crop residue to the soil helps to maintain the content of organic matter.

If a water control system is established and maintained to help control flooding and remove excess water, improved pasture grasses and clover grow well on this soil. The high water table should be maintained close to the surface to prevent excessive oxidation in the organic soil layers. Applications of fertilizer with minor elements are needed. Grazing should be controlled to ensure maximum yields.

The potential of this soil for the production of pine trees is very low. This soil is not suited to commercial woodland production. The high rate of seedling mortality is caused by flooding and excessive wetness, and the high windthrow hazard is caused by the low strength of the organic layers. The use of equipment, seedling mortality, and the hazard of windthrow are the main concerns in management.

The excessive wetness, rapid permeability, low soil strength, and poor filtering capacity of this soil are severe limitations for urban uses, such as septic tank

absorption fields, dwellings, and local roads and streets. This soil is frequently flooded and remains saturated for long periods. This organic soil is rapidly permeable and does not adequately filter the effluent in the septic tank absorption fields. This can cause contamination of the ground water. The organic layers should be removed and building sites and roadbeds should be elevated to overcome the wetness and low strength limitations. The use of suitable fill material is needed to elevate the septic tank absorption fields to help maintain the high water table at an effective depth.

The high water table and low strength of the organic material are severe limitations for recreational development. The hazard of flooding is severe. Because this soil is in depressional areas, a water control system to maintain the high water table at an effective depth is difficult to establish and maintain. The surface layer has poor trafficability because of the low strength of the organic material.

This Terra Ceia soil is in capability subclass VIIw (undrained). The woodland ordination symbol is 6W.

27—Samsula muck. This organic soil is nearly level and very poorly drained. It formed in moderately thick beds of hydrophytic, nonwoody plant remains. This soil is in depressional areas. The mapped areas are irregular in shape to circular and range from 3 to 300 acres. The slopes are concave and are less than 1 percent.

Typically, this soil has a surface layer of dark reddish brown and black muck about 29 inches thick. The upper part of the underlying material, to a depth of 40 inches, is black fine sand. The next layer, to a depth of 50 inches, is gray fine sand. The lower part to a depth of 80 inches or more is light brownish gray fine sand.

Included with this soil in mapping are small areas of Hontoon, Placid, St. Johns, and Tomoka soils. Also included are small areas of soils that are similar to Samsula soil, but some of these soils have a muck surface layer less than 16 inches thick, and some have a muck surface layer underlain by a thin, light sandy subsurface layer that is underlain by a black or very dark brown sandy layer. The included soils make up about 20 percent of this map unit.

This soil has a high water table at or above the surface except during extended dry periods. The available water capacity is very high in the muck surface layer, and it is very low in the underlying material. The permeability is rapid throughout. Natural fertility is high.

Most areas of this soil are in natural vegetation that includes bay, cypress, maple, and other hardwoods. Some areas have a marsh vegetation of sawgrass, maidencane, and other water-tolerant plants. In some areas, this soil has been drained and is used for pasture or for vegetables, corn, soybeans, and wheat.

Excessive wetness is a severe limitation to use of this Samsula soil for cultivated crops. In its natural state, the root zone is limited by a high water table that is within 12 inches of the surface. In most areas, this soil is covered by water for long periods. If an adequate water control system is established and maintained, this soil is well suited to vegetable or grain crops. A properly designed and maintained water control system is needed to remove excess water during the growing season. This soil should be saturated when it is not cultivated to keep oxidation of the muck layers to a minimum. Fertilizer that contains phosphate, potash, and minor elements is needed. Regular applications of lime are needed for this acid soil. Crop residue should be left on the soil to help control erosion, conserve moisture, and improve soil quality.

This soil is well suited to pasture and hay crops if a water control system is established and maintained. Bermudagrass, bahiagrass, and clover grow well if this soil is properly managed. To help prevent excessive oxidation in the organic soil layers, the water control system should keep the high water table near the surface. Fertilizer that is high in phosphate, potash, and minor elements is needed. Grazing should be controlled to obtain maximum yields.

This soil is not suited to commercial woodland production. The potential of this soil for the production of pine trees is very low. The restricted use of equipment on this soil, seedling mortality, and the hazard of windthrow are the main concerns in management. Excessive wetness is a limitation to use of equipment on this soil. The high rate of seedling mortality is also caused by excessive wetness. The high windthrow hazard is caused by low strength.

The rapid permeability and poor filtering capacity are severe limitations to use of this soil as septic tank absorption fields, for dwellings, and for local roads and streets. This soil is saturated for long periods, and the organic soil is rapidly permeable and does not adequately filter the effluent in the septic tank absorption fields. This can cause contamination of the ground water. Ponding and the low strength of the organic material are severe limitations for building sites, for dwellings, and for local roads and streets. The organic layers should be removed and the building sites and roadbeds should be elevated by adding suitable fill material to overcome these limitations.

Ponding, low strength, and the high water table are severe limitations to use of this soil for recreational development. Because this soil is in depressional areas, a water control system to maintain the high water table at an effective depth is difficult to establish and maintain. The surface layer has poor trafficability because of the low strength of the organic material.

This Samsula soil is in capability subclass VIIw (undrained). The woodland ordination symbol is 2W.

28—Centenary fine sand. This soil is nearly level and moderately well drained. It is on ridges and knolls on the low uplands. The mapped areas are irregular in shape

and range from 20 to 200 acres. The slopes are convex and are less than 2 percent.

Typically, this soil has a surface layer of dark gray fine sand about 8 inches thick. The upper part of the subsurface layer, to a depth of 50 inches, is yellow and very pale brown fine sand. The lower part, to a depth of 65 inches, is light gray fine sand. The upper part of the subsoil, to a depth of 76 inches, is dark grayish brown fine sand. The lower part to a depth of 80 inches or more is dark reddish brown fine sand.

Included with this soil in mapping are small areas of Adamsville, Deland, Florahome, Ona, Tavares, and Zolfo soils. Also included are small areas of soils that are similar to Centenary soil, but some of these soils have a subsoil at a depth of less than 50 inches, and some have a dark surface layer that is 10 inches or more thick. The included soils make up less than 20 percent of this map unit.

In most years, this soil has a high water table between depths of 40 and 60 inches for 2 to 6 months. The high water table recedes to a depth of more than 60 inches during extended dry periods. The available water capacity is low or very low. The permeability is rapid in the surface and subsurface layers and in the upper part of the subsoil. It is moderate in the lower part of the subsoil. Natural fertility is low.

Most of the acreage of this soil is in natural vegetation that includes turkey oak, scrub live oak, and few longleaf pine. The understory vegetation is threeawn and panicum.

Droughtiness and rapid leaching of nutrients are severe limitations to use of this Centenary soil for cultivated crops. It generally is feasible to grow high-value crops if irrigation water is readily available. Close-growing cover crops should be grown in rotation with cultivated crops. Crop residue should be returned to the soil to help control erosion, maintain moisture, and improve soil quality.

This soil is well suited to pasture and hay crops. Coastal bermudagrass and bahiagrass are well suited to this soil, but yields are reduced by periodic drought. Applications of fertilizer and lime provide good growth response. Grazing should be controlled to maintain plant vigor.

The potential of this soil for the production of pine trees is medium to high. Slash and longleaf pines are the better suited trees to plant for commercial woodland production. The use of equipment, seedling mortality, and plant competition are the main concerns in management. This soil is droughty; and during long, dry periods, adequate moisture for plant growth is not available. Using special planting stock that is larger than usual or that is containerized reduces seedling mortality. Planting seedlings during periods when rainfall is more frequent and heavier increase plant growth and the rate of plant survival. The loose, sandy surface of this soil is a limitation to use of equipment. Machinery equipped with large, low-pressure tires or tracks will help overcome this limitation. Plant competition from hardwoods, mostly oaks, can be reduced if herbicides are used during site preparation. Although runoff is slow, logging and site preparation operations can increase and concentrate water movement on this soil and cause soil erosion. These activities should be avoided in and adjacent to drainageways. Special design and proper placement of roads, skid trails, and stream crossings can help reduce soil loss. During site preparation and thinning and harvesting operations, as much plant debris as possible should be left on the surface of the soil to help conserve organic matter.

Wetness is a moderate limitation to use of this soil as septic tank absorption fields. Special measures, such as adding suitable fill material to elevate the septic tank absorption field, may be needed to overcome this wetness limitation. In areas where septic tank absorption fields are concentrated, ground water contamination is a hazard. Limitations for dwellings and for local roads and streets are slight. Special measures are not needed for these uses.

The sandy surface layer of this soil is a severe limitation for recreational development. In areas of intensive foot traffic, the surface should be stabilized for recreational development by using a vegetation cover, adding suitable topsoil, or using a hard surface material to help overcome this limitation.

This Centenary soil is in capability subclass IIIs. The woodland ordination symbol is 11S.

29—Riviera fine sand, frequently flooded. This soil is nearly level and poorly drained. It is on broad to narrow flood plains and in drainageways on the flatwoods and is in a few upland areas. The mapped areas are irregular in shape to long and narrow and range from 20 to 200 acres. The slopes range from 0 to 2 percent.

Typically, this soil has a surface layer of black fine sand about 5 inches thick. The subsurface layer, to a depth of 21 inches, is gray and grayish brown fine sand. The upper part of the subsoil, to a depth of 47 inches, is grayish brown fine sandy loam that has tongues of grayish brown fine sand. The lower part, to a depth of 55 inches, is grayish brown sandy clay loam. The substratum to a depth of 80 inches or more is gray fine sand.

Included with this soil in mapping are small areas of Holopaw and Pompano soils. Also included are small areas of soils that are similar to Riviera soil, but some of these soils have a brownish yellow fine sand layer above the subsoil, and others have a loamy fine sand surface layer that has a high content of calcium carbonate accumulations. The included soils make up about 20 percent of this map unit.

This soil is frequently flooded for long periods during rainy seasons. During dry periods, the high water table is

within 12 inches of the surface. The available water capacity is low in the surface and subsurface layers, and it is medium in the subsoil. The permeability is rapid in the surface and subsurface layers, slow or very slow in the subsoil, and moderate or moderately rapid in the substratum. Natural fertility is low.

Most of the acreage of this soil is in natural vegetation that includes sweetgum, red maple, cypress, bay, and scattered cabbage palm. The understory vegetation includes bluestem, waxmyrtle, and maidencane.

This Riviera soil is not suited to cultivated crops, improved pasture, and hay crops because of flooding and excessive wetness. The root zone is limited by the high water table. This soil is flooded during wet periods.

This soil generally is not used for growing pine trees because of flooding. The potential of this soil for the production of pine trees is medium if flooding can be controlled. Slash pine is the better suited tree to plant for commercial woodland production. A simple water control system, such as surface drainage ditches, should be established and maintained to remove excess surface water. Site preparation should include bedding of the rows. The use of equipment and seedling mortality are the main concerns in management.

Excessive wetness and poor filtering capacity are severe limitations to use of this soil as septic tank absorption fields, for dwellings, and for local roads and streets. Flooding is a severe hazard. These limitations are difficult to overcome because of the low position of this soil on the landscape. Large amounts of fill material would be required to elevate building sites, roadways, and septic tank absorption fields. Because of the poor filtering of effluents in septic tank absorption fields when the soil is flooded, the possibility of ground and surface water contamination would continue to exist.

The sandy surface layer and excessive wetness are severe limitations to use of this soil for recreational development. Flooding is a severe hazard. In camp and playground areas, flooding must be controlled. A water control system is needed to help maintain the high water table at an effective depth, to control flooding, and to overcome the wetness limitation. In areas of intensive foot traffic, the surface should be stabilized by adding suitable fill material or by paving the area.

This Riviera soil is in capability subclass Vw. The woodland ordination symbol is 6W.

30—Hontoon muck. This organic soil is nearly level and very poorly drained. It formed in thick beds of hydrophytic, nonwoody plant remains. This soil is in depressional areas throughout the county. The mapped areas are irregular in shape to circular and range from 3 to 300 acres. The slopes are less than 1 percent.

Typically, the upper part of this organic soil is black muck about 20 inches thick. The lower part to a depth of 80 inches or more is dark reddish brown muck.

Included with this soil in mapping are small areas of Placid and Samsula soils. Also included are small areas of soils that are similar to Hontoon soil, but they have a thin layer of muck that is less than 16 inches thick that is underlain by sandy material. The included soils make up about 15 percent of this map unit.

This soil has a high water table at or above the surface except during extended dry periods. The available water capacity is very high. The permeability is rapid throughout. Natural fertility is high.

Most areas of this soil are in natural vegetation that includes bay, cypress, maple, and other hardwoods. Some areas have a marsh vegetation of sawgrass, maidencane, and other water-tolerant plants. In some areas, this soil has been drained and is used for pasture or for vegetables, corn, soybeans, and wheat.

Excessive wetness is a severe limitation to use of this Hontoon soil for cultivated crops. In its natural state, the root zone is limited by a high water table. In most areas, this soil is covered by water for long periods, but in large areas near Florahome, this soil has been drained and is used for agriculture. If an adequate water control system is established and maintained, this soil is well suited to vegetable crops or grain crops. A properly designed and maintained water control system is needed to remove excess water during the growing season. This soil should be saturated when it is not cultivated to keep oxidation of the muck layers to a minimum. Fertilizer that contains phosphate, potash, and minor elements is needed. Regular applications of lime are needed for this acid soil. Crop residue should be left on the soil to control erosion, maintain moisture, and improve soil quality.

This soil is well suited to pasture and hay crops if a water control system is established and maintained. Bermudagrass, bahiagrass, and clover grow well if this soil is properly managed. To help prevent excessive oxidation in the organic soil layers, the water control system should keep the water table near the surface. Fertilizer that is high in phosphate, potash, and minor elements is needed. Grazing should be controlled to obtain maximum yields.

This soil is not suited to commercial woodland production. The potential of this soil for the production of pine trees is very low. The use of equipment on this soil, seedling mortality, and the hazard of windthrow are the main concerns in management. Excessive wetness is a limitation to use of equipment on this soil, and it increases the rate of seedling mortality. The low soil strength results in high windthrow hazard.

The rapid permeability and poor filtering capacity are severe limitations to use of this soil as septic tank absorption fields, for dwellings, and for local roads and streets. This soil is saturated for long periods, and the organic soil is rapidly permeable and does not adequately filter the effluent in the septic tank absorption fields. This can cause contamination of the ground water. Ponding and the low strength of the organic

material are severe limitations for building sites, for dwellings, and for local roads and streets. The organic layers should be removed and the building sites and roadbeds should be elevated to overcome these limitations.

Ponding, low strength, and the high water table are severe limitations to use of this soil for recreational development. Because this soil is in depressional areas, a water control system to maintain the high water table at an effective depth is difficult to establish and maintain. The surface layer has poor trafficability because of the low strength of the organic material.

This Hontoon soil is in capability subclass VIIw (undrained). The woodland ordination symbol is 6W.

31—Myakka fine sand, depressional. This soil is nearly level and very poorly drained. It is in depressional areas on the flatwoods and in a few places on the uplands. The mapped areas are irregular in shape to circular and range from 3 to 270 acres. The slopes are concave and are less than 2 percent.

Typically, this soil has a surface layer of very dark gray fine sand about 7 inches thick. The subsurface layer, to a depth of 28 inches, is light brownish gray fine sand. The subsoil, to a depth of 34 inches, is very dark grayish brown fine sand. The substratum to a depth of 80 inches or more is light gray and very pale brown fine sand.

Included with this soil in mapping are small areas of Placid, Pomona, and St. Johns soils. Also included are small areas of soils that are similar to Myakka soil, but they have a subsoil that is at a depth of more than 30 inches. The included soils make up about 10 percent of this map unit.

In most years, this soil has a high water table 1 foot to 2 feet above the surface for 6 to 9 months. The available water capacity is very low in the surface and subsurface layers and in the substratum, and it is medium in the subsoil. The permeability is rapid in the surface and subsurface layers and in the substratum, and it is moderate or moderately rapid in the subsoil. Natural fertility is low.

Most of the acreage of this soil is in natural vegetation that includes bay, cypress, waxmyrtle, and scattered sweetgum and maple. Some areas have a marsh vegetation that includes maidencane, St. Johnswort, chalky bluestem, and panicum.

This Myakka soil is not suitable for cultivated crops. The surface is ponded for long periods, which inhibits plant growth and interferes if the soil is cultivated. This soil is in low-lying, depressional areas. Adequate outlets to remove excess water are generally not available or are difficult to install and maintain.

This soil is not suited to improved pasture and hay crops. The surface is ponded for long periods, which severely limits growth of improved pasture plants. Adequate water outlets for surface drainage systems are generally not available.

This soil generally is not used for pine trees because of ponding. The potential of this soil for the production of pine trees is low, but trees can be grown if an adequate surface drainage system is established and maintained on this soil. Slash pine is the better suited tree to plant for commercial woodland production. The use of equipment on this soil and seedling mortality are the main concerns in management. This soil is rarely drained for commercial woodland production. Water outlets are generally not available.

This soil has severe limitations for urban development. Ponding restricts the use of this soil for building sites, for local roads and streets, and as septic tank absorption fields. Adequate drainage outlets to remove excess water are generally not available. If this soil is used for urban development, large quantities of fill material would be required to elevate the building sites, roadways, and septic tank absorption fields and to maintain the high water table at an effective depth.

The sandy surface layer, ponding for long periods, and excessive wetness are severe limitations to use of this soil for recreational development. If water outlets are available, the wetness limitation can be overcome. A water control system should be installed to remove excess water and to maintain the high water table at an effective depth. In areas of intensive foot traffic, the surface layer should be stabilized by adding suitable fill material or by paving the areas.

This Myakka soil is in capability subclass VIIw. The woodland ordination symbol is 2W.

32—Sparr sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and somewhat poorly drained. It is on low side slopes on the uplands, along well-defined drainageways on the flatwoods, and on low knolls and ridges on the flatwoods. The mapped areas are irregular in shape and range from 20 to 150 acres.

Typically, this soil has a surface layer of dark grayish brown sand about 9 inches thick. The upper part of the subsurface layer, to a depth of 30 inches, is very pale brown sand. The lower part, to a depth of 65 inches, is white sand. The upper part of the subsoil, to a depth of about 70 inches, is yellowish brown loamy sand. The lower part to a depth of 80 inches or more is yellowish brown fine sandy loam.

Included with this soil in mapping are small areas of Adamsville, Lochloosa, and Millhopper soils. Also included are small areas of soils that are similar to Sparr soil, but some of these soils have a surface layer of fine sand, and some have a subsoil that is neutral or mildly alkaline. The included soils make up about 10 percent of this map unit.

In most years, this soil has a high water table at a depth of 20 to 40 inches for 1 month to 4 months. The available water capacity is low or medium in the surface layer, low in the subsurface layer, and medium in the subsoil. The permeability is rapid in the surface and

subsurface layers, and it is moderate in the subsoil. Natural fertility is low.

Most areas of this soil have been left in natural vegetation that includes longleaf pine, slash pine, loblolly pine, magnolia, dogwood, hickory, live oak, laurel oak, and water oak.

Periodic wetness and poor soil quality are severe limitations to use of this Sparr soil for cultivated crops. The number of adapted crops that can be grown on this soil is very limited unless a water control system is installed. The system must remove excess water in wet periods and provide for subsurface irrigation in dry periods. Fertilizer is rapidly leached from this soil. Regular applications of fertilizer and lime are needed. Close-growing cover crops should be included in the rotation system when the soil is not cultivated. Cover crops and crop residue should be left on the soil to help maintain the content of organic matter and to improve soil quality.

This soil is moderately well suited to pasture and hay crops. Bermudagrass and bahiagrass are well adapted to this soil. A water control system is needed to remove excess surface water during heavy rains. Regular applications of fertilizer and lime are needed. Grazing should be controlled to help maintain plant vigor and obtain maximum yields.

The potential of this soil for the production of pine trees is medium to high. Slash, loblolly, and longleaf pines are the better suited trees to plant for commercial woodland production. The major concerns in management are restricted use of equipment, seedling mortality, and plant competition. Seasonal wetness and periods of droughtiness limit the use of equipment and increase seedling mortality. Site preparation activities, such as harrowing and bedding, help to establish seedlings, reduce seedling mortality, and increase early growth. Chopping and bedding reduce debris, control competing vegetation, and facilitate planting operations. Machinery equipped with large low-pressure rubber tires or tracks helps to overcome the use of equipment limitations, reduces soil compaction, and also reduces root damage during thinning operations. Plant competition from hardwood understory can be reduced by chemical or mechanical methods. The use of logging systems that leave residual biomass well distributed on the surface of the soil increases the content of organic matter and residual fertility of the soil. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Wetness is a severe limitation to use of this soil as septic tank absorption fields. A water control system should be established and maintained or the septic tank absorption field should be elevated by adding fill material to help overcome this wetness limitation. Wetness is a moderate limitation for dwellings and for local roads and streets. This limitation can be overcome by using a water control system to help keep the high water table at an effective depth for building sites and roadbeds. Elevation of building sites and roadbeds can also help keep the high water table at an effective depth.

The sandy surface layer is a severe limitation for recreational uses. The surface layer should be stabilized by adding suitable fill material or by paving the area to help overcome this limitation.

This Sparr soil is in capability subclass IIIw. The woodland ordination symbol is 10W.

33—Winder fine sand. This soil is nearly level and poorly drained. It is in broad, low flatwood areas. The mapped areas are irregular in shape and range from 5 to 1,500 acres. The slopes are less than 2 percent.

Typically, this soil has a surface layer of black fine sand about 6 inches thick. The subsurface layer, to a depth of 17 inches, is grayish brown and light grayish brown fine sand. Tongues of the subsurface layer extend into the upper 10 inches of the subsoil. The upper part of the subsoil, to a depth of 27 inches, is dark gray sandy clay loam. The lower part, to a depth of 39 inches, is grayish brown fine sandy loam. The substratum to a depth of 80 inches or more is light gray fine sandy loam that includes calcium carbonate accumulations and shell fragments.

Included with this soil in mapping are small areas of Riviera, Holopaw, Malabar, Paisley, and Pomona soils. Also included are small areas of soils that are similar to Winder soil, but some of these soils have a loamy fine sand surface layer, some have a high content of calcium carbonate accumulations throughout, some have a strongly acid or very strongly acid subsoil, and some have a brown or yellow subsurface layer. The included soils make up about 20 percent of this map unit.

In most years, the high water table is at a depth of 0 to 12 inches for 2 to 6 months. The available water capacity is low or very low in the surface and subsurface layers, and it is low to medium in the subsoil. The permeability is rapid in the surface and subsurface layers, and it is moderately slow in the upper part of the subsoil and slow or very slow in the lower part. Natural fertility is low.

Most of the acreage of this soil is in natural vegetation that includes laurel oak, water oak, red maple, cedar, and live oak. The understory vegetation includes cabbage palm, cordgrass, pineland threeawn, and maidencane.

Wetness is a severe limitation to use of this Winder soil for cultivated crops. If an adequate water control system is established and maintained, this soil is suitable for cabbage and other vegetable crops. A water control system is needed to remove excess surface water during heavy rains and to provide for subsurface irrigation during dry periods. Soil-improving cover crops should be included in the rotation system when the soil is not cultivated. Crop residue should be left on the soil to help improve soil tilth and increase the content of organic

matter. Good seedbed preparation should include bedding of the rows. Fertilizer should be applied according to the needs of the crop.

This soil is suited to use as pasture. Bermudagrass, bahiagrass, and clover can be grown if a water control system is established to remove excess water. Applications of fertilizer are needed. Grazing should be controlled to obtain maximum yields.

The potential of this soil for the production of pine trees is medium to high. Slash and loblolly pines are the better suited trees to plant for commercial woodland production. The main concerns in management are the use of equipment, seedling mortality, and plant competition. During rainy periods, a high water table causes moderate seedling mortality. Special site preparation, such as bedding, furrowing, or surface drainage, helps to establish seedlings, increases early growth, and reduces the mortality rate. The high rate of seedling mortality is also caused by an inadequate water supply. This soil is droughty, and during long, dry periods not enough moisture is retained in the root zone to sustain plant growth. The sandy surface texture and the seasonal high water table limit the use of equipment on this soil. Site preparation and planting, thinning, and harvesting operations should be scheduled to avoid seasonal limitations. If special machinery is used that is equipped with large tires or tracks, forest management operations can generally be carried out during the wet periods. Site preparation activities, such as harrowing, chopping, or bedding, help to control plant competition. During site preparation and thinning and harvesting operations, most of the plant residue should be left on the surface of the soil to conserve organic matter. Applying fertilizer with phosphorus at planting time is a good management practice. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

The slow permeability and excessive wetness are severe limitations for urban uses, such as septic tank absorption fields, dwellings, and local roads and streets. A water control system is needed to remove excess water and to maintain a high water table at an effective depth, and septic tank absorption fields, building sites for dwellings, and roadbeds should be elevated by adding suitable fill material to overcome these limitations.

Wetness and the sandy surface layer are severe limitations to use of this soil for recreational development. To help overcome these limitations, a water control system is needed to help maintain the seasonal high water table at an effective depth. In areas of intensive foot traffic, the surface layer should be stabilized by adding a suitable fill material or paving the areas to help overcome these limitations.

This Winder soil is in capability subclass IIIw. The woodland ordination symbol is 11W.

34—Riviera fine sand. This soil is nearly level and poorly drained. It is in broad, low areas on the flatwoods. The mapped areas are irregular in shape and range from 20 to 300 acres. The slopes range from 0 to 2 percent.

Typically, this soil has a surface layer of black fine sand about 5 inches thick. The subsurface layer, to a depth of 25 inches, is gray fine sand. The upper part of the subsoil, to a depth of 41 inches, is gray sandy clay loam. The lower part, to a depth of 50 inches, is gray fine sandy loam. Tongues of light gray fine sand extend into the upper part of the subsoil from the subsurface layer. The substratum to a depth of 80 inches or more is grayish brown loamy fine sand.

Included with this soil in mapping are small areas of Holopaw, Pompano, and Winder soils. Also included are small areas of soils that are similar to Riviera soil, but some of these soils have a brownish yellow sandy layer above the subsoil, some have a black or very dark gray surface layer more than 6 inches thick, and others have a subsoil of sandy clay or clay. The included soils make up about 20 percent of this map unit.

In most years, this soil has a high water table at a depth of less than 12 inches for 2 to 4 months and at a depth of 12 to 30 inches during the rest of the year. The high water table is at a depth of more than 40 inches during dry periods. The available water capacity is low in the surface and subsurface layers and in the substratum, and it is medium in the subsoil. The permeability is rapid in the surface and subsurface layers, slow or very slow in the subsoil, and moderate or moderately rapid in the substratum. Natural fertility is low.

Most of the acreage of this soil is used for commercial production of slash pine. Some areas of this soil are in natural vegetation that includes slash and longleaf pine, water oak, sweetgum, and cabbage palm. The understory vegetation includes gallberry, waxmyrtle, bluestem, and threeawn.

Excessive wetness and poor soil quality are severe limitations to use of this Riviera soil for cultivated crops. The number and kinds of crops that can be grown on this soil are limited if intensive management practices are not used. If a water control system is established and maintained, potatoes, cabbage, and many other vegetable crops can be grown. The water control system is needed to remove excess water in wet periods and provide for subsurface irrigation during dry periods. Close-growing cover crops should be included in the rotation system when the soil is not cultivated. Crop residue left on or in the soil helps maintain the content of organic matter and improves soil tilth.

This soil is well suited to pasture and hay crops. Bermudagrass, bahiagrass, and clover grow well if this soil is properly managed. A water control system is needed to remove excess surface water after heavy rains. Applications of lime and fertilizer are needed. Grazing should be controlled to prevent overgrazing and to maintain plant vigor.

The potential of this soil for the production of pine trees is medium to high. Slash and loblolly pines are the better suited trees to plant for commercial woodland production. The use of equipment, seedling mortality, and plant competition are the main concerns in management. During rainy periods, a high water table causes a moderate rate of seedling mortality, but during droughty periods, a high rate of seedling mortality is caused by not enough water. This soil is droughty, and during long, dry periods, it does not retain enough moisture in the root zone to sustain plant growth. The sandy surface of this soil and the seasonal high water table are moderate limitations to use of equipment. Site preparation and planting, thinning, and harvesting operations should be scheduled to avoid seasonal limitations. Forest management operations generally can be carried out in the wet periods if machinery is equipped with large tires or tracks. Site preparation activities, such as harrowing, chopping, or bedding, help to control plant competition. During site preparation and thinning and harvesting operations, as much plant residue as possible should be left on the soil to help conserve organic matter. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Wetness is a severe limitation for urban uses, such as septic tank absorption fields, dwellings, and local roads and streets. This soil readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity may result in pollution of the ground water. Septic tank absorption fields, building sites, and roadbeds should be elevated by adding suitable fill material to maintain the high water table at an effective depth. If adequate outlets are available, a water control system can be installed to remove excess water and to overcome the wetness limitation.

Excessive wetness and the sandy surface layer are severe limitations for recreational development. To overcome the wetness limitation, a water control system is needed to maintain the high water table at an effective depth. The surface layer should be stabilized by adding suitable fill material or paving the areas to overcome the sandy texture limitation.

This Riviera soil is in capability subclass IIIw. The woodland ordination symbol is 10W.

35—Malabar fine sand. This soil is nearly level and poorly drained. It is in low flatwood areas. The mapped areas are broad to narrow and irregular in shape and range from 5 to 200 acres. The slopes range from 0 to 2 percent.

Typically, this soil has a surface layer of black fine sand about 4 inches thick. The subsurface layer, to a depth of 20 inches, is grayish brown and very pale brown fine sand. The upper part of the subsoil, to a depth of 31 inches, is brownish yellow and yellowish brown fine sand. The next layer, to a depth of 60 inches, is grayish brown fine sand. The next layer, to a depth of 75 inches, is gray sandy clay loam. The lower part to a depth of 80 inches or more is gray fine sandy loam.

Included with this soil in mapping are small areas of Holopaw, Palmetto, Pompano, and Riviera soils. Also included are small areas of soils that are similar to this Malabar soil, but in some of these soils, the lower part of the subsoil is at a depth of less than 40 inches, and some of these soils are in depressional areas. The included soils make up about 10 percent of this map unit.

In most years, this soil has a high water table at a depth of less than 12 inches for 2 to 6 months. The available water capacity is low or very low in the sandy surface and subsurface layers and in the upper part of the subsoil. It is medium in the loamy part of the subsoil. The permeability is rapid in the surface and subsurface layers and in the upper part of the subsoil, and it is moderately slow to very slow in the lower part of the subsoil. Natural fertility is low.

Most of the acreage of this soil is used for commercial production of slash pine. Some areas of this soil are in natural vegetation that includes slash and longleaf pines and a few sweetgum. The understory vegetation includes St. Johnswort, gallberry, waxmyrtle, bluestem, and threeawn.

Excessive wetness and poor soil quality are severe limitations to use of this Malabar soil for cultivated crops. The number and kinds of crops that can be grown on this soil are limited unless intensive management practices are used. If an adequate water control system is established and maintained, potatoes, cabbage, and many other vegetable crops can be grown. A water control system is needed to remove excess water in wet periods and to provide for subsurface irrigation during dry periods. Close-growing cover crops should be included in the rotation system when the soil is not cultivated. Crop residue left on the soil helps maintain the content of organic matter and improves soil tilth.

This soil is well suited to pasture and hay crops. Bermudagrass, bahiagrass, and clover grow well if this soil is properly managed. A water control system is needed to remove excess surface water after heavy rains. Applications of fertilizer are needed, and some areas of this soil may need lime. Grazing should be controlled to prevent overgrazing and to maintain plant vigor.

The potential of this soil for the production of pine trees is medium to high. Slash pine is the better suited tree to plant for commercial woodland production. Seedling mortality is a major concern in management. This soil is droughty and does not retain enough moisture to sustain plant growth during long, dry periods. Excessive wetness during rainy periods can increase the mortality rate of seedlings. Site preparation practices that include bedding, furrowing, or surface drainage help to

establish seedlings and increase early plant growth. The use of equipment, seedling mortality, and plant competition are the main concerns in management. Site preparation and planting, thinning, and harvesting operations should be scheduled to avoid seasonal limitations. Forest management operations can be generally carried out during wet periods if machinery is equipped with large tires or tracks. Harrowing and chopping reduce plant competition. The surface layer of this soil is generally low in organic matter. During site preparation and harvesting operations, as much plant residue as possible should be left on the surface of the soil to help conserve organic matter. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Wetness is a severe limitation for urban uses, such as septic tank absorption fields, dwellings, and local roads and streets. This soil readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity may result in pollution of the ground water. Septic tank absorption fields, building sites, and roadbeds should be elevated by adding suitable fill material to maintain the high water table at an effective depth. If adequate water outlets are available, a water control system can be installed to remove excess water and to maintain the high water table at an effective depth to overcome the wetness limitation.

Excessive wetness and the sandy surface layer are severe limitations for recreational development. To overcome the wetness limitation, a water control system is needed to maintain the high water table at an effective depth. The surface layer should be stabilized by adding suitable fill material or paving the areas to overcome the sandy texture limitation.

This Malabar soil is in capability subclass IVw. The woodland ordination symbol is 10W.

36—Shenks muck, frequently flooded. This soil is nearly level and very poorly drained. It is on the flood plains of major rivers and streams. The mapped areas are broad and elongated and range from 10 to 1,500 acres. The slopes are less than 2 percent.

Typically, this soil has a surface layer of dark reddish brown muck about 18 inches thick. The upper part of the underlying material, to a depth of 60 inches, is black clay. The middle part, to a depth of 70 inches, is very dark gray loamy sand. The lower part to a depth of 80 inches or more is dark gray sand.

Included with this soil in mapping are small areas of Holopaw, Riviera, and Terra Ceia soils. Also included are small areas of soils that are similar to Shenks soil, but they have a surface layer of muck that is less than 16 inches thick. The included soils make up about 15 percent of this map unit.

In most years, this soil has a high water table at a depth of less than 12 inches for 6 months or more. This soil is frequently flooded for long periods during rainy seasons. The available water capacity is very high in the organic surface layer, and it is medium to high in the underlying material. The permeability is rapid or very rapid in the surface layer, very slow to a depth of 60 inches, and rapid in the lower part of the underlying material. Natural fertility is moderate.

Most of the acreage of this soil is in natural vegetation that includes sweetgum, red maple, elm, hickory, and cypress. Hardwood timber is harvested from natural tree stands on a few acres of this soil.

This Shenks soil is not suitable for cultivated crops because of excessive wetness and flooding. A water control system to help control flooding is needed if the soil is used for cultivated crops.

In its natural state, this soil is not suited to pasture and hay crops because of wetness and flooding. If an adequate water control system is established and maintained to help control flooding, this soil is well suited to bermudagrass, bahiagrass, and clover. The high water table should be maintained as close to the surface of the soil as possible to prevent excessive oxidation in the muck layer. Regular applications of fertilizer containing phosphate, potash, and minor elements are needed for maximum yields. Grazing should be controlled to help maintain plant vigor.

This soil is not suited to commercial woodland production. The potential of this soil for the production of pine trees is very low. This soil has a high windthrow hazard. The high rate of seedling mortality is caused by excessive wetness and flooding. Wetness also is a limitation to use of equipment on this soil. Excessive wetness, flooding, and soil strength are major concerns in management.

The slow permeability and excessive wetness are severe limitations to use of this soil as septic tank absorption fields. Excessive wetness, the low strength of the organic material, and the high shrink-swell potential of the soil below the organic layers are severe limitations for building sites, dwellings, and local roads and streets. The organic and clayey layers should be removed, and the building sites and roadbeds should be elevated by adding suitable fill material to overcome these limitations. This soil is frequently flooded and is saturated for long periods.

The organic surface layer and the high water table are severe limitations to use of this soil for recreational development. Flooding is a severe hazard. This soil is in depressional areas, and a water control system to help control flooding and to maintain the high water table at an effective depth is difficult to establish and maintain. The surface layer has poor trafficability because of the low strength of the organic material.

This Shenks soil is in capability subclass VIw (undrained). The woodland ordination symbol is 6W.

37—Ona fine sand. This soil is nearly level and poorly drained. It is in broad to narrow flatwood areas and is adjacent to the lakes on the uplands. The mapped areas are irregular in shape and range from 10 to 200 acres. The slopes range from 0 to 2 percent.

Typically, this soil has a surface layer of very dark gray fine sand about 9 inches thick. The subsurface layer, to a depth of 11 inches, is dark gray fine sand. The upper part of the subsoil, to a depth of 26 inches, is dark reddish brown and dark brown fine sand. Below that layer, to a depth of 55 inches, is pale brown, gray, and brown fine sand. The lower part of the subsoil to a depth of 80 inches or more is very dark gray fine sand.

Included with this soil in mapping are small areas of Myakka, Placid, and St. Johns soils. Also included are small areas of soils that are similar to Ona soil, but some of these soils have a loamy subsoil, some are better drained than Ona soil, and others are in depressional areas. The included soils make up about 10 percent of this map unit.

This soil has a high water table at a depth of less than 12 inches for 1 month to 2 months during rainy periods in most years. The high water table is between depths of 12 and 40 inches for 4 to 6 months and may recede to a depth of more than 40 inches during dry periods. The available water capacity is moderate in the surface and subsurface layers and in the upper part of the subsoil, and it is very low or low below the upper part of the subsoil. The permeability is rapid, in the surface layer, moderate in the upper part of the subsoil, and rapid below the upper part of the subsoil. Natural fertility is low.

In some areas, this soil is used for commercial production of slash pine. Most of the acreage of this soil is in natural vegetation that includes slash and longleaf pines. The understory vegetation includes sawpalmetto, gallberry, waxmyrtle, lopsided indiangrass, threeawn, and bluestem.

Wetness is a severe limitation to use of this Ona soil for cultivated crops. If a water control system is established and maintained, this soil is suitable for many vegetable crops. The water control system should remove excess water in wet periods and provide for subsurface irrigation in dry periods. Management practices should include soil-improving measures. Close-growing cover crops should be included in the rotation system when the soil is not cultivated. Seedbed preparation should include bedding of the rows. Crop residue should be left on the soil to control erosion, to help maintain the content of organic matter, and to improve soil tilth. Fertilizer and lime are needed.

This soil is well suited to improved pasture and hay crops. Bermudagrass, bahiagrass, and clover are well adapted to this soil. A water control system is needed to remove excess surface water after heavy rains. Regular applications of fertilizer and lime are needed. Grazing should be controlled to prevent overgrazing, help maintain plant vigor, and obtain maximum yields.

The potential of this soil for the production of pine trees is medium. Slash and longleaf pines are the better suited trees to plant for commercial woodland production. The major concerns in management are use of equipment, seedling mortality, plant competition, and the hazard of windthrow. Seasonal wetness limits the use of equipment on this soil and increases seedling mortality. Timely scheduling of site preparation and planting, thinning, and harvesting operations can help overcome this wetness limitation. Field work generally can be done during the wet periods if machinery is equipped with large, low-pressure rubber tires or tracks. Proper site preparation can reduce seedling mortality and help control plant competition. Bedding helps to establish seedlings, increases early growth, and reduces seedling mortality. Chopping helps control competing vegetation, reduces debris, and facilitates planting operations. The use of logging systems that leave residual biomass well distributed on the surface of the soil helps to conserve organic matter. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Excessive wetness during rainy periods is a severe limitation to use of this soil for urban development. The high water table and poor filtering capacity can interfere with the proper functioning of septic tank absorption fields. If septic tank absorption fields are elevated by adding a suitable fill material, the soil is suited to this use. The use of this soil for building sites and for local roads and streets also requires that measures be taken to overcome the wetness limitation. If adequate water outlets are available, a drainage system should be installed to help keep the high water table at an effective depth. The use of fill material to elevate building sites and roadbeds will help keep the high water table at an effective depth.

Excessive wetness and the sandy surface layer of this soil are severe limitations for recreational uses. The wetness limitation can be overcome by installing a water control system that will help keep the high water table at an effective depth. In areas of intensive foot traffic, the surface should be stabilized by adding suitable fill material or by paving the area.

This Ona soil is in capability subclass IIIw. The woodland ordination symbol is 10W.

38—Holopaw fine sand. This soil is nearly level and poorly drained. It is in low flatwood areas. The mapped areas are irregular in shape and range from 30 to 300 acres. The slopes range from 0 to 2 percent.

Typically, this soil has a surface layer of dark gray fine sand about 6 inches thick. The subsurface layer, to a depth of 55 inches, is light gray, gray, and dark gray fine sand. The upper part of the subsoil, to a depth of 69 inches, is gray fine sandy loam. The lower part to a

depth of 80 inches or more is greenish gray sandy clay loam.

Included with this soil in mapping are small areas of Malabar, Palmetto, Pompano, and Sparr soils. Also included are small areas of soils that are similar to Holopaw soil, but they have dark fine sand or sand in the upper part of the subsoil. The included soils make up about 20 percent of this map unit.

In most years, this soil has a high water table at a depth of less than 12 inches for 2 to 6 months. The available water capacity is low in the surface and subsurface layers, and it is high in the subsoil. The permeability is rapid in the surface and subsurface layers, and it is moderately slow or moderate in the subsoil. Natural fertility is low.

Most of the acreage of this soil is used for commercial production of slash pine. The natural vegetation includes slash and longleaf pines and a few sweetgum. The understory vegetation includes gallberry, waxmyrtle, bluestem, and threeawn.

Excessive wetness and poor soil quality are severe limitations to use of this Holopaw soil for cultivated crops. The number and kinds of crops that can be grown on this soil are limited unless intensive management practices are used. If an adequate water control system is established and maintained, potatoes, cabbage, and many other vegetable crops can be grown. The water control system is needed to remove excess water in wet periods and to provide for subsurface irrigation during dry periods. Close-growing cover crops should be included in the rotation system when the soil is not cultivated. Crop residue left on the soil helps maintain the content of organic matter and improves soil tilth.

This soil is well suited to pasture and hay crops. Bermudagrass, bahiagrass, and clover grow well when properly managed. A water control system is needed to remove excess surface water after heavy rains. Lime and fertilizer are needed. Grazing should be controlled to prevent overgrazing and to maintain plant vigor.

The potential of this soil for the production of pine trees is medium to high. Slash and loblolly pines are the better suited trees to plant for commercial woodland production. Seedling mortality is a major concern in management. This soil is droughty and does not retain enough moisture to sustain plant growth during long, dry periods. Excessive wetness during rainy periods can kill seedlings. Proper site preparation, which includes such practices as bedding, furrowing, or surface drainage, helps to establish seedlings and increases early growth. The use of equipment, seedling mortality, and plant competition are the main concerns in management. Site preparation and planting, thinning, and harvesting operations should be scheduled to avoid seasonal limitations. Forest management operations can generally be carried out during wet periods if field machinery is equipped with special features, such as large tires or tracks. Harrowing and chopping reduce plant competition. The surface layer of this soil is generally low in organic matter. During site preparation and harvesting operations, as much plant residue as possible should be left on the surface of the soil to help conserve organic matter. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Wetness is a severe limitation to use of this soil for urban development, such as septic tank absorption fields, dwellings, and local roads and streets. This soil readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity may result in pollution of the ground water. Septic tank absorption fields, building sites, and roadbeds should be elevated by adding suitable fill material to maintain the high water table at an effective depth. If adequate water outlets are available, a water control system can be installed to remove excess water and to also help maintain the high water table at an effective depth to overcome the wetness limitation.

Excessive wetness and the sandy surface layer are severe limitations to use of this soil for recreational development. To overcome the wetness limitation, a water control system is needed to maintain the high water table at an effective depth. The surface layer should be stabilized by adding suitable fill material or paving the areas to overcome the sandy texture limitation.

This Holopaw soil is in capability subclass IVw. The woodland ordination symbol is 10W.

39—Holopaw fine sand, depressional. This soil is nearly level and very poorly drained. It is in depressional areas on the flatwoods. The mapped areas are circular to irregular in shape and range from 3 to 200 acres. The slopes are concave and are less than 2 percent.

Typically, this soil has a surface layer of black fine sand about 5 inches thick. The subsurface layer, to a depth of 47 inches, is gray and light gray fine sand. The upper part of the subsoil, to a depth of 51 inches, is dark gray fine sandy loam. The middle part, to a depth of 58 inches, is gray sandy clay loam. The lower part to a depth of about 80 inches is greenish gray sandy loam.

Included with this soil in mapping are small areas of Riviera and Pompano soils. Also included are small areas of soils that are similar to Holopaw soil, but they have a thick, dark surface layer and some small areas of Holopaw soils that are not ponded. The included soils make up about 15 percent of this map unit.

This soil is ponded during rainy periods. In most years, the high water table is 1 foot to 2 feet above the surface for more than 6 months. The available water capacity is low or very low in the surface and subsurface layers, and it is medium or high in the subsoil. The permeability is rapid in the surface and subsurface layers, and it is moderately slow in the subsoil. Natural fertility is low.

Most of the acreage of this soil is in natural vegetation that includes cypress, sweetgum, red maple, and bay. In

areas with dense tree growth, the understory vegetation is sparse. If the canopy cover is thin, the understory vegetation includes maidencane, cordgrass, and other water-tolerant plants.

Ponding is a severe limitation to use of this Holopaw soil for cultivated crops or improved pasture. The high water table is above the surface during long periods of wetness. A water control system is needed and is difficult to establish because of the low position of this soil on the landscape. Adequate outlets to remove excess water are generally not available or are difficult to install.

This soil generally is not used for growing pine trees because of ponding. The potential of this soil for the production of pine trees is low. Water ponds for long periods and causes a high rate of seedling mortality. Wetness is a limitation to use of equipment during rainy periods. Ponding and excessive wetness are the major concerns in woodland management.

Ponding, excessive wetness, and poor filtering capacity are severe limitations for urban uses, such as septic tank absorption fields, dwellings, and local roads and streets. This soil is ponded for long periods during rainy seasons. The limitations are very difficult to overcome. A water control system is difficult to establish because of the low position of this soil on the landscape and also because water outlets generally are not available. Septic tank absorption fields, building sites, and roadways should be elevated to maintain the high water table at an effective depth to overcome the limitations. Large amounts of fill material would be needed to accomplish this.

Ponding during rainy periods and the sandy surface of this soil are severe limitations for recreational development. To overcome the wetness limitation, a water control system is needed to remove the excess water and to maintain the high water table at an effective depth; but because of the low position of this soil on the landscape and because adequate outlets generally are not available, a water control system is difficult to establish and maintain.

This Holopaw soil is in capability subclass VIIw. The woodland ordination symbol is 2W.

40—Paola fine sand, 0 to 8 percent slopes. This soil is nearly level to sloping and excessively drained. It is on broad to narrow slopes and ridges on the uplands. Most areas of this soil are north of Florahome and southeast of Crescent City. The mapped areas are irregular in shape and range from 5 to 250 acres.

Typically, this soil has a surface layer of dark gray fine sand about 3 inches thick. The subsurface layer, to a depth of 27 inches, is light gray fine sand. The upper part of the subsoil, to a depth of 52 inches, is yellow fine sand. The lower part to a depth of 80 inches or more is very pale brown fine sand.

Included with this soil in mapping are small areas of Candler, Cassia, Orsino, and Tavares soils. Also included are small areas of soils that are similar to Paola soil, but some of these soils are light gray sand throughout, and others have a well developed spodic horizon at a depth of 30 to 50 inches. The included soils make up about 10 percent of this map unit.

This soil has a high water table at a depth of more than 72 inches throughout the year. The available water capacity is very low. The permeability is very rapid.

Most acreage of this soil is in natural vegetation that includes sand pine, scrub live oak, and sawpalmetto.

This Paola soil is not suited to most cultivated crops. Extreme droughtiness and very poor soil quality are severe limitations to use for cultivated crops. Nutrients are rapidly leached from this soil. Conservation tillage helps conserve moisture and controls erosion if this soil is cultivated. This soil is moderately suited to citrus crops if cold temperatures are not a problem.

This soil is poorly suited to pasture and hay crops. Deep-rooted plants, such as bermudagrass and bahiagrass, are well adapted to this soil. Proper management should include regular applications of fertilizer and lime. Grazing should be controlled to maintain plant vigor.

The potential of this soil for the production of pine trees is low. Sand pine is the better suited tree to plant for commercial woodland production. The main concerns in management are the use of equipment and seedling mortality. The loose, sandy surface of this soil is a limitation to use of equipment. Machinery equipped with large tires or tracks will help overcome this limitation. This soil has very low available water capacity and does not supply enough moisture to provide for a good survival rate for seedlings. Using special planting stock that is larger than usual or that is containerized reduces seedling mortality. Scheduling planting operations so that seedlings are planted during the seasons when rainfall is heavier and more frequent can also reduce the rate of seedling mortality. Although runoff is slow, logging and site preparation operations can increase and concentrate water runoff on this soil and cause soil erosion. These activities should be avoided in and adjacent to drainageways. Special design and proper placement of roads, skid trails, and stream crossings reduce soil erosion. During site preparation and harvesting operations, plant debris should be left on the surface of the soil to help conserve organic matter.

This soil has slight limitations for urban uses, such as septic tank absorption fields, dwellings, and local roads and streets. In areas where septic tank absorption fields are concentrated, ground water contamination is a hazard.

The sandy surface of this soil is a severe limitation for recreational uses. In areas of intensive foot traffic, the surface layer should be stabilized by adding suitable fill

material or paving the areas to help overcome this limitation.

This Paola soil is in capability subclass VIs. The woodland ordination symbol is 2S.

41—Millhopper sand, 5 to 8 percent slopes. This soil is sloping and moderately well drained. It is on side slopes, ridges, and knolls on the uplands and is also on slopes adjacent to drainageways and lakes in upland areas. The mapped areas are mostly irregular in shape to long and narrow, but some areas are circular. The individual areas range from 3 to 60 acres.

Typically, this soil has a surface layer of dark gray and dark grayish brown sand about 8 inches thick. The subsurface layer extends to a depth of 67 inches. The upper part is light yellowish brown and pale brown sand. The lower part is light gray sand. The upper part of the subsoil, to a depth of about 70 inches, is very pale brown loamy sand. The lower part to a depth of 80 inches or more is light gray sandy clay loam.

Included with this soil in mapping are small areas of Apopka and Tavares soils. Also included are small areas of soils that are similar to Millhopper soil, but some of these soils have a subsoil at a depth of less than 40 inches, some have a more coarse surface texture, and some have slopes of more than 8 percent. The included soils make up about 15 percent of this map unit.

In most years, this soil has a high water table at a depth of 40 to 60 inches for 1 month to 4 months. During some years, the high water table is between depths of 30 and 40 inches for 1 week to 3 weeks. The available water capacity is low in the surface and subsurface layers, and it is medium in the subsoil. The permeability is rapid in the surface and subsurface layers, and it is moderate to slow in the subsoil. Natural fertility is low.

A large acreage of this soil is used for commercial production of slash pine. The natural vegetation includes turkey oak, bluejack oak, laurel oak, and longleaf pine. The understory vegetation is sparse, but includes bluestem, lopsided indiangrass, and pineland threeawn.

Droughtiness and rapid leaching of plant nutrients from the root zone are severe limitations to use of this Millhopper soil for most cultivated crops. These limitations restrict the choice of plants that can be grown on this soil and reduce yields. The steepness of slope limits the use of this soil for row crops. The erosion hazard is increased, and it is more difficult to cultivate this soil. If this soil is cultivated, conservation tillage helps to conserve moisture and controls erosion. Close-growing crops should be used in the rotation system at least three-fourths of the time. Soil-improving cover crops and crop residue should be used to help control erosion. Regular applications of fertilizer and lime are needed.

This soil is moderately well suited to improved pasture. Deep-rooted plants, such as bermudagrass and bahiagrass, are well adapted to this soil. High yields can be obtained if the soil is fertilized and limed. Periodic drought reduces yields significantly. Steepness of slope increases the hazard of erosion and reduces yields. Grazing should be controlled to help maintain plant vigor and to help keep a good ground cover on the soil.

The potential of this soil for the production of pine trees is medium to high. Slash, loblolly, and longleaf pines are the better suited trees to plant for commercial woodland production. Use of equipment, seedling mortality, and plant competition are concerns in management. This soil is droughty, and seasonal dry periods and the low available water capacity in the root zone cause excessive seedling mortality and inhibit plant growth. Plant competition from hardwoods, mainly oaks, can be reduced if herbicides are used during site preparation. Site preparation should also include chopping, which helps to control competing vegetation. The loose, sandy surface of this soil is a limitation to use of equipment, but use of machinery that is equipped with large tires or tracks can help overcome this limitation. Using special planting stock that is larger than usual or that is containerized reduces seedling mortality. Scheduling planting operations during seasons when rainfall is heavier and more frequent will increase the survival rate of seedlings and also increases plant growth. Although runoff is slow, logging, site preparation, and planting operations can increase and concentrate water runoff on this soil and cause soil erosion. These activities should be avoided in and adjacent to stream beds. Special design and proper placement of roads, skid trails, and stream crossings reduce soil erosion. During site preparation and thinning and harvesting operations, as much plant debris as possible should be left on the surface of the soil to help conserve organic matter. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Wetness is a moderate limitation to use of this soil as septic tank absorption fields. This limitation can be easily overcome by adding suitable fill material to elevate the septic tank absorption field slightly. Limitations to use of this soil for dwellings without basements and local roads and streets are slight. The soil is well suited to these uses and no special measures are needed.

The sandy surface layer and slope are severe limitations to use of this soil for recreational development. The surface layer should be stabilized by adding suitable fill material or by paving the area to help overcome the sandy texture limitation. If this soil is used for playgrounds, land smoothing is necessary to reduce the steepness of the slope.

This Millhopper soil is in capability subclass IVs. The woodland ordination symbol is 10S.

42—Riviera fine sand, depressional. This soil is nearly level and very poorly drained. It is mostly in depressional areas on the flatwoods. A few small areas

are adjacent to lakes and marshes on the uplands. The mapped areas generally are broad to narrow, but many are circular. These areas range from 3 to 200 acres. The slopes are concave and are less than 2 percent.

Typically, this soil has a surface layer of black fine sand about 5 inches thick. The subsurface layer, to a depth of 25 inches, is gray and light gray fine sand. Tongues of light gray fine sand extend into the upper part of the subsoil. The upper part of the subsoil, to a depth of about 45 inches, is light grayish brown and grayish brown sandy clay loam. The lower part, to a depth of 49 inches, is gray fine sandy loam. The substratum to a depth of about 80 inches is gray loamy fine sand.

Included with this soil in mapping are small areas of Holopaw, Riviera fine sand, frequently flooded, and Winder soils. Also included are small areas of soils that are similar to Riviera soil, but some of these soils have a thick, black or very dark gray surface layer, some do not have tongues in the upper part of the subsoil, and others have a sandy clay or clay subsoil. The included soils make up about 30 percent of this map unit.

This soil has a high water table above the surface for 6 to 12 months. The available water capacity is low in the surface and subsurface layers, medium in the subsoil, and low in the substratum. The permeability is rapid in the surface and subsurface layers, very slow or slow in the subsoil, and moderate or moderately rapid in the substratum. Natural fertility is low.

Most of the acreage of this soil has been left in natural vegetation and is used as habitat for wildlife. The natural vegetation includes cypress, bay, waxmyrtle, and a few sweetgum. The understory vegetation is sparse. It includes greenbrier and maidencane.

Ponding is a severe limitation to use of this Riviera soil for cultivated crops and improved pasture. The high water table is above the surface during long periods of wetness. A water control system is needed and is difficult to establish because of the low position of this soil on the landscape. Adequate outlets to remove excess water are generally not available or are difficult to install and maintain.

This soil is generally not used for growing pine trees because of ponding. The potential of this soil for the production of pine trees is low. Water ponds for long periods and causes a high rate of seedling mortality. The limitation to use of equipment during rainy periods, ponding, and excessive wetness are the main concerns in woodland management.

Ponding is a severe limitation for urban uses, such as septic tank absorption fields, dwellings, and local roads and streets. The surface is ponded for long periods during rainy seasons. This limitation is very difficult to overcome. A water control system is difficult to establish because of the low position of this soil on the landscape and because water outlets are generally not available. Septic tank absorption fields, building sites, and roadways should be elevated to maintain the high water table at an effective depth. Large amounts of fill material would be needed to elevate these areas.

Ponding during rainy periods and the sandy surface of this soil are severe limitations for recreational development. A water control system to remove the excess water and to maintain the water table at a depth of 2 to 2.5 feet or more is needed to overcome these limitations. These limitations are difficult to overcome because of the low position of this soil on the landscape, and adequate outlets generally are not available to establish a water control system.

This Riviera soil is in capability subclass VIIw. The woodland ordination symbol is 2W.

43—Placid-Pompano association, frequently flooded. The soils in this association are nearly level and very poorly drained and poorly drained. These soils are in regular and repeating patterns in narrow to broad drainageways on the flatwoods and uplands. The mapped areas are elongated and range from 15 to 250 acres. The slopes range from 0 to 2 percent.

Placid soil makes up about 55 percent of the association. Pompano soil makes up about 30 percent. The included soils make up about 15 percent.

Typically, the surface layer of Placid soil is black and very dark gray sand about 11 inches thick. The upper part of the underlying material, to a depth of 35 inches, is dark grayish brown sand. The lower part to a depth of 80 inches or more is light gray sand.

During rainy periods, Placid soil is frequently flooded for brief periods. When this soil is not flooded, the high water table is within 12 inches of the surface for more than 6 months in most years. The available water capacity is high in the surface layer and low in the underlying material. The permeability is rapid. Natural fertility is medium.

Typically, the surface layer of Pompano soil is very dark gray sand about 6 inches thick. The underlying material to a depth of 80 inches or more is gray sand.

During rainy periods, Pompano soil is frequently flooded for brief periods. When this soil is not flooded, the high water table is at a depth of less than 12 inches for 4 to 6 months in most years. The available water capacity is very low. The permeability is rapid. Natural fertility is low.

Included with these soils in mapping most commonly are Samsula soils.

Most of the acreage in this association is in dense, natural vegetation that includes sweetgum, red maple, loblolly bay, cabbage palm, waxmyrtle, and greenbrier. The understory vegetation is sparse.

The soils in this association in their native state have severe limitations for cultivated crops because of excessive wetness and periodic flooding. If an adequate water control system is established and maintained to control flooding and remove excess surface water

rapidly, a number of crops can be grown on these soils. Seedbed preparation should include bedding of the rows. A close-growing cover crop should be included in the rotation system when the soil is not cultivated, and crop residue should be left on the soil.

Wetness and flooding are severe limitations to use of these soils for improved pasture. If water remains on the surface of these soils for long periods, plant growth is restricted. If an adequate water control system is established and maintained to control flooding and remove excess surface water rapidly after heavy rains, this soil is moderately suited to improved pasture grasses. Bahiagrass and bermudagrass can be grown. Fertilizer and, in some places, lime are needed. Grazing should be controlled to help maintain plant vigor.

These soils are generally not used for pine trees because of flooding. The potential of these soils for the production of pine trees is moderate. A water control system is needed to control flooding for satisfactory tree growth. Slash pines are the better suited trees to plant for commercial woodland production. Use of equipment and seedling mortality are concerns in woodland management.

Excessive wetness is a severe limitation of the soils in this association for urban uses, such as septic tank absorption fields, dwellings, and local roads and streets. Flooding is a severe hazard. Because these soils are in low positions on the landscape, it is difficult to implement measures to control flooding and remove excess water. These soils do not adequately filter septic tank effluent because they are too sandy. Fill material should be used to elevate building sites and roadways to help overcome the limitations caused by flooding and excessive wetness.

Excessive wetness and the sandy surface layer are severe limitations to use of these soils for recreational development. Additionally, flooding is a hazard and limits the use of this soil for camp areas and playgrounds. Flooding and excessive wetness can be overcome but generally only with difficulty. A water control system should be installed and maintained to keep the high water table at a depth of more than 30 inches for camp areas, picnic areas, and playgrounds and at a depth of about 24 inches in areas used for paths and trails. The water control system must also control flooding if these soils are used for campgrounds or playgrounds. The surface should be stabilized by adding suitable fill material or by paving the areas.

Placid and Pompano soils are in capability subclass VIw. The woodland ordination symbol of these soils is 6W.

44—Candler sand, 12 to 25 percent slopes. This soil is strongly sloping to steep and excessively drained. It is on the slopes of ridges, knolls, and sinkholes on the uplands. The mapped areas are irregular in shape or circular and range from 5 to 80 acres.

Typically, this soil has a surface layer of grayish brown sand about 4 inches thick. The subsurface layer, to a depth of 70 inches, is yellow and brownish yellow sand. The subsoil to a depth of 80 inches or more is yellow sand and has thin, yellowish brown bands or layers of sandy loam.

Included with this soil in mapping are small areas of Apopka, Astatula, Millhopper, and Tavares soils. These soils are in similar positions on the landscape as Candler soil or in slightly lower positions. Also included are small areas of soils that are similar to Candler soil, but they are coarse sand throughout or have a high content of gravel-size particles. The included soils make up less than 10 percent of this map unit.

This soil has a high water table at a depth of more than 80 inches. The available water capacity is very low or low in the surface layer and upper part of the subsurface layer, and it is low in the lower part of the subsurface layer. The permeability is rapid. Natural fertility is low.

Most of the acreage of this soil is in natural vegetation that includes turkey oak and scrub live oak and a few longleaf pine. The understory vegetation includes pineland threeawn and bluestem.

This Candler soil is not suitable for cultivated crops; but in some areas, this soil is used for citrus crops if cold temperatures are not a problem. Droughtiness, poor soil quality, and steep slopes are severe limitations to use of this soil for cultivated crops. Rainfall is rapidly absorbed, but runoff is rapid in areas without vegetation during intense rains. If a vegetation cover crop is not left on the surface, the hazard of erosion is severe.

This soil is not suited to pasture. Even if fertilized, deep-rooted grasses, such as bermudagrass and bahiagrass, produce only moderate yields. Periodic drought severely limits plant growth. Erosion is a severe hazard on this soil.

The potential of this soil for the production of pine trees is medium. Slash, longleaf, and sand pines are the better suited trees to plant for commercial woodland production. The use of equipment, seedling mortality, and plant competition are concerns in management. This soil is droughty and does not retain enough moisture in the root zone to sustain plant growth during long, dry periods. Using special planting stock that is larger than usual or that is containerized reduces seedling mortality. The loose, sandy surface of this soil is a limitation to use of equipment. Machinery equipped with large, low-pressure tires or tracks can help overcome this limitation. Plant competition from hardwoods, mostly oaks, can be reduced if herbicides are used during site preparation. Although runoff is slow, logging and site preparation operations can increase and concentrate water movement on this soil and cause soil erosion. These activities should be avoided in and adjacent to drainageways. Special design and proper placement of roads, skid trails, and stream crossings can reduce soil

loss. During site preparation and thinning and harvesting operations, as much plant debris as possible should be left on the surface of the soil to help conserve organic matter.

Steepness of slope is a severe limitation of this Candler soil for urban uses, such as septic tank absorption fields, dwellings, and local roads and streets. In areas where septic tank absorption fields are concentrated, ground water contamination is a hazard.

The loose, sandy surface layer and steepness of slope are severe limitations to use of this soil for recreational development. Steepness of slope is a moderate limitation in areas used for paths and trails. In areas of intensive foot traffic, the surface layer should be stabilized by adding suitable fill material or by paving the areas to overcome the loose, sandy texture limitation. If this soil is used for playgrounds, the areas should be levelled and smoothed.

This Candler soil is in capability subclass VIIs. The woodland ordination symbol is 8S.

45—Astatula fine sand, 0 to 8 percent slopes. This soil is nearly level to sloping and excessively drained. It is on ridges and knolls on broad uplands. The mapped areas are irregular in shape and range from 10 to 1,500 acres.

Typically, this soil has a surface layer of dark gray fine sand about 4 inches thick. The upper part of the underlying material, to a depth of 12 inches, is pale brown fine sand. The lower part to a depth of more than 80 inches is very pale brown fine sand.

Included with this soil in mapping are small areas of Apopka, Candler, Deland, Millhopper, and Tavares soils. Also included are small areas of soils that are similar to Astatula soil, but some of these soils have a high content of gravel-size particles, and others are on slopes of more than 8 percent. The included soils make up about 15 percent of this map unit.

This soil has a high water table at a depth of more than 72 inches. The available water capacity is very low. The permeability is very rapid. Natural fertility is low.

Most of the acreage of this soil is in natural vegetation that includes turkey oak, live oak, threeawn, and bluestem. A dense growth of sand pine is in some areas. In the area near Crescent City and where cold temperatures are not a problem, this soil is used for citrus crops.

This Astatula soil is not suitable for most cultivated crops. Droughtiness and poor soil quality are severe limitations for cultivated crops. Plant nutrients are rapidly leached from this soil. Conservation tillage helps conserve moisture and controls erosion if the soil is cultivated. Close-growing plants should be included in the rotation system at least three-fourths of the time. Crop residue left on or in the soil controls erosion and improves soil quality. This soil is well suited to citrus crops if cold temperatures are not a problem.

This soil is moderately suited to pasture and hay crops. Deep-rooted plants, such as bermudagrass and bahiagrass, are well suited to this soil. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

The potential of this soil for the production of pine trees is low. Sand and longleaf pines are the better suited trees to plant for commercial woodland production. Concerns in management are the use of equipment on this soil and seedling mortality. The loose, sandy surface of this soil is a severe limitation to use of equipment. Machinery equipped with large tires or tracks can help overcome this use of equipment limitation. This soil has very low available water capacity and does not supply enough moisture to provide for a good survival rate for seedlings. Using special planting stock that is larger than usual or that is containerized reduces seedling mortality. Scheduling planting operations so that seedlings are planted during the seasons when rains are more frequent can reduce the rate of seedling mortality. Although runoff is slow, logging and site preparation operations can increase and concentrate water runoff on this soil and and cause soil erosion. These activities should be avoided in and adjacent to drainageways. Special design and proper placement of roads, skid trails, and stream crossings can reduce soil erosion. During site preparation and thinning and harvesting operations, as much plant debris as possible should be left on the surface of the soil to help conserve organic matter.

This soil has slight limitations for urban uses, such as septic tank absorption fields, dwellings, and local roads and streets. In areas where septic tank absorption fields are concentrated, ground water contamination is a hazard.

The sandy surface layer is a severe limitation for recreational development. The surface layer should be stabilized by adding suitable fill material or by paving the area to help overcome this limitation.

This Astatula soil is in capability subclass VIs. The woodland ordination symbol is 3S.

46—Astatula fine sand, 8 to 15 percent slopes. This soil is sloping and excessively drained. It is on ridges and knolls on the uplands. The mapped areas are irregular in shape and range from 5 to 60 acres.

Typically, this soil has a surface layer of dark grayish brown fine sand about 7 inches thick. The underlying material to a depth of 80 inches or more is pale brown and very pale brown fine sand.

Included with this soil in mapping are small areas of Candler and Tavares soils. These soils are in similar positions on the landscape as Astatula soil or in slightly lower positions. Also included are small areas of soils that are similar to Astatula soil, but some of these soils have slopes of more than 15 percent, and some have a high content of gravel-size particles throughout. The

included soils make up about 10 percent of this map unit.

This soil has a high water table at a depth of more than 72 inches. The available water capacity is very low. The permeability is very rapid. Natural fertility is very low.

In the southeastern part of the survey area, this soil is used for citrus crops. Most of the acreage of this soil is in natural vegetation that includes turkey oak and scrub live oak and a few longleaf pine. A dense growth of sand pine is in a few areas. The understory vegetation is generally sparse. It includes threeawn and bluestem and a few sawpalmetto.

This Astatula soil is not suitable for most cultivated crops. Droughtiness and poor soil quality are severe limitations for cultivated crops. Water drains rapidly from this soil along with the plant nutrients. Rainfall is rapidly absorbed, but runoff from unprotected areas is rapid during heavy rains. In these areas, the hazard of erosion is severe. Conservation tillage helps conserve moisture and controls erosion if this soil is cultivated. This soil is well suited to citrus crops if cold temperatures are not a problem.

This soil is moderately well suited to pasture and hay crops. Deep-rooted plants, such as bermudagrass and bahiagrass, produce only moderate yields even if the soil is fertilized. Periodic drought severely limits plant growth.

The potential of this soil for the production of pine trees is low. Sand and longleaf pines are the better suited trees to plant for commercial woodland production. The main concerns in management are use of equipment and seedling mortality. The loose, sandy surface of this soil is a severe limitation to use of equipment. Machinery equipped with large tires or tracks can help overcome this limitation. This soil has very low available water capacity and does not supply enough moisture to provide for a good survival rate for seedlings. Using special planting stock that is larger than usual or that is containerized reduces seedling mortality. Scheduling planting operations so that seedlings are planted during the seasons when rains are more frequent also reduces the rate of seedling mortality. Although runoff is slow, logging and site preparation operations can increase and concentrate water runoff on this soil and cause soil erosion. These activities should be avoided in and adjacent to drainageways. Special design and proper placement of roads, skid trails, and stream crossings can reduce soil erosion. During site preparation and thinning and harvesting operations, as much plant debris as possible should be left on the surface of the soil to help conserve organic matter.

This soil has slight limitations for urban uses, such as septic tank absorption fields, dwellings, and local roads and streets. In areas where septic tank absorption fields are concentrated, ground water contamination is a hazard.

The sandy surface layer of this soil is a severe limitation for recreational development. Slopes of more than 6 percent are severe limitations if this soil is used for playgrounds. The surface should be stabilized by adding suitable fill material or by paving the areas to help overcome these limitations.

This Astatula soil is in capability subclass VIIs. The woodland ordination symbol is 3S.

47—Myakka-Urban land complex. This map unit consists of Myakka soil that is nearly level and poorly drained and of areas of Urban land. The mapped areas are irregular in shape and range from 40 to 200 acres.

This map unit consists of about 65 percent Myakka soil and 35 percent Urban land. In some small areas, Urban land makes up about 60 percent of the map unit. The included soils make up less than 10 percent of this map unit. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication.

Typically, Myakka soil has a surface layer of black fine sand about 6 inches thick. The subsurface layer, to a depth of 22 inches, is gray fine sand. The upper part of the subsoil, to a depth of 37 inches, is black and dark reddish brown fine sand. The next layer, to a depth of 57 inches, is brown fine sand. The lower part to a depth of 80 inches or more is light gray fine sand.

The Urban land part of this map unit is covered by concrete, asphalt, buildings, and other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Included in mapping are small areas of Adamsville, Cassia, Electra, and Pomona soils. Of these, Pomona soils are the most extensive.

Myakka soil has a high water table at a depth of less than 12 inches for 1 month to 4 months in most years and is at a depth of more than 40 inches during long, dry periods. The available water capacity is very low in the surface and subsurface layers, medium or high in the subsoil, and very low to low in the substratum. The permeability is rapid in the surface and subsurface layers and substratum and is moderate or moderately rapid in the subsoil. Natural fertility is low.

Present land use precludes the use of the soils in this map unit for cultivated crops, improved pasture grasses, or commercial production of pine trees. The Myakka soil part of this map unit is used for lawns, vacant lots, or playgrounds, or it is left as open space. The Urban land part of this map unit is used mostly for houses, streets, driveways, buildings, parking lots, or other similar uses.

Wetness severely limits the use of Myakka soil as septic tank absorption fields. Using fill material to elevate the septic tank absorption field increases the effective depth of the high water table and helps overcome the wetness limitation. Establishing and maintaining area drainage systems or using fill material to elevate building sites can help overcome the wetness limitation to use of Myakka soil for houses, buildings, and streets and roads.

Excessive wetness and the sandy texture of the surface layer are severe limitations to use of Myakka soil for recreational development. Water control measures, which keep the seasonal high water table at an effective depth, are needed to overcome the wetness limitation. Stabilizing the surface layer by adding suitable topsoil and by paving the high traffic areas can help overcome the sandy surface layer limitation.

The soils in this map unit have not been assigned to a capability subclass or to a woodland group.

48—Florahome sand. This soil is nearly level to gently sloping and moderately well drained. It is on ridges and side slopes on the uplands. This soil is mostly in an area northeast and southeast of the Florahome community. The mapped areas are irregular in shape to long and narrow and range from about 30 to 700 acres. The slopes range from 0 to 3 percent.

Typically, this soil has a surface layer of very dark grayish brown and dark brown sand about 36 inches thick. The upper part of the underlying material, to a depth of 58 inches, is brown sand. The lower part to a depth of 80 inches is grayish brown sand.

Included with this soil in mapping are small areas of Adamsville, Centenary, Narcoossee, and Tavares soils. Also included are small areas of soils that are similar to Florahome soil, but some of these soils are not as well drained, or some have a thin, light subsurface layer that is underlain by a darker subsurface layer. The included soils make up about 10 percent of this map unit.

In most years, this soil has a high water table at a depth of 42 to 72 inches for 4 to 6 months. It recedes to a depth of more than 72 inches during periods of low rainfall. In some years, the high water table is within 30 to 42 inches of the surface for about 2 weeks. The available water capacity is low or medium in the surface layer, and it is low or very low in the underlying material. The permeability is rapid. Natural fertility is low.

A large acreage of this soil is used for growing improved pasture and hay. A small acreage is used for growing corn and some small grain. The natural vegetation on this soil includes laurel oak, magnolia, hickory, live oak, and a few sweetgum and longleaf pine. The understory vegetation includes bluestem, panicum, Virginia creeper, and poison ivy.

Droughtiness and rapid leaching of nutrients are severe limitations to use of this Florahome soil for cultivated crops. If this soil is cultivated, row crops should be planted on the contour. Close-growing cover crops should be grown in rotation with row crops. Crop residue should be left on the surface to help control erosion and to improve soil quality. It is feasible to grow high-value crops on this soil if irrigation water is readily available.

This soil is well suited to pasture and hay. Coastal bermudagrass and bahiagrass are well suited to this soil, but yields are reduced by periodic droughts. Grazing should be controlled to maintain plant vigor.

The potential of this soil for the production of pine trees is medium to high. Slash and longleaf pines are the better suited trees to plant for commercial woodland production. Use of equipment, seedling mortality, and plant competition are the main concerns in management. This soil is droughty, and seasonal dry periods and very low available water capacity in the root zone cause excessive seedling mortality and inhibit plant growth. Plant competition from hardwoods, mainly oaks, can be reduced if herbicides are used during site preparation. Site preparation activities should include chopping, which helps control competing vegetation, reduces debris, and facilitates planting operations. The loose, sandy surface of this soil is a moderate limitation to use of equipment. Machinery equipped with large tires or tracks can help overcome this limitation. Using special planting stock that is larger than usual or that is containerized reduces seedling mortality. Scheduling planting operations during seasons when rainfall is heavier and more frequent will increase the survival rate of seedlings and sustain plant growth. Logging, site preparation, and planting activities can increase and concentrate water runoff on this soil and cause soil erosion. These activities should be avoided in and adjacent to stream beds. Special design and proper placement of roads, skid trails, and stream crossings can reduce soil erosion. During site preparation and thinning and harvesting operations, as much plant debris as possible should be left on the surface of this soil to help conserve organic matter. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Wetness is a moderate limitation to use of this soil as septic tank absorption fields. The poor filtering capacity is a limitation and may result in ground water contamination if the density of septic tank absorption fields in the area is high. For proper functioning of the septic system, the septic tank absorption fields may need to be slightly elevated. Limitations for dwellings and for local roads and streets are slight. No special measures are needed for these uses.

The sandy surface layer of this soil is a severe limitation for recreational uses. In areas of intensive foot traffic, the surface should be stabilized for recreational uses by adding a suitable topsoil, establishing vegetation cover, or paving the area to reduce or overcome this limitation.

This Florahome soil is in capability subclass IIIs. The woodland ordination symbol is 10S.

49—Bonneau fine sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and moderately well drained. It is on knolls and side slopes on the uplands. The mapped areas are irregular in shape and range from 4 to 200 acres. The slopes are convex.

Typically, this soil has a surface layer of dark grayish brown fine sand about 7 inches thick. The subsurface layer, to a depth of 25 inches, is yellowish brown fine sand. The upper part of the subsoil, to a depth of 31 inches, is brownish yellow fine sandy loam. The middle part, to a depth of 64 inches, is brownish yellow sandy clay loam. The lower part to a depth of 80 inches or more is mixed light gray and yellowish brown sandy clay loam.

Included with this soil in mapping are small areas of Lochloosa and Millhopper soils. Also included are small areas of soils that are similar to Bonneau soil, but some of these soils have a surface layer of loamy sand or sand, others have a subsoil at a depth of less than 20 inches, and others are better drained than Bonneau soil or have slopes of more than 5 percent. The included soils make up about 20 percent of this map unit.

In most years, this soil has a high water table between depths of 40 and 60 inches for 1 month to 4 months. During some years, the high water table is between depths of 30 and 40 inches for 1 week to 3 weeks. The available water capacity is very low or low in the surface and subsurface layers, and it is medium in the subsoil. The permeability is rapid in the surface and subsurface layers, and it is moderate in the subsoil. Natural fertility is low.

Most areas of this soil are in improved pasture. In some areas, this soil is used for growing pecans, and in other areas, it is used for commercial woodland production of slash pine. The natural vegetation includes laurel oak, turkey oak, longleaf pine, slash pine, and scattered live oak. The understory vegetation consists of pineland threeawn, bluestem, panicum, and scattered sawpalmetto.

This Bonneau soil has moderate limitations for most cultivated crops. Droughtiness and rapid leaching of plant nutrients from the root zone limit the choice of plants that can be grown and reduce yields of suitable crops. Cover crops should be included in the crop rotation system at least half the time. Crop residue should be left on the soil to help control erosion and improve soil quality. Conservation tillage helps to conserve moisture and controls erosion. Regular applications of lime and fertilizer are needed.

This soil is well suited to improved pasture grasses. The most suited grasses to plant on this soil are bermudagrass and bahiagrass. Regular applications of fertilizer and occasional applications of lime are needed. Grazing should be controlled to help maintain plant vigor, obtain maximum yields, and help keep a good ground cover on the soil.

The potential of this soil for the production of pine trees is medium to high. Slash, loblolly, and longleaf pines are the better suited trees to plant for commercial woodland production. The major concerns in management are the use of equipment on this soil and seedling mortality. Machinery equipped with large, low-pressure tires or tracks can help overcome the limitations that restrict the use of equipment and can reduce soil compaction. The available water capacity is low or very low in the effective rooting depth. During long, dry periods, this soil does not retain enough moisture in the root zone to sustain plant growth. Using special planting stock that is larger than usual or that is containerized reduces the rate of seedling mortality. Scheduling planting operations during seasons when rainfall is heavier and more frequent can also reduce seedling mortality. Logging, site preparation, and planting operations can increase and concentrate water runoff on this soil and cause soil erosion. Special design and proper placement of roads, skid trails, and stream crossings can reduce soil erosion. Applications of nitrogen fertilizer with phosphorus and potassium provide excellent growth response.

Wetness is a moderate limitation to use of this soil as septic tank absorption fields. This limitation can be overcome by adding fill material to slightly elevate the septic tank absorption field. Limitations for dwellings and local roads and streets are slight. This soil is well suited to these uses and no special measures are required.

The sandy surface layer of this soil is a severe limitation for recreational development. The surface layer should be stabilized by adding suitable fill material or by paving the areas to help overcome this limitation.

This Bonneau soil is in capability subclass IIs. The woodland ordination symbol is 9S.

50—Wabasso fine sand. This soil is nearly level and poorly drained. It is on the flatwoods. The mapped areas are irregular in shape and range from 5 to 200 acres. The slopes range from 0 to 2 percent.

Typically, this soil has a surface layer of black fine sand about 4 inches thick. The subsurface layer, to a depth of 21 inches, is light gray fine sand. The upper part of the subsoil, to a depth of 28 inches, is black and dark reddish brown fine sand. The layer below that, to a depth of 31 inches, is brown fine sand. The next layer, to a depth of 35 inches, is dark grayish brown fine sandy loam. The next layer, to a depth of 49 inches, is grayish brown sandy clay loam. The lower part of the subsoil, to a depth of 57 inches, is light gray fine sandy loam. The substratum to a depth of 80 inches is light gray fine sand.

Included with this soil in mapping are small areas of Myakka, Palmetto, Pompano, Riviera, and Wauchula soils. Also included are small areas of soils similar to Wabasso soil, but some of these soils have a thicker surface layer than Wabasso soil, and some have a sandy clay texture in the lower part of the subsoil. The included soils make up about 15 percent of this map unit.

In most years, this soil has a high water table at a depth of less than 12 inches for 1 month to 4 months. The high water table is at a depth of 12 to 40 inches for

periods as long as about 6 months and at a depth of more than 40 inches during very dry periods. The available water capacity is very low in the surface and subsurface layers, medium in the subsoil, and low in the substratum. The permeability is rapid in the surface and subsurface layers, moderate in the upper part of the subsoil and slow or very slow in the lower part, and rapid in the substratum. Natural fertility is low.

Large acreages of this soil are used for crops, such as potatoes and cabbage. The natural vegetation includes slash pine, cabbage palm, and water oak. The understory vegetation includes sawpalmetto, waxmyrtle, and pineland threeawn.

Wetness is a severe limitation to use of this Wabasso soil for cultivated crops. The number of adapted crops that can be grown on this soil is very limited if intensive water control measures are not used. If a water control system is established and maintained, this soil is suited to many kinds of flowers and vegetable crops. The water control system is needed to remove excess water in wet periods and provide for subsurface irrigation in dry periods. Close-growing, soil-improving crops should be included in the rotation system at least two-thirds of the time. Crop residue should be left on the surface to help control erosion, maintain organic matter, and improve soil quality. Conservation tillage will help conserve moisture and control erosion. Fertilizer and lime should be applied according to the needs of the crop.

These soils are well suited to pasture and hay crops. Bermudagrass, bahiagrass, and clover are well adapted to this soil and grow well with proper management. A drainage system is needed to remove excess surface water during heavy rains. Grazing should be controlled to help prevent overgrazing, to maintain plant vigor, and to obtain maximum yields.

The potential of this soil for the production of pine trees is medium to high. Slash, loblolly, and longleaf pines are the better suited trees to plant for commercial woodland production. The major concerns in management are restricted use of equipment on this soil, seedling mortality, and plant competition. Seasonal wetness and periods of droughtiness limit the use of equipment and increase the rate of seedling mortality. Site preparation activities, such as harrowing and bedding, help establish seedlings, reduce seedling mortality, and increase early growth. Chopping and bedding reduce debris, control competing vegetation, and facilitate planting operations. Machinery equipped with large, low-pressure rubber tires or tracks will help overcome the limitations that restrict the use of equipment, reduce soil compaction, and also reduce root damage during thinning operations. Plant competition from the hardwood understory can be reduced by chemical or mechanical methods. The use of logging systems that leave residual biomass well distributed on the surface of the soil increases organic matter content and residual fertility of the soil. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Excessive wetness during rainy periods is a severe limitation to use of this soil for urban development. The high water table can interfere with the proper functioning of septic tank absorption fields. If septic tank absorption fields are elevated by adding suitable fill material, the soil is suited to this use. The use of this soil for building sites and for local roads and streets also requires that measures be taken to overcome the severe wetness limitation. If adequate water outlets are available, a drainage system should be installed to help keep the high water table at an effective depth. The use of fill material to elevate building sites and roadbeds will also help keep the high water table at an effective depth.

Excessive wetness and the sandy surface layer of this soil are severe limitations for recreational uses. The wetness limitation can be overcome by establishing a water control system that will help keep the high water table at an effective depth. In areas of intensive foot traffic, the surface should be stabilized by adding fill material or by paving the areas.

This Wabasso soil is in capability subclass IIIw. The woodland ordination symbol is 10W.

51—Surrency fine sand, depressional. This soil is nearly level and very poorly drained. It is in depressional areas on the uplands and flatwoods. The mapped areas are circular to irregular in shape and range from 3 to 70 acres. The slopes are concave and are less than 2 percent.

Typically, this soil has a surface layer of very dark gray fine sand about 13 inches thick. The subsurface layer, to a depth of 25 inches, is light gray fine sand. The upper part of the subsoil, to a depth of 40 inches, is light brownish gray fine sandy loam. The lower part to a depth of 80 inches or more is grayish brown sandy clay loam.

Included with this soil in mapping are small areas of Pomona and Tomoka soils. Also included are small areas of soils that are similar to Surrency soil, but some of these soils have a subsoil that is slightly acid to mildly alkaline, some have a surface layer of sandy clay, and others have a thin surface layer. The included soils make up about 20 percent of this map unit.

In most years, this soil has a high water table above the surface for more than 6 months. The available water capacity is low in the surface and subsurface layers, and it is low or medium in the subsoil. The permeability is rapid in the surface and subsurface layers, and it is moderate in the subsoil. Natural fertility is low.

Most acreage of this soil is in natural vegetation that includes cypress, bay, and sweetgum. Some areas have a marsh vegetation that consists mostly of maidencane and other water-tolerant plants.

This Surrency soil is not suited to cultivated crops unless a properly designed water control system is established and maintained. Water is above the surface

for long periods during the growing season. Outlets for needed water control systems are often not available, or they are difficult and expensive to install. If a water control system can be established, this soil is well suited to many grain and vegetable crops. Close-growing cover crops should be included in the rotation system when the soil is not cultivated. Crop residue should be left on the soil to help control erosion and to maintain soil quality. Regular applications of fertilizer and lime are needed.

This soil is too wet for most improved grasses and legumes. If an adequate water control system can be maintained, this soil is well suited to bermudagrass, bahiagrass, and clover. The water control system must keep the high water table from rising above the surface during wet periods. Plants grow well if fertilized and limed. Grazing should be controlled to maintain plant vigor and to obtain maximum yields.

This soil is generally not used for commercial production of pine trees. The potential of this soil for the production of pine trees is low because the high water table is above the surface of the soil for long periods. Seedling mortality and the use of equipment on this soil are the main concerns in woodland management.

This soil has a severe limitation for urban development because the surface is ponded for long periods. Adequate water outlets are generally not available to establish and maintain a water control system for building sites, roadways, or septic tank absorption fields. Adding fill material to elevate these areas can help overcome this limitation. Large amounts of fill material are needed to maintain the high water table at an effective depth.

Because of ponding and the sandy surface layer, this soil has severe limitations for recreational development. If a water control system is established to maintain the high water table at an effective depth, this soil is suited to recreational uses, such as campgrounds, picnic areas, playgrounds, and paths and trails. The surface should be stabilized for recreational uses by adding suitable fill material or by paving the areas that are subject to intensive foot traffic.

This Surrency soil is in capability subclass VIw (undrained). The woodland ordination symbol is 2W.

52—Orsino fine sand, 0 to 8 percent slopes. This soil is nearly level to sloping, moderately well drained, and very rapidly permeable. It is on broad to narrow slopes and moderately high ridges in upland areas. The mapped areas are irregular in shape and range from 8 to 310 acres.

Typically, this soil has a surface layer of gray fine sand about 6 inches thick. The subsurface layer, to a depth of 24 inches, is light gray fine sand. The upper part of the subsoil, to a depth of 36 inches, is brownish yellow fine sand. Tongues of light gray fine sand extend from the subsurface layer into the upper part of the subsoil. The lower part, to a depth of 64 inches, is brownish yellow and yellowish brown fine sand. The substratum to a depth of 80 inches or more is light gray fine sand.

Included with this soil in mapping are small areas of Astatula, Cassia, Paola, and Tavares soils. Also included are small areas of soils that are similar to Orsino soil, but some of these soils have a dark sandy subsoil, some have a loamy subsoil, and others are light gray fine sand throughout. The included soils make up about 20 percent of this map unit.

In most years, this soil has a high water table at 40 to 60 inches for up to 6 months. The available water capacity is low or very low. The permeability is very rapid. Natural fertility is very low.

Most of the acreage of this soil is in natural vegetation that includes laurel oak, scrub live oak, sand pine, sawpalmetto, pineland threeawn, and bluestem grasses.

Poor soil quality is a severe limitation to use of this Orsino soil for cultivated crops. Natural fertility is low and response to fertilizer is moderate to high. Droughtiness and rapid leaching of plant nutrients limit the choice of adapted crops that can be grown on this soil and reduce the potential yield. Intensive management practices, such as contour stripcropping, crop rotation, crop residue management, and irrigation, should be used on this soil.

This soil is moderately suited to pasture and hay crops. Deep-rooted plants, such as bermudagrass and bahiagrass, are well adapted to this soil. Management practices should include regular applications of fertilizer and lime and controlled grazing to help maintain plant vigor.

The potential of this soil for the production of pine trees is medium. Slash and longleaf pines are the better suited trees to plant for commercial woodland production. The use of equipment, seedling mortality, and plant competition are the main concerns in management. This soil is droughty, and during long, dry seasons, not enough moisture is available in the root zone to sustain plant growth. Using special planting stock that is larger than usual or that is containerized reduces seedling mortality. The loose, sandy surface of this soil is a limitation to use of equipment. Machinery equipped with large, low-pressure tires or tracks helps to overcome this limitation. Plant competition from hardwoods, mostly oaks, can be reduced if herbicides are used during site preparation. Although runoff is slow, logging and site preparation operations can increase and concentrate water movement on this soil and cause soil erosion. These activities should be avoided in and adjacent to drainageways. Special design and proper placement of roads, skid trails, and stream crossings reduce soil erosion. During site preparation and thinning and harvesting operations, as much plant debris as possible should be left on the surface of the soil to help conserve organic matter.

Wetness is a moderate limitation to use of this soil as septic tank absorption fields. In areas where septic tank

absorption fields are concentrated, ground water contamination is a hazard. A water control system is needed to help overcome this limitation by lowering the high water table to an effective depth. Adding suitable fill material to slightly elevate the septic tank absorption field can also help to overcome the wetness limitation. Limitations for other urban uses, such as dwellings, small commercial buildings, and local roads and streets, are slight. No special measures are needed for these uses.

The sandy surface layer is a severe limitation for recreational development. The surface layer should be stabilized to help overcome this limitation by adding suitable top soil, establishing vegetation cover, or paving the areas that are subject to intensive foot traffic.

This Orsino soil is in capability subclass IVs. The woodland ordination symbol is 8S.

53—Zolfo-Urban land complex. This map unit consists of Zolfo soil that is nearly level and somewhat poorly drained and of areas of Urban land. The soils in this map unit are on low ridges and knolls in areas that have been developed for residential, institutional, or commercial purposes. Most areas of this map unit are in or near the cities of Palatka and Crescent City. The mapped areas are mostly square or rectangular, but some areas are irregular in shape. They range from 20 to 300 acres. The slopes are less than 2 percent.

Most of the mapped areas consist of about 65 percent Zolfo soil and about 35 percent Urban land. In a few areas, Urban land makes up more than 65 percent of the map unit. The included soils make up less than 10 percent of this map unit. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication.

Typically, Zolfo soil has a surface layer of black and very dark brown fine sand about 9 inches thick. The subsurface layer, to a depth of 53 inches, is light brownish gray and gray fine sand. The subsoil to a depth of 80 inches or more is dark brown and brown fine sand.

The Urban land part of this map unit is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Included in mapping are small areas of Adamsville, Cassia, Centenary, Myakka, Narcoossee, and Tavares soils. Also included are small areas of soils that are similar to this Zolfo soil except they have a thick, dark surface layer.

The high water table is at a depth of 24 to 40 inches for 2 to 6 months in most years. It is at a depth of 10 to 24 inches for up to 2 weeks in some years. The available water capacity is medium in the surface layer, very low or low in the subsurface layer, and medium to very high in the subsoil. The permeability of Zolfo soil is rapid in the surface and subsurface layers and moderate in the subsoil. Natural fertility is low.

Present land use precludes the use of this map unit for cultivated crops, pasture and hay crops, or commercial woodland production. The Zolfo soil part of this map unit is used for lawns, parks, or playgrounds, or it is left as open space. The Urban land part of this map unit is used mostly for houses, streets, driveways, buildings, parking lots, or other similar uses.

Zolfo soil is moderately suited to use for lawns, parks, or playgrounds. Regular applications of fertilizer and lime are needed to maintain lawn grasses and ornamental plants in good condition. Periodic irrigation is also needed. Because of the disturbed surface layer, good quality topsoil should be spread before establishing lawns.

Wetness is a severe limitation to use of Zolfo soil as septic tank absorption fields and is a moderate limitation for dwellings without basements and for local roads and streets. This wetness limitation is caused by the high water table. The poor filtering capacity of this soil is a severe limitation and can result in ground water contamination if the density of septic tank absorption fields in the area is high. Using fill material to elevate the septic tank absorption fields and roadbeds can help overcome these limitations. If water outlets are available, area drainage systems should be installed to keep the water table at an effective depth.

The sandy surface is a severe limitation for recreational uses. Stabilizing the surface layer by adding suitable topsoil, establishing vegetation cover, or using some other form of surfacing material should reduce or help overcome this limitation.

The soils in this map unit have not been assigned to a capability subclass or to a woodland group.

54—Candler-Urban land complex, 0 to 8 percent slopes. This map unit consists of Candler soil that is nearly level to sloping and excessively drained and of areas of Urban land. The soils in this map unit are on broad upland ridges in areas that have been developed for residential, institutional, or commercial purposes. The mapped areas range from about 40 to 400 acres.

Most of the mapped areas consist of about 65 percent Candler soil and 35 percent Urban land. In a few areas, Urban land makes up more than 65 percent of the map unit. The included soils make up less than 10 percent of this map unit. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication.

Typically, Candler soil has a surface layer of brown fine sand about 4 inches thick. The subsurface layer, to a depth of about 62 inches, is very pale brown fine sand. The next layer to a depth of 80 inches or more is very pale brown fine sand that has thin horizontal bands of strong brown fine sandy loam.

The Urban land part of this map unit is covered by concrete, asphalt, buildings, and other impervious

surfaces that obscure or alter the soils so that their identification is not feasible.

Included in mapping are small areas of Astatula, Candler, 8 to 25 percent slopes, Centenary, and Deland soils.

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

Present land use precludes the use of the soils in this map unit for cultivated crops, pasture, or commercial woodland production. The Candler soil part of this map unit is used for lawns, parks, playgrounds, golf courses, or cemeteries, or it is left as open space. The Urban land part of this map unit is used mostly for houses, streets, driveways, buildings, parking lots, or other similar uses.

The soils in this map unit are moderately suited to growing lawn grasses and ornamental shrubs. Regular applications of fertilizer and water are needed to maintain lawns in good condition. The selection of drought-tolerant plants is critical for the establishment of lawns, shrubs, and vegetable gardens. If the surface layer has been removed during construction, the addition of good quality topsoil may be required for vigorous plant growth.

Candler soil has only slight limitations to use as septic tank absorption fields, for dwellings with or without basements, and for local roads and streets. In areas where septic tank absorption fields are concentrated, the hazard of ground water pollution exists because of the poor filtering capacity of the soil.

The sandy surface is a severe limitation for recreational development. Slope of more than 6 percent is a severe limitation to use of Candler soil for playgrounds. Stabilizing the surface layer by establishing vegetation cover, adding suitable topsoil, or paving the high traffic areas can help overcome these limitations. Land shaping of the areas that have slope of more than 6 percent may be needed to overcome the slope limitation to use of Candler soil for playgrounds.

The soils in this map unit have not been assigned to a capability subclass or to a woodland group.

55—Centenary-Urban land complex, 0 to 5 percent slopes. This map unit consists of Centenary soil that is nearly level or gently sloping and moderately well drained and of areas of Urban land. The soils in this map unit are on low ridges and knolls in areas that have been developed for residential, institutional, industrial, or commercial purposes. Most areas of this map unit are in or near the cities of Palatka and Crescent City. The mapped areas are mostly square or rectangular, but a few areas are irregular in shape. They range from 20 to several hundred acres.

Most of the mapped areas consist of about 65 percent Centenary soil and about 35 percent Urban land. In a few areas, Urban land makes up more than 65 percent of the map unit. The included soils make up less than 10 percent of this map unit. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication.

Typically, Centenary soil has a surface layer of grayish brown fine sand about 4 inches thick. The upper part of the subsurface layer, to a depth of 45 inches, is light grayish brown sand. The lower part, to a depth of 65 inches, is light gray sand. The subsoil to a depth of 80 inches or more is dark brown fine sand.

The Urban land part of this map unit is covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that their identification is not feasible.

Included in mapping are small areas of Candler, Deland, Tavares, and Zolfo soils.

The high water table is at a depth of 40 to 60 inches for 2 to 6 months in most years, and it recedes to a depth of more than 60 inches during extended dry periods. The available water capacity is low or very low in the surface layer, low in the subsurface layer, and very low to low in the subsoil. The permeability is very rapid in the surface and subsurface layers and moderately rapid in the subsoil. Natural fertility is low.

Present land use precludes the use of this map unit for cultivated crops, pasture and hay crops, or commercial woodland production. The Centenary soil part of this map unit is used for lawns, parks, or playgrounds, or it is left as open space. The Urban land part of this map unit is used mainly for houses, streets, driveways, buildings, parking lots, or other similar uses.

Centenary soil is moderately suited to use for parks and playgrounds. Poor soil quality is a severe limitation to use for lawns and landscaping. Regular applications of fertilizer and lime are needed to maintain lawn grasses and ornamental plants in good condition. Periodic irrigation is also needed during dry periods. If the surface layer has been removed or disturbed during construction, a good quality topsoil should be added before establishing lawns.

Wetness is a moderate limitation to use of Centenary soil as septic tank absorption fields and a slight limitation for dwellings without basements and for local roads and streets. To overcome the wetness limitation, fill material is needed to slightly elevate the septic tank absorption fields. In areas where septic tank absorption fields are concentrated, ground water contamination is a hazard.

The sandy surface is a severe limitation for recreational uses. Stabilizing the surface layer by adding suitable topsoil, establishing vegetation cover, paving the high traffic areas, or using some other form of surfacing material can help overcome or reduce these limitations.

The soils in this map unit have not been assigned to a capability subclass or to a woodland group.

56—Mulat fine sand. This soil is nearly level and poorly drained. It is in low areas on the uplands and on broad, low flats. Large areas of this soil are in the east Palatka and Federal Point areas of the county. The mapped areas are irregular in shape and range from 4 to 400 acres. The slopes are less than 2 percent.

Typically, this soil has a surface layer of very dark gray and dark gray fine sand about 9 inches thick. The subsurface layer, to a depth of 33 inches, is grayish brown and dark grayish brown fine sand. The upper part of the subsoil, to a depth of 38 inches, is gray fine sandy loam. The lower part, to a depth of 58 inches, is gray sandy clay loam. The upper part of the substratum, to a depth of 63 inches, is gray loamy fine sand. The lower part to a depth of 80 inches or more is light gray fine sand.

Included with this soil in mapping are small areas of Lochloosa, Paisley, Riviera, and Wauchula soils. Also included are small areas of soils that are similar to Mulat soil, but some of these soils have a sandy clay subsoil, some have a subsoil that is at a depth of less than 20 inches or that extends to a depth of more than 60 inches, some have a yellowish brown, brownish yellow, or yellow subsurface layer, and, in the cultivated areas, some soils have a thicker, black surface layer than Mulat soil. The included soils make up about 20 percent of this map unit.

This soil has a high water table at a depth of less than 12 inches for 2 to 8 months during rainy periods. It is between depths of 12 and 30 inches during periods of low rainfall. The available water capacity is medium in the surface layer, low to medium in the subsurface layer, medium in the subsoil, and low in the substratum. The permeability is moderately rapid or rapid in the surface and subsurface layers, slow or moderately slow in the subsoil, and moderately rapid in the substratum. Natural fertility is medium.

Large acreages of this soil are used for cultivated crops, such as Irish potatoes and cabbage. Some areas are in natural vegetation of water oak and waxmyrtle and a few slash pine, longleaf pine, and sawpalmetto. The understory vegetation consists of gallberry, bluestem, pineland threeawn, and greenbrier.

Excessive wetness and poor soil quality are severe limitations to use of this Mulat soil for cultivated crops. Because of these limitations, the number and kinds of crops that can be grown are limited if very intensive management practices are not used. If a water control system is established and maintained, potatoes, cabbage, and many other vegetable crops can be grown. A water control system is needed to remove excess water in wet periods and provide for subsurface irrigation during dry periods. Close-growing cover crops should be planted when the soil is not cultivated. Crop residue should be left on or in the soil to help maintain the content of organic matter and soil tilth.

This soil is well suited to pasture and hay crops. Bermudagrass, bahiagrass, and clover grow well if properly managed. A water control system is needed to remove excess surface water after heavy rains. Lime and fertilizer are needed. Grazing should be controlled to prevent overgrazing and to maintain plant vigor.

The potential of this soil for the production of pine trees is medium to high. Slash, loblolly, and longleaf pines are the better suited trees to plant for commercial woodland production. Concerns in management are the use of equipment on this soil, seedling mortality, and plant competition. During rainy periods, the high water table causes moderate seedling mortality. Site preparation activities, such as bedding, furrowing, or surface drainage, help establish seedlings, increase early growth, and decrease the seedling mortality rate. This soil is droughty; and during long, dry periods, it does not retain enough moisture in the root zone to sustain plant growth. The sandy surface texture and the seasonal high water table of this soil are severe limitations to use of equipment. Site preparation and planting, thinning, and harvesting operations should be scheduled during dry periods. If machinery is equipped with large tires or tracks, forest management operations can be carried out in the wet periods. Site preparation that includes harrowing, chopping, or bedding of the rows helps to control plant competition. During site preparation and thinning and harvesting operations, as much plant residue as possible should be left on the surface of the soil to help conserve organic matter. Applications of fertilizer with phosphorus should be applied during planting operations. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Wetness is a severe limitation for urban uses, such as septic tank absorption fields, dwellings, and local roads and streets. This soil readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity may result in pollution of the ground water. Septic tank absorption fields, building sites, and roadbeds should be elevated by adding suitable fill material. If adequate water outlets are available, a water control system should be installed to remove excess water and to also help maintain the high water table at an effective depth.

Excessive wetness and the sandy surface layer are severe limitations for recreational development. To overcome the wetness limitation, a water control system is needed to maintain the high water table at an effective depth. The surface layer should be stabilized by adding suitable fill material or paving the areas to overcome the sandy texture limitation.

This Mulat soil is in capability subclass IIIw. The woodland ordination symbol is 11W.

57—Deland fine sand, 0 to 8 percent slopes. This soil is nearly level to sloping and well drained. It is on moderately high knolls and broad ridges on the uplands.

The mapped areas are long to irregular in shape and range from 6 to more than 200 acres.

Typically, this soil has a surface layer of very dark grayish brown fine sand about 6 inches thick. The upper part of the subsurface layer, to a depth of 12 inches, is grayish brown fine sand. The middle part, to a depth of 46 inches, is very pale brown fine sand. The lower part, to a depth of 55 inches, is light yellowish brown fine sand. The upper part of the subsoil, to a depth of 61 inches, is dark brown fine sand. The lower part to a depth of more than 80 inches is very dark brown and dark grayish brown fine sand.

Included with this soil in mapping are small areas of Astatula and Centenary soils. Also included are small areas of soils that are similar to Deland soil, but some of these soils have a surface texture of sand, and some have a subsoil at a depth of less than 50 inches. The included areas make up about 10 percent of this map unit.

This soil has a high water table at a depth of more than 72 inches. The available water capacity is very low in the surface and subsurface layers, and it is medium in the subsoil. The permeability is very rapid or rapid in the surface and subsurface layers, and it is moderate in the subsoil. Natural fertility is very low.

Most of the acreage of this soil is in natural vegetation that includes turkey oak, longleaf pine, sand pine, and sand live oak. The understory vegetation includes rosemary, pineland threeawn, scattered scrub oak, bluestem, and native grasses. Some areas have been planted to pasture and pine trees.

Under natural conditions, this Deland soil has severe limitations for cultivated crops. Because of droughtiness and poor soil qualities, row crops generally are not grown. If intensive management practices are used, a few special crops, such as watermelons and ferns, can be grown.

In areas where cold temperatures are not a problem, this soil is well suited to citrus trees. Growing a cover crop between trees reduces soil loss to wind erosion. Applying lime and fertilizer and irrigating during dry periods are good management practices.

This soil is moderately well suited to pasture and hay crops. If properly managed, deep-rooted grasses, such as bahiagrass and bermudagrass, grow well. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor.

The potential of this soil for the production of pine trees is moderately low. Slash, longleaf, and sand pines are the better suited trees to plant for commercial woodland production. The main concerns in management are the use of equipment on this soil and seedling mortality. The loose, sandy surface of this soil is a moderate limitation to use of equipment. Machinery that is equipped with large tires or tracks can help overcome this limitation. This soil has very low available water capacity and does not supply enough moisture to provide for a good survival rate for seedlings. Use of special planting stock that is larger than usual or that is containerized reduces seedling mortality. Scheduling planting operations so that seedlings are planted during the seasons when rainfall is heavier and more frequent can also reduce the rate of seedling mortality. Although water runoff is slow, logging and site preparation operations can increase and concentrate water runoff on this soil and cause soil erosion. These activities should be avoided in and adjacent to drainageways. Special design and proper placement of roads, skid trails, and stream crossings reduce soil erosion. During site preparation and thinning and harvesting operations, as much plant debris as possible should be left on the surface of the soil to help conserve organic matter.

This soil has slight limitations for urban uses, such as for dwellings and local roads and streets. Because of rapid permeability and depth of the high water table, this soil is well suited to use as septic tank absorption fields. In areas where septic tank absorption fields are concentrated, ground water contamination is a hazard.

This soil is poorly suited to recreational uses because of the sandy surface texture. This limitation can be overcome if the surface layer is stabilized by adding topsoil to establish a vegetation cover. Slope of more than 6 percent is a severe limitation to use of this soil for playgrounds. Frequent irrigation and regular application of fertilizer are required for good lawn and turf management.

This Deland soil is in capability subclass IVs. The woodland ordination symbol is 5S.

58—Wauchula fine sand. This soil is nearly level and poorly drained. It is on broad flats. This soil is in the vegetable farming area in the northeastern part of the county. The mapped areas are irregular in shape and range from 3 to 250 acres. The slopes are less than 2 percent.

Typically, this soil has a surface layer of black fine sand about 6 inches thick. The subsurface layer, to a depth of 12 inches, is light gray fine sand. The upper part of the subsoil, to a depth of 22 inches, is black and very dark grayish brown fine sand. The middle part, to a depth of 34 inches, is brown fine sand. The lower part, to a depth of 44 inches, is gray fine sandy loam. The substratum to a depth of 80 inches is grayish brown fine sand.

Included with this soil in mapping are small areas of Mulat, Myakka, Palmetto, Pomona, Riviera, and Wabasso soils. Also included are small areas of soils that are similar to Wauchula soil, but some of these soils have a thicker surface layer, and some have a sandy clay texture in the lower part of the subsoil. The included soils make up about 15 percent of this map unit.

In most years, this soil has a high water table at a depth of 12 to 40 inches for about 6 months. It is at a depth of less than 12 inches for 1 month to 4 months in

wet periods and at a depth of more than 40 inches during very dry periods. The available water capacity is low or medium in the surface layer, very low or low in the subsurface layer, and high or very high in the upper part of the subsoil and medium or high in the lower part. The permeability is very rapid in the surface and subsurface layers, and it is moderate in the upper part of the subsoil and slow or moderately slow in the lower part. Natural fertility is low.

Large acreages of this soil are used for cultivated crops, such as potatoes and cabbage. Some areas are in natural vegetation that includes slash pine, cabbage palm, and water oak. The understory vegetation includes sawpalmetto, waxmyrtle, and pineland threeawn.

Wetness is a severe limitation to use of this Wauchula soil for cultivated crops. The number of adapted crops that can be grown on this soil is very limited if intensive water control measures are not used. If a properly designed water control system is established and maintained, this soil is suited to many kinds of flowers and vegetable crops. The water control system is needed to remove excess water in wet periods and provide for subsurface irrigation in dry periods. Close-growing, soil-improving crops should be included in the rotation system at least two-thirds of the time. Crop residue should be left on the surface to help control erosion, maintain organic matter, and improve soil quality. Conservation tillage will help conserve moisture and control erosion. Fertilizer and lime should be applied according to the needs of the crop.

These soils are well suited to pasture and hay crops. Bermudagrass, bahiagrass, and clover are well adapted to this soil and grow well if properly managed. A drainage system is needed to remove excess surface water during intense rains. Grazing should be controlled to prevent overgrazing, to help maintain plant vigor, and to obtain maximum yields.

The potential of this soil for the production of pine trees is medium to high. Slash, loblolly, and longleaf pines are the better suited trees to plant for commercial woodland production. The major concerns in management are the use of equipment on this soil, seedling mortality, and plant competition. Seasonal wetness and periods of droughtiness are limitations to use of equipment, and they also cause seedling mortality. Site preparation activities, such as harrowing and bedding, help establish seedlings, reduce seedling mortality, and increase early plant growth; and chopping and bedding reduce debris, control competing vegetation, and facilitate planting operations. Machinery equipped with large, low-pressure rubber tires or tracks can help overcome the limitation to use of equipment on this soil, can reduce soil compaction, and can also reduce root damage during thinning operations. Plant competition from the hardwood understory can be reduced by chemical or mechanical methods. The use of logging systems that leave residual biomass well distributed on the surface of the soil increases organic matter content and residual fertility of the soil. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Excessive wetness during rainy periods is a severe limitation to use of this soil for urban development. The high water table and slow permeability of the loamy subsoil can interfere with the proper functioning of septic tank absorption fields. If septic tank absorption fields are elevated by adding suitable fill material, this soil is suited to this use. The use of this soil for building sites and for local roads and streets also requires that measures be taken to overcome the severe wetness limitation. If adequate water outlets are available, an area wide drainage system should be installed to remove excess water and to help keep the high water table at an effective depth. The use of fill material to elevate building sites and roadbeds will also help keep the high water table at an effective depth.

Excessive wetness and the sandy surface layer of this soil are severe limitations for recreational uses. The wetness limitation can be overcome by establishing a water control system that will help maintain the high water table at an effective depth. In areas of intensive foot traffic, the surface should be stabilized by adding fill material, establishing vegetation cover, or by paving the recreation areas.

This Wauchula soil is in capability subclass IIIw. The woodland ordination symbol is 10W.

59—Floridana fine sand. This soil is nearly level and very poorly drained. It is on low, broad flats. This soil is in the vegetable farming area in the northeastern part of the county. The mapped areas are irregular in shape and range from 40 to 80 acres. The slopes are less than 2 percent.

Typically, this soil has a surface layer of very dark gray and very dark grayish brown fine sand about 12 inches thick. The subsurface layer, to a depth of 24 inches, is light gray fine sand. The subsoil, to a depth of 35 inches, is light gray sandy clay loam. The substratum to a depth of 80 inches or more is light gray loamy fine sand and fine sand.

Included with this soil in mapping are small areas of soils that are similar to Floridana soil, but in some soils, the subsoil is within 20 inches of the surface, some have a yellowish brown sandy subsurface layer, and some have a surface layer that is 7 to 10 inches thick. The included soils make up less than 15 percent of this map unit.

In its natural state, this soil has a high water table at a depth of less than 12 inches for 6 to 9 months. The available water capacity is medium to high in the surface layer and subsoil, and it is low in the subsurface layer. The permeability is rapid in the surface and subsurface layers, and it is very slow or slow in the subsoil. Natural

fertility is high, and the organic matter content is moderate.

In most areas, this soil has been cleared and is used for cabbage and potato production. Some areas are in natural vegetation that includes slash pine, cabbage palm, sweetgum, water oak, waxmyrtle, sawpalmetto, and various ferns.

Wetness is a severe limitation to use of this Floridana soil for cultivated crops. The root zone is limited by a seasonal high water table that is at a depth of less than 12 inches. A water control system to remove excess water rapidly and provide for subsurface irrigation is needed to obtain maximum yields. Close-growing cover crops should be included in the rotation system when the soil is not cultivated. Crop residue should be returned to the soil. Seedbed preparation should include bedding of the rows. Fertilizer should be applied according to the needs of the crop.

This soil is well suited to most pasture grasses. A water control system should be established and maintained to remove excess surface water rapidly, and regular applications of fertilizer are needed to realize the full potential of this soil for pasture grasses. Bermudagrass, bahiagrass, and clover grow well if properly managed. Grazing should be controlled to maintain plant vigor.

The potential of this soil for the production of pine trees is moderately high. This potential productivity is attainable only in areas that have adequate surface drainage. Slash and loblolly pines are the better suited trees to plant for commercial woodland production. The use of equipment and seedling mortality are concerns in management. Because of seasonal wetness and periods of drought, a timely scheduling of site preparation and seedling planting is necessary. Proper site preparation includes bedding of the rows.

Wetness is a severe limitation to use of this soil as septic tank absorption fields, for dwellings, and for local roads and streets. This soil readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity may result in pollution of the ground water. Slow permeability of the loamy subsoil is also a limitation. Septic tank absorption fields, building sites, and roadbeds should be elevated by adding suitable fill material, and if water outlets are available, a water control system should be installed to remove excess water and to maintain the high water table at a depth of 1.5 feet or more to overcome the wetness limitation.

Excessive wetness and the sandy surface layer are severe limitations for recreational development. To overcome the wetness limitation, a water control system is needed to maintain the high water table at an effective depth. The surface layer should be stabilized by adding suitable fill material, establishing vegetation cover, or paving the areas to overcome the sandy texture limitation.

This Floridana soil is in capability subclass IIIw. The woodland ordination symbol is 11W.

60—Astor mucky fine sand, frequently flooded. This soil is nearly level and very poorly drained. It is on the flood plain of the St. Johns River and in narrow drainageways extending from the St. Johns River. The mapped areas are irregular in shape to long and narrow and range from 5 to 200 acres. The slopes are less than 1 percent.

Typically, the surface layer is about 55 inches thick. The upper part of the surface layer of this soil is black mucky fine sand about 13 inches thick. The middle part, to a depth of 32 inches, is very dark gray fine sand. The lower part, to a depth of 55 inches, is very dark grayish brown fine sand. The underlying material to a depth of 80 inches or more is dark grayish brown fine sand.

Included with this soil in mapping are small areas of Holopaw, Pompano, and Terra Ceia soils. Also included are small areas of soils that are similar to Astor soil, but some of these soils have a surface layer that is less than 24 inches thick, some are brown or dark brown in the lower part of the surface layer, and others are in slightly higher positions on the landscape than Astor soil and are rarely flooded. The included soils make up about 25 percent of this map unit.

This soil is flooded several times each year during periods of heavy rains. Areas adjacent to the St. Johns River are subject to flooding that is caused by storm tides. The duration of flooding is generally more than 1 month. When not flooded, this soil has a water table generally at a depth of 12 inches or less, but the water table may recede to greater depths during dry periods. The available water capacity is very high or high in the surface layer, and it is low in the underlying material. The permeability is rapid. Natural fertility is medium.

Most of the acreage of this soil is in natural vegetation that includes sweetgum, blackgum, red maple, cypress, bay, and cabbage palm. The understory vegetation is generally sparse.

Flooding and wetness are severe limitations to use of this Astor soil for cultivated crops. A water control system is needed to help control flooding and to remove excess water if the soil is cultivated. Close-growing cover crops should be included in the cropping system when the soil is not cultivated. Crop residue should be left on the soil to help maintain the content of organic matter, to control erosion, and to maintain soil tilth. Seedbed preparation should include bedding of the rows.

In its natural state, this soil is not suited to pasture because it is flooded for long periods. This soil is well suited to bermudagrass, bahiagrass, and clover if a water control system can be established and maintained to control flooding and to remove excess surface water rapidly. Regular applications of fertilizer are needed. Grazing should be controlled to help maintain plant vigor.

The potential of this soil for the production of pine trees is moderately high, but this soil is generally not used for growing pines for commercial woodland production because of flooding. With proper management, slash pines can be grown. The potential productivity is attainable only if a water control system can be established to control flooding on this soil. The major concerns in management are seedling mortality and the restriced use of equipment. Flooding is a severe hazard. Because of excessive wetness, the seedling survival rate is very low. Excessive wetness and the high content of organic matter in the surface layer restricts the use of heavy equipment.

Excessive wetness is a severe limitation for urban uses, such as septic tank absorption fields, dwellings, and local roads and streets. The hazard of flooding is severe. It is difficult to control flooding and to remove excess water because of the low position of the soil on the landscape. Large amounts of fill material would be needed to elevate septic tank absorption fields, building sites, and roadbeds. The possibility of ground water contamination because of the poor filtering of effluents in septic tank absorption fields when the soil is flooded would continue to exist.

Wetness and the sandy surface are severe limitations to use of this soil for recreational development. Flooding is a severe hazard. In camp areas and in areas used for playgrounds, a water control system is needed to help control flooding, to remove excess water, and to help maintain the high water table at a depth of 2 to 2.5 feet or more. In areas of intensive foot traffic, the loose, sandy surface layer should be stabilized by adding a suitable fill material or by paving the recreation areas.

This Astor soil is in capability subclass VIw (undrained). The woodland ordination symbol is 6W.

61—Newnan fine sand. This soil is nearly level and somewhat poorly drained. It is along the edges of well-defined drainageways and low knolls on the flatwoods. It is also on low ridges and side slopes adjacent to depressions on the uplands. The mapped areas are irregular in shape and range from 5 to 120 acres. The slopes range from 0 to 2 percent.

Typically, this soil has a surface layer of very dark grayish brown fine sand about 4 inches thick. The subsurface layer, to a depth of 22 inches, is light gray fine sand. The upper part of the subsoil, to a depth of 30 inches, is dark brown and dark yellowish brown fine sand. The next layer, to a depth of 58 inches, is yellowish brown and very pale brown fine sand. The lower part of the subsoil to a depth of 80 inches or more is light brownish gray sandy loam and sandy clay loam.

Included with this soil in mapping are small areas of Cassia, Electra, Lochloosa, and Sparr soils. Also included are small areas of soils that are similar to Newnan soil, but in some of these soils, the upper part of the subsoil is weakly developed, and some have a higher reaction in the lower part of the subsoil. The included soils make up about 25 percent of this map unit.

In most years, this soil has a seasonal high water table between depths of 18 and 30 inches for 1 month to 2 months and is at a depth of 30 to 60 inches for 2 to 5 months. It recedes to a depth of more than 60 inches during long, dry periods. The available water capacity is very low or low in the surface and subsurface layers, and it is low or medium in the subsoil. The permeability is rapid in the surface and subsurface layers, and it is moderately rapid or rapid in the upper part of the subsoil and slow to moderately slow in the lower part. Natural fertility is very low.

Most of the acreage of this soil is in natural vegetation that includes scrub live oak, water oak, slash pine, and longleaf pine. The understory vegetation includes sawpalmetto, bluestem, pineland threeawn, and greenbrier.

Droughtiness, rapid leaching of plant nutrients, and poor soil quality are severe limitations to use of this Newnan soil for cultivated crops. Use of intensive soil management practices are required if this soil is cultivated. Soil-improving cover crops should be included in the cropping system if the soil is not cultivated. Crop residue should be left on the surface until the soil is cultivated, and then the crop residue should be plowed into the soil. Conservation tillage helps to improve soil tilth, conserves moisture, and helps to control erosion. Regular applications of lime and fertilizer are needed. A water control system is needed to remove excess water during wet periods. A properly designed irrigation system is needed to maintain optimum moisture and ensure maximum yields during dry periods.

This soil is moderately suited to pasture and hay crops. Poor soil quality and periodic drought reduce yields. Deep-rooted plants, such as bermudagrass and bahiagrass, are well adapted to this soil. Regular applications of lime and fertilizer are needed. Grazing should be controlled to maintain plant vigor, to help keep a good ground cover on the soil, and to obtain maximum yields.

The potential of this soil for the production of pine trees is medium. Slash and longleaf pines are the better suited trees for commercial woodland production. The major management concerns are restricted use of equipment, seedling mortality, and plant competition. Seasonal wetness and periods of droughtiness limit use of equipment and increase the rate of seedling mortality. Site preparation activities, such as harrowing and bedding, help establish seedlings, reduce seedling mortality, and increase early plant growth; and chopping and bedding reduce debris, control competing vegetation, and facilitate planting operations. Machinery equipped with high flotation rubber tires or tracks can help overcome the limitation to use of equipment, can reduce soil compaction, and can also reduce root

damage during thinning operations. Plant competition from hardwood understory can be reduced by chemical or mechanical methods. The use of logging systems that leave residual biomass well distributed on the surface of the soil increases the content of organic matter and residual fertility of the soil. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

A seasonally high water table is a severe limitation to use of this soil as septic tank absorption fields. A water control system should be established to maintain the high water table at an effective depth. Elevating the septic tank absorption fields by adding suitable fill material can increase the filtering capacity of the soil and can also help maintain the high water table at an effective depth. Wetness is a moderate limitation for dwellings and local roads and streets. Special measures, such as installing a water control system and elevating building sites and roadways, will help to overcome this wetness limitation.

The sandy surface layer of this soil is a severe limitation for recreational development. To reduce or overcome this limitation in areas of intensive foot traffic, the surface layer should be stabilized by adding suitable fill material or paving areas used for trails, campsites, picnicking, and playgrounds. Establishing a good vegetation cover is difficult.

This Newnan soil is in capability subclass IIIs. The woodland ordination symbol is 10W.

62—Monteocha sand, depressional. This soil is nearly level and very poorly drained. It is in depressional areas on the flatwoods. The mapped areas are irregular in shape to circular and range from 8 to 135 acres. The slopes are less than 2 percent.

Typically, this soil has a surface layer of black sand about 12 inches thick. The subsurface layer, to a depth of 25 inches, is gray sand. The upper part of the subsoil, to a depth of 34 inches, is black and dark reddish brown sand. The layers below that, to a depth of 50 inches, are dark brown and brown sand. The lower part of the subsoil to a depth of 80 inches or more is gray and light gray sandy loam.

Included with this soil in mapping are small areas of Placid, Samsula, and Surrency soils. Also included are soils that are similar to Monteocha soil, but they have a dark brown subsoil at a depth of more than 30 inches. The center of some delineations include some soils that have a surface layer of well decomposed organic material about 1 inch to 5 inches thick. The included soils make up 20 percent or less of this map unit.

In most years, this soil has a high water table that is 1 foot to 2 feet above the surface for more than 4 months. The available water capacity is high or very high in the surface layer, and it is medium in the subsurface layer and in the subsoil. The permeability is rapid in the surface layer, moderately rapid to rapid in the subsurface layer and the upper part of the subsoil, and moderately slow to moderate in the lower part of the subsoil. Natural fertility is medium.

Most of the acreage of this soil is in natural vegetation that includes cypress, sweetgum, red maple, and bay. In areas with dense tree growth, the understory vegetation is sparse. If the canopy cover is thin, the understory vegetation includes maidencane, cordgrass, and other water-tolerant plants.

Under natural conditions, this soil is not suited to cultivated crops and improved pasture because of ponding. Adequate water control systems are difficult to establish because this soil is mostly in isolated depressional areas that do not have suitable drainage outlets. If these areas can be adequately drained and a good water control system maintained, some special crops and grasses can be grown.

This soil is generally not suited to production of pine trees because of ponding. In some areas, trees are harvested, but regrowth is caused by natural regeneration rather than the planting of seedlings.

Ponding and the sandy surface layer severely restrict the use of this soil as septic tank absorption fields, for dwellings, and for local roads and streets. A water control system is difficult to establish and maintain because of the low position of this soil on the landscape and because drainage outlets are generally not available.

Because of ponding and the sandy surface layer, this soil has severe limitations for recreational uses. Drainage outlets and a water control system are needed to remove excess water before this soil can be used for recreational areas. The excessive wetness and ponding limitations are difficult to overcome because of the low position of this soil on the landscape. Outlets to remove excess water are generally not available.

This Monteocha soil is in capability subclass VIIw. The woodland ordination symbol is 2W.

63—Okeechobee muck. This organic soil is nearly level and very poorly drained. It formed in thick beds of hydrophytic, nonwoody plant remains. This soil is in depressional areas on the uplands. It is in the western part of the county. The mapped areas are irregular in shape to circular and range from 500 to 1,200 acres. The slopes are concave and are less than 1 percent.

Typically, this soil has a surface layer of black muck about 25 inches thick. The next layer, to a depth of 46 inches, is brown mucky peat. Below that layer to a depth of 80 inches or more is dark reddish brown muck.

Included with this soil in mapping are small areas of Hontoon, Placid, Samsula, and St. Johns soils. Also included are small areas of soils that are similar to Okeechobee soil, but they are very strongly acid or extremely acid. The included soils make up about 10 percent of this map unit.

This soil has a high water table at or above the surface except during extended dry periods. The

available water capacity is very high. The permeability is rapid. Natural fertility is high.

Most areas of this soil are in natural vegetation of water-tolerant grasses, reeds, and sedges. Cattails, sawgrass, maidencane, pickerelweed, and buttonwood are common plants in the marsh areas. In a few small areas are mixed hardwoods of red maple, sweetgum, cypress, and swamp elm.

This Okeechobee soil is not suited to cultivated crops or improved pasture because of ponding. If an adequate water control system can be installed, this soil is well suited to vegetable or grain crops and improved pasture. A properly designed and maintained water control system to remove excess water during the growing season is needed. This soil should be saturated when it is not cultivated to keep oxidation in the organic layers to a minimum. Fertilizer that contains phosphate, potash, and other minor elements is needed. Bermudagrass, bahiagrass, and clover grow well if properly managed. Crop residue should be left on the soil to help control erosion, conserve moisture, and improve soil quality. Controlled grazing is needed to obtain maximum yields.

This soil is not suited to commercial woodland production because of ponding and low soil strength.

The rapid permeability and poor filtering capacity are severe limitations to use of this soil for urban development. This soil is saturated for long periods, and the organic material is rapidly permeable and does not adequately filter the effluent in the septic tank absorption fields. This can cause contamination of the ground water. Ponding and the low strength of the organic material are severe limitations for building sites, for dwellings, and for local roads and streets. The organic layers should be removed and the building sites and roadbeds should be elevated to overcome these limitations.

This soil is not suited to recreational uses because of ponding and low strength of the organic material.

This Okeechobee soil is in capability subclass VIIw (undrained). This soil has not been assigned to a woodland group.

64—Paisley loamy fine sand. This soil is nearly level and poorly drained. It is in low, broad to narrow areas on the flatwoods. The mapped areas are irregular in shape and range from 20 to 180 acres. The slopes are less than 1 percent.

Typically, this soil has a surface layer of very dark gray loamy fine sand about 5 inches thick. The subsurface layer, to a depth of 9 inches, is grayish brown loamy fine sand. The subsoil, to a depth of 65 inches, is gray and light gray sandy clay. The substratum to a depth of 80 inches or more is light gray sandy clay that has pockets of white sand, soft white carbonates, and calcareous concretions.

Included with this soil in mapping are small areas of Riviera and Winder soils. Also included are small areas of soils that are similar to Paisley soil, but some of these soils are strongly acid or very strongly acid and do not have carbonatic material, and some have a subsoil of clay loam. The included soils make up about 20 percent of this map unit.

In most years, this soil has a high water table at a depth of 12 inches or less for 2 to 6 months. The available water capacity is low in the surface layer, and it is high or very high in the subsoil. The permeability is rapid in the surface layer, and it is slow in the subsoil. Natural fertility is moderate.

Most of the acreage of this soil is in natural vegetation that includes slash and longleaf pines and a few red maple, sweetgum, and cabbage palm. The understory vegetation includes waxmyrtle, gallberry, pineland threeawn, and a few sawpalmetto.

Excessive wetness is a severe limitation to use of this Paisley soil for cultivated crops. Because of this limitation, the number and kinds of crops that can be grown are limited unless very intensive management practices are used. If good water control measures are used, cabbage and many other vegetable crops can be grown. A water control system is needed to remove excess water in wet periods and to provide for subsurface irrigation during dry periods. Close-growing cover crops should be planted when the soil is not cultivated. Crop residue should be left on the soil to help maintain the content of organic matter and improve tilth.

This soil is well suited to pasture and hay crops. Bermudagrass, bahiagrass, and clover grow well if properly managed. A water control system is needed to remove excess surface water after heavy rains. Lime and fertilizer are needed. Grazing should be controlled to prevent overgrazing and to maintain plant vigor.

The potential of this soil for the production of pine trees is moderately high. Slash and loblolly pines are the better suited trees for commercial woodland production. The major concerns in management are seedling mortality, restricted use of equipment, and plant competition. Seasonal wetness is a severe limitation. It restricts the use of equipment on this soil and increases plant competition. The severe rate of seedling mortality is also caused by excessive wetness. Site preparation activities, such as harrowing and bedding, help establish seedlings, increase early growth, and reduce seedling mortality. Bedding should be done in a manner that does not block the natural drainage flow. Short-term drainage of surface water is needed until trees become well established. Special machinery equipped with high flotation rubber tires or crawler equipment will reduce root damage and soil compaction. Thinning and harvesting operations should be done during dry periods. Site preparation, such as chopping, burning, and bedding, reduce debris, control competing vegetation, and facilitate planting. Applications of nitrogen fertilizer with phosphorus provide excellent growth response.

Wetness and an unstable, fine-textured subsoil that has a low load-bearing capacity are severe limitations for most urban uses, such as septic tank absorption fields, dwellings, and local roads and streets. Septic tank absorption fields, building sites, and roadbeds should be elevated by adding suitable fill material to maintain the high water table at an effective depth and to stabilize foundations and subgrades. Using enlarged footers, extra reinforcements in foundations, or piling can also help increase the load-bearing capacity of this soil. If adequate water outlets are available, a water control system can be installed to remove excess water and to maintain the high water table at an effective depth.

Excessive wetness is a severe limitation to use of this soil for recreational development. To help overcome this limitation, a water control system is needed to maintain the high water table to an effective depth.

This Paisley soil is in capability subclass IIIw. The woodland ordination symbol is 13W.

65—Hobe fine sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and somewhat excessively drained. It is on low knolls and ridges on the flatwoods and in low upland areas. The mapped areas are oval to irregular in shape and range from 5 to 80 acres.

Typically, this soil has a surface layer of gray fine sand about 3 inches thick. The subsurface layer, to a depth of 42 inches, is light gray and white fine sand. The upper part of the subsoil, to a depth of 50 inches, is dark brown fine sand. The next layer, to a depth of 62 inches, is dark yellowish brown fine sand. The next layer, to a depth of 68 inches, is yellowish brown fine sandy loam. The lower part to a depth of 80 inches or more is light gray sandy clay loam.

Included with this soil in mapping are small areas of Cassia, Electra, and Pomona soils. Also included are small areas of a soil that is similar to Hobe soil, but it does not have dark brown fine sand in the upper part of the subsoil. The included soils make up about 20 percent of this map unit.

In most years, this soil has a high water table at a depth of 60 to 72 inches for 1 month to 4 months. It is within 40 to 60 inches of the surface for up to 3 weeks during wet periods. The available water capacity is very low to low in the surface layer, very low in the subsurface layer, and medium in the subsoil. The permeability is very rapid in the surface and subsurface layers, and it is moderate in the subsoil. Natural fertility is low.

A small acreage of this soil is used for citrus crops and ornamental fern production. Most acreage is in natural vegetation that includes scrub live oak, sand pine, scattered longleaf pine, and a few, widely spaced turkey oak. The understory vegetation includes sawpalmetto, pineland threeawn, and panicum.

Droughtiness and rapid leaching of nutrients are severe limitations to use of this Hobe soil for cultivated crops. Close-growing cover crops should be included in the rotation system with row crops. Crop residue should be left on the surface to help control erosion and improve soil quality. Conservation tillage helps conserve moisture and control erosion. High value crops should be irrigated if water is readily available.

This soil is poorly suited to improved pasture. Poor soil quality and droughtiness limit growth and reduce yields. Deep-rooted plants, such as Coastal bermudagrass and improved bahiagrass, are well adapted to this soil. Regular applications of fertilizer and lime are needed. Grazing should be controlled to maintain plant vigor and to help keep a good ground cover on the soil.

The potential of this soil for the production of longleaf pine is medium. It is low to medium for slash and loblolly pines and medium for sand pine. All of these trees are suited to plant for commercial woodland production. The major concern in management is a low available water capacity that causes a moderate rate of seedling mortality. Using special planting stock that is larger than usual or that is containerized reduces seedling mortality. The loose, sandy surface layer of this soil is a moderate limitation to use of equipment. Machinery equipped with large, low-pressure tires or tracks can help overcome this limitation. During site preparation practices, as much debris as possible should be left on the surface of the soil. To conserve organic matter, burning should be restricted.

This soil has slight limitations to use as septic tank absorption fields. In areas where septic tank absorption fields are concentrated, ground water contamination is a hazard. Limitations are slight for dwellings, for local roads and streets, and for small commercial buildings.

The sandy surface layer is a severe limitation to use of this soil for recreational development. To reduce or overcome this limitation in areas of intensive foot traffic, the surface layer should be stabilized by adding suitable fill material or paving areas used for picnicking, campsites, playgrounds, and paths and trails. Establishing a good vegetation cover on this soil is difficult.

This Hobe soil is in capability subclass VIs. The woodland ordination symbol is 2S.

Use and Management of the Soils

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

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

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

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

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

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

Crops and Pasture

William F. Kuentsler, agronomist, Soil Conservation Service, helped to prepare this section.

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

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

According to the 1985 Florida Statistical Abstract, more than 50,000 acres in Putnam County is used for crops and pasture. The Putnam County Extension Service estimates that of the total acreage about 35,000 acres is used for pasture, 8,000 acres for vegetable crops, 3,000 acres for fruit crops, 4,000 acres for hay, 2,500 acres for corn, 700 acres for fern, and 300 acres for pecans.

Specialty crops grown commercially in the survey area include vegetables, citrus crops, watermelons, pecans, ferns, cut flowers, and flower bulbs and sets. Irish potatoes and cabbage are the most extensively grown vegetable crops. Crops are grown mostly in the East Palatka, Federal Point, and Hastings areas. Soils most used for vegetable crops are Mulat, Myakka, Pomona, and Wauchula soils. These soils are nearly level and poorly drained but water control systems have been established to provide subirrigation during dry periods and for drainage of excess water during wet periods. Many of these soils have been leveled to provide for the most efficient use of irrigation water.

In the past, oranges, grapefruit, and tangerines were the most important fruit crops in the survey area. The acreage of citrus crops has declined dramatically during the early and middle 1980's because of severe freezes. Most citrus was grown in the area west of Crescent City on Astatula, Centenary, Candler, Deland, and Tavares soils. Acreages of blueberries, grapes, peaches, and pecans have been steadily increasing.

Ferns that are produced for cut foliage and are used by florists are also grown in the area west of Crescent City (see cover). Leatherleaf ferns are the most extensively grown, followed by plumosus. Ferns are grown mostly on Astatula, Centenary, Orsino, and Tavares soils. The ferns are grown under natural shade of large live oak and laurel oak trees or under canopy-covered areas. Ferns require spray irrigation to supply moisture during dry periods and provide protection from freezing during cold weather. The acreage of fern has

increased significantly in recent years because of increasing demand and because of the decline of the citrus industry. Although the total acreage of fern produced is relatively small, the total value of the crop exceeds that of any other crop in the Putnam County Area.

Field crops in the survey area include corn and small acreages of grain sorghum, wheat, oats, and soybeans. Most of the corn is grown on organic soils near Florahome and on the mineral soils in the vegetable farming area in the eastern part of Putnam County. In the vegetable producing area, a tropical variety of corn is planted late in the spring or early in the summer following the harvest of cabbage or Irish potatoes. The corn crop uses the residual fertilizer remaining from the vegetable crops and requires little or no additional fertilizer. Mostly, cultivated crops are followed by a cover crop, generally a close-growing crop of sweet sorghum or sorghum sudangrass. The cover crop helps protect the soil from erosion and uses the residual fertilizer remaining from the cultivated crop. The cover crop also adds organic matter to the soil and helps to maintain fertility.

The potential of the soils in Putnam County for increased production of food is high. About 150,000 acres of potentially good cropland is currently used as woodland, and about 20,000 acres is used as improved pasture. Food production could also be considerably increased by the use of the latest cropland technology on all cropland in the county. This soil survey can greatly facilitate the application of such technology. The acreage in crops and pasture has increased slightly in the past years. The acreage in woodland has decreased as more land is used for farming and urban uses. Food production could be increased by growing crops that are not presently grown commercially. If water is adequately controlled, soils that are poorly drained and very poorly drained and that warm up early in spring are well suited to many vegetable crops and small fruits, such as blueberries, blackberries, and strawberries. Other crops, such as sweet potatoes and tomatoes, can be grown if economic conditions are favorable. Rice, sugarcane, corn, and similar crops are well suited to the organic soils. Organic soils oxidize and subside when pore space is exposed to the air. Because of this, water must be maintained at the level required for the crops during the growing season and then raised during other parts of the year to minimize subsidence.

Although the soils of the Putnam County Area have the potential for increased production, other factors must also be considered in choosing crops and selecting sites. Among these are: economic conditions; availability of suitable drainage outlets; risk of possible adverse weather conditions; saltwater intrusion into the aquifer; availability of an adequate supply of freshwater for irrigation; environmental considerations, such as preservation of wetlands; possible pollution of nearby waters; and desirability of using the land for other purposes.

As population increases, the demand for food will also increase. To increase food production, knowledge of soils and soil properties is essential. Some of the major soil properties to be considered are water and wind erosion, wetness, fertility, and tilth.

Soil erosion from water runoff is not as serious in Putnam County as it is in many areas in the southern United States. Most of the soils are sandy and nearly level. However, erosion does occur during periods of torrential rainfall in a few bare areas that have short, steep slopes. In areas that are experiencing rapid urban development, erosion can be a problem if water quantities are concentrated and runoff is accelerated. Installation of properly designed water control systems can help prevent erosion in built-up areas.

In the other areas where erosion is a problem, erosion control practices that provide a protective surface cover, reduce runoff, and increase the rate of infiltration can help keep the soil in place. Conservation tillage that minimizes soil disturbance and leaves a maximum amount of crop residue on the surface increases infiltration and reduces runoff and the hazard of erosion.

Soil blowing is a major problem on the sandy soils and on the muck soils. In a few hours, soil blowing can damage the soil and the tender truck crops and young citrus trees if winds are strong and the soil is bare of vegetation or surface mulch. In addition to crop and soil damage, other environmental problems are associated with soil blowing. Conservation tillage that maintains a plant cover or a surface mulch minimizes soil blowing on these soils. Windbreaks of adapted trees and shrubs, such as slash pine, sand pine, and waxmyrtle, and cover crops and stripcrops of small grain are effective in reducing wind erosion and crop damage.

Water control is a major management need on land used for crops and pasture. About 65 percent of the soils in the survey area are poorly drained or very poorly drained. In most years, they are too wet for crops commonly grown in the area. These sandy soils also have a low available water capacity and are droughty during dry periods. For intensive row cropping, a combination of surface drainage and subirrigation (fig. 7) is needed on most of the poorly drained soils. The design of surface drainage and irrigation systems varies with the kind of soil and the crop grown. More information about water control and practices that prevent wind erosion is available at the local office of the Soil Conservation Service.

Soil fertility is naturally low in most of the sandy soils in the survey area. Dark-surfaced mineral soils generally have more organic matter and more plant nutrients. Organic soils require special fertilizer because they are low in copper and other trace elements. Most soils in the county are very strongly acid. If they have not been limed, applications of ground limestone are needed for

Figure 7.—Irish potatoes in an area of Mulat fine sand. This soil requires intensive management for cultivated crops.

good growth of legumes and other crops. Nitrogen and available phosphorus and potash levels are naturally low in most of the mineral soils. More specific information about natural fertility is given for each soil under "Detailed Soil Map Units" and "Soil Series and Their Morphology." Natural soil fertility, however, changes as the soil is used. Kinds and amounts of lime and fertilizer added to the soils should be based on the results of soil tests, on the needs of the crop, and on the expected yields. The Cooperative Extension Service can help in determining the proper application of fertilizer and lime needed.

Tilth refers to the condition of the soil in relation to plant growth. It is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils that have good tilth are granular, porous, and easily cultivated.

Most soils used for crops in the survey area have a sandy surface layer structure. Some are structureless. Structure can be improved by regular applications of organic matter, such as crop residue and manure. Soils that have a light color surface also are low in organic matter. Adding organic matter increases the fertility and available water capacity of the soils.

Pastures in the survey area are used to produce forage and hay crops for beef and dairy cattle. Beef cattle cow-calf operations are the main livestock enterprises. Only a few dairy farms are presently in operation. Bahiagrass and bermudagrass (fig. 8) are the main pasture plants. Extensive areas of pasture are grown throughout the county on both the flatwoods and the uplands.

Pasture yields are closely related to the kind of soil. Proper pasture management depends on the soil properties, kinds of pasture plants, lime and fertilizer inputs, available moisture, and animal density. Pastures in many parts of the county are greatly depleted by continuous excessive grazing. Yields can be increased

Figure 8.—Improved pasture of bermudagrass in an area of Centenary fine sand. This soil is well suited to pasture grasses, but yields are reduced by periodic drought.

by applying lime and fertilizer, using grass-legume mixtures, and controlling grazing.

If adequately drained, the poorly drained soils on the flatwoods are well suited to pasture. Subsurface irrigation increases the length of time that the forage is available and the total forage produced. If irrigated and adequately limed and fertilized, these soils are well suited to white clover and other legumes.

If adequately limed and fertilized, the well drained and moderately well drained soils, such as Apopka, Centenary, Deland, Astatula, and Tavares soils, are well suited to pasture of improved bahiagrass and bermudagrass varieties. Irrigation is needed for best production.

In 1984, it was estimated that 14,000 acres was used for urban development and an increase of about 5 percent per year is foreseen. The use of this soil survey in making land use decisions can influence the future role of farming in the county.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 4. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

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

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium,

and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that insures the smallest possible loss.

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

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

Crops other than those shown in table 4 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

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

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

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

Class I soils have few limitations that restrict their use. (None in the Putnam County Area.)

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

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

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

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

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

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

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production. (None in the Putnam County Area.)

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *w* or *s,* to the class numeral, for example, IIw. The letter *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); and *s* shows that the soil is limited mainly because it is shallow or droughty.

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

The capability classification of each map unit is given in the section "Detailed Soil Map Units."

Grazeable Woodland

R. Gregory Hendricks, range conservationist, Soil Conservation Service, helped to prepare this section.

Putnam County Area has approximately 340,000 acres of woodland, which mostly has the potential for cattle grazing. Woodland ownership in the county has been defined as 6 percent Federal, 26 percent corporate, and 70 percent as privately owned. Utilization of woodland grazing resources can compliment tame pasture grazing systems. They offer a low overhead and provide a low maintenance winter reserve.

Grazeable woodland is forest that has an understory of native grasses, legumes, forbs, and shrubs (fig. 9). The understory is an integral part of the forest plant community. The native plants can be grazed without significantly impairing other forest values. On such forest land, grazing is compatible with timber management if it is controlled or managed in such a manner that timber and forage resources are maintained or enhanced. The native forage in woodland areas is readily available to livestock producers and is an economically grazeable resource. Integrating forest and grazing management is an opportunity to obtain income from the land during the life of the pine stand.

Each soil in the Putnam County Area supports the growth of distinctive types and amounts of native vegetation. Based on this vegetation, grazeable woodland sites have been developed. These sites correspond with the commonly known ecological communities *(19)*. Table 5 shows each soil mapped in

Figure 9.—This slash pine plantation in an area of Myakka fine sand has excellent potential for woodland grazing.

the survey area and its associated grazeable woodland site. Although seven grazeable woodland sites are recognized, only three are considered to be major sites. These woodland sites are the North Florida Flatwoods, the Longleaf Pine-Turkey Oak Hills, and the Sand Pine-Scrub Oak. Important native forage for livestock is chalky bluestem, creeping bluestem, and indiangrass on the North Florida Flatwoods. Associated plants of annual forbs, ground blueberry, gallberry, and a variety of sedges and rushes provide excellent food for wildlife. Important native forage for livestock on the Longleaf Pine-Turkey Oak Hills and the Sand Pine-Scrub Oak sites consist of indiangrass and a variety of panicum and bluestem plants. Associated plants of annual forbs, sedges, and a variety of browse plants provide most of the food for wildlife on the droughty Longleaf Pine-Turkey Oak Hills and Sand Pine-Scrub Oak woodland sites.

Forage production on grazeable woodland varies according to specific sites. Table 6 shows the amount of forage a grazeable woodland site can be expected to produce under differing yearly climatic conditions. It also shows the percentage and the major native grazing plants that make up a grazeable woodland site. The potential for production of annual forage can be correlated to many factors, such as the natural soil-water regime. Soils that have a high water table and are on the flatwoods and in sloughs and marshes will produce more than the soils in the Longleaf Pine-Turkey Oak Hills and Sand Pine-Scrub Oak sites by 70 percent if proper grazing management is followed. Other factors, such as shade cast by the forest and brush canopy, the

accumulation of fallen needles, the influence of time, and intensity of grazing on the forage, and the number, size, spacing, and method of site preparation for tree planting, affect potential grazing capacity. Suggested annual stocking rates range from 8 to 30 acres per cow on soils that have a high water table, such as Myakka, Immokalee, and Holopaw soils. On droughty soils, such as Candler, Astatula, and Apopka soils, stocking rates range from 20 to 60 acres per cow annually. Site condition, in respect to the make up of forage composition and forest canopy, correlate directly with suggested stocking rates and annual carrying capacity. Newly planted pine stands can be grazed the second growing season following planting. Maximum forage yields can be expected on through the 12th year of the pine stand; whereas, annual forage production will begin to diminish as the forest canopy begins to close.

Woodland Management and Productivity

John Holzaepfel, Putnam County forester, Florida Division of Forestry, assisted in preparing this section.

An understanding of the influence soils have on forest productivity can increase the capabilities that woodland owners and managers have in making optimal silvicultural and economic decisions *(6)*. The relationship between soils and species suitability, growth potential, and forest operations will be discussed later in this section.

Woodlands in the Putnam County survey area cover 340,000 acres, or 76 percent of the land area *(22)* (fig. 10). The private forest industry has about 85,400 acres under corporate ownership, most of which is under intensive management for pulpwood and sawtimber products.

Figure 10.—Pomona fine sand is a significant soil for commercial production of pine trees.

Most of the woodland in the survey area is on Myakka, Immokalee, Holopaw, Riviera, Palmetto, and Pomona soils on the flatwoods. Slash pine is the most widely planted tree on these soils, although loblolly pine is also utilized, especially on soils that have a shallow, loamy or clayey subsoil. Longleaf pine also occurs naturally on the flatwoods and was once the predominant tree, since it was resistant to damage caused by the frequent fires which occurred throughout the southern pine forest.

Some longleaf pine is now being planted on the better drained soils, such as Candler, Apopka, Tavares, Bonneau, and Millhopper soils. Sand pine is grown commercially on the excessively drained to well drained sandy soils, which include Astatula, Candler, Apopka, and Paola soils.

Slash pine, longleaf pine, loblolly pine, sand pine, pond pine, and cypress are coniferous trees that are being actively harvested. Hardwood trees harvested include red maple, sweetbay, sweetgum, loblolly bay, and others. Most of the hardwood timber is harvested in the depressions, sloughs, and drainageways.

Forestry has traditionally had much influence on the economic development of Putnam County, and this influence is evident today in the plentiful local forest industry. The products produced by local mills include paper, plywood, lumber, crates, furniture, wood chips, and fuelwood. The strong market for the timber resources created by the local mills and the mills in surrounding counties has encouraged a more intensive management of the woodland resources, but many opportunities for increasing the productivity of the survey area's woodlands for timber and other benefits still exist. This is especially true of the many private, nonindustrial ownership properties that support much lower than optimal stocking levels of the commercial pine trees.

Forestry practices focus on the elimination of cull or weed trees and the reduction of acreage that is understocked in preferred timber species. On the flatwoods, this is frequently done by clearcutting, intensive site preparation, and replanting of commercial pine trees. Seeding and natural regeneration methods are also utilized in reforestation.

Optimal growth rates of the commercial pine trees are encouraged by reducing competition stress. Prescribed burning reduces competition from undesirable hardwoods, reduces dangerous fuel levels, and improves accessibility, esthetics, and wildlife production. Thinning reduces excessive competition between the pines while eliminating diseased or poorly formed trees and increases the amount of light reaching the grass and herbaceous understory growth for improved habitat for wildlife and cattle.

Several factors influence the soil's productivity. The physical qualities of the soil and the depth to the water table determine the extent of root development and the ability of the soil to provide water and nutrients. A consideration of these soil factors provides a fundamental basis to many of the timber management decisions facing the woodland owner and manager. These factors are further examined for each woodland grouping. Additional information on timber management is available from the Soil Conservation Service, the Florida Division of Forestry, and the Florida Cooperative Extension Service.

Soils vary in their ability to produce trees. Depth, fertility, texture, and the available water capacity influence tree growth. Elevation, aspect, and climate determine the kinds of trees that can grow on a site. Available water capacity and depth of the root zone are major influences of tree growth. Elevation and aspect are of particular importance in mountainous areas.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to fertilization than others, and some are more susceptible to erosion after roads are built and timber is harvested. Some soils require special efforts to reforest. In the section "Detailed Soil Map Units," each map unit in the survey area suitable for producing timber presents information about productivity, limitations for harvesting timber, and management concerns for producing timber. The common forest understory plants are also listed. Table 7 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate*, and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

The first tree listed for each soil under the column "Common trees" is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

Table 7 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation for use and management. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *S* indicates a dry, sandy soil. The letter *A* indicates a soil that has no significant restrictions or limitations for forest use and management. If a soil has more than one limitation, the priority is as follows: W and S.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation activities or harvesting operations expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions, and *moderate* if erosion control measures are needed for particular silvicultural activities. A rating of *moderate* indicates the need for construction

of higher standard roads, additional maintenance of roads, additional care in planning of harvesting and reforestation operations, or use of specialized equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, or susceptibility of the surface layer to compaction. As slope gradient and length increase, it becomes more difficult to use wheeled equipment. On the steeper slopes, tracked equipment must be used. On the steepest slopes, even tracked equipment cannot operate; more sophisticated systems are needed. The rating is *slight* if equipment use is restricted by soil wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are steep enough that wheeled equipment cannot be operated safely across the slope, if soil wetness restricts equipment use from 2 to 6 months per year, or if special equipment is needed to avoid or reduce soil compaction. The rating is *severe* if slopes are steep enough that tracked equipment cannot be operated safely across the slope, if soil wetness restricts equipment use for more than 6 months per year, or if special equipment is needed to avoid or reduce soil compaction. Ratings of *moderate* or *severe* indicate a need to choose the most suitable equipment and to carefully plan the timing of harvesting and other management operations.

Ratings of *seedling mortality* refer to the probability of death of naturally occurring or properly planted seedlings of good stock in periods of normal rainfall as influenced by kinds of soil or topographic features. *Seedling mortality* is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments in the surface layer, rooting depth, and the aspect of the slope. Mortality generally is greatest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of *moderate* or *severe* indicate that it may be necessary to use containerized or larger than usual planting stock or to make special site preparations, such as bedding, furrowing, installing surface drainage, or providing artificial shade for seedings. Reinforcement planting is often needed if the risk is *moderate* or *severe*.

Ratings of *windthrow hazard* consider the likelihood of trees being uprooted by the wind. Restricted rooting depth is the main reason for windthrow. Rooting depth can be restricted by a high water table or fragipan, or by a combination of such factors as soil wetness, texture, structure, and depth. The risk is *slight* if strong winds cause trees to break but do not uproot them; *moderate* if strong winds cause an occasional tree to be blown over and many trees to break; and *severe* if moderate or strong winds commonly blow trees over. Ratings of *moderate* or *severe* indicate the need for care in thinning or possibly not thinning. Specialized equipment may be needed to avoid damage to shallow root systems in partial cutting operations. A plan for periodic salvage of windthrown trees and the maintenance of a road and trail system may be needed.

Ratings of *plant competition* indicate the likelihood of the growth or invasion of undesirable plants. *Plant competition* becomes more severe on the more productive soils, on poorly drained soils, and on soils having a restricted root zone that holds moisture. The risk is *slight* if competition from undesirable plants reduces adequate natural or artificial reforestation but does not necessitate intensive site preparation and maintenance. The risk is *moderate* if competition from undesirable plants reduces natural or artificial reforestation to the extent that intensive site preparation and maintenance are needed. The risk is *severe* if competition from undesirable plants prevents adequate natural or artificial reforestation unless the site is intensively prepared and maintained. A *moderate* or *severe* rating indicates the need for site preparation to ensure the development of an adequately stocked stand. Managers must plan site preparation measures to ensure reforestation without delays.

The potential productivity of *common trees* on a soil is expressed as a *site index*. Common trees are listed in the order of their observed general occurrence. Generally, only two or three tree species dominate.

The soils that are commonly used to produce timber have the yield predicted in cubic meters. The yield is predicted at the point where mean annual increment culminates.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands. The procedure and technique for determining site index are given in the site index tables used for this survey *(10, 14, 18)*.

The *productivity class* represents an expected volume produced by the most important trees, expressed in cubic meters per hectare per year. Cubic meters per hectare can be converted to cubic feet per acre by multiplying by 14.3. It can be converted to board feet by multiplying by a factor of about 71. For example, a productivity class of 8 means the soil can be expected to produce 114 cubic feet per acre per year at the point where mean annual increment culminates, or about 568 board feet per acre per year.

Trees to plant are those that are used for reforestation or, if suitable conditions exist, natural regeneration. They are suited to the soils and will produce a commercial wood crop. Desired product, topographic position (such as a low, wet area), and personal preference are three

factors of many that can influence the choice of trees to use for reforestation.

Recreation

In table 8, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

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

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is firm after rains and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

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

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

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

Wildlife is a valuable resource of Putnam County Area. Fishing and hunting are popular, year-round sports. Several national professional bass fishing tournaments are hosted each year in the county. Large acreages of soils on both flatwoods and uplands provide a wide diversity of wildlife.

The primary game species include white-tailed deer, squirrels, turkey, bobwhite quail, feral hogs, and waterfowl. Nongame species include raccoon, rabbit, armadillo, opossum, skunk, bobcat, gray and red foxes, otter, and a variety of songbirds, wading birds, woodpeckers, predatory birds, reptiles, and amphibians. Some of the more important habitat areas are the 11,000 acre Georgia Pacific Wildlife Management Area and the wetlands of the many streams and lakes.

The St. Johns River, Crescent Lake, Lake George, and Rodman Reservoir provide excellent freshwater fishing, but the many sandhill lakes in the western part of the county also provide good habitat for fish. Game and nongame species include largemouth bass, channel catfish, bullhead catfish, bluegill, redear, spotted sunfish, warmouth, black crappie, chain pickerel, gar, bowfin, and sucker. Striped bass and mullet are in the St. Johns River and its connections.

A number of endangered and threatened species are in the Putnam County Area. These included the red-cockaded woodpecker, the alligator, and the bald eagle. A detailed list of these species with information on range and habitat needs is available from the district conservationist at the local Soil Conservation Service office.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can

be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

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

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

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

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are bahiagrass, lovegrass, white clover, sesbania, and hairy indigo.

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

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, maple, sweetgum, dogwood, hickory, palmetto, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are wild plum, blueberry, blackberry, and firethorn.

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

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

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

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

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

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

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

Engineering

Elwyn O. Cooper, area engineer, Soil Conservation Service, helped to prepare this section.

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the

most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

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

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

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

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

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

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

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

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are somewhat restrictive for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are unfavorable for the indicated use and special design, significant increases in construction costs, and possibly increased maintenance are required to overcome or minimize the limitations. Special feasibility studies may be required where the soil limitations are severe.

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

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

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

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

Sanitary Facilities

Table 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are somewhat restrictive for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are unfavorable for the indicated use and special design, soil reclaimation, and possibly increased maintenance are required to overcome or minimize the limitations.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

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

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

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

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, flooding, and content of organic matter.

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

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

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

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a water table, slope, and flooding affect both types of landfill. Texture, highly organic layers, soil reaction, and content of salts affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

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

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of excess gravel are the best cover for a landfill.

Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

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

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

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

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

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

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

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

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

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

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

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

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

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

moisture and releases a variety of plant-available nutrients as it decomposes.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are somewhat restrictive for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are unfavorable for the indicated use and special design, soil reclamation, and possibly increased maintenance are required to overcome or minimize the limitations.

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

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

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

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

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

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

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on layers that affect the rate of water movement, permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, susceptibility to flooding, and subsidence of organic layers. Excavating and grading and the stability of ditchbanks are affected by slope and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts or sulfur. Availability of drainage outlets is not considered in the ratings.

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

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

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

Soil Properties

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

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 21.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

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

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

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

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

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

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

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

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 21.

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

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

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

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

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

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They influence the soil's adsorption of cations, moisture retention, shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

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

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

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

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

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

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

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

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

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of

soil lost. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
3. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

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

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

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

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

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

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

In table 16, some soils are assigned to two hydrologic soil groups. Soils that have a seasonal high water table but can be drained are assigned first to a hydrologic soil group that denotes the drained condition of the soil and then to a hydrologic group that denotes the undrained condition, for example, B/D. Because there are different degrees of drainage and water table control, onsite investigation is needed to determine the hydrologic group of the soil in a particular location.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none* or *frequent. None* means that flooding is not probable. *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year). Duration is expressed as *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. June-November, for example, means that flooding can occur during the period June through November. About two-thirds to three-fourths of all flooding occurs during the stated period.

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

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

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. The water table in 7 pedons, representing 7 soil series, was measured twice a month during the course of the soil survey. The pedons were selected as typical of the series as mapped in the county, and they were as far removed as possible from any source of artificial

drainage (table 17). Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, that is, *perched* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 16.

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

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

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 16 shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Not shown in the table is subsidence caused by an imposed surface load or by the withdrawal of ground water throughout an extensive area as a result of lowering the water table.

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

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

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

Physical, Chemical, and Mineralogical Properties of Selected Soils

Dr. Victor W. Carlisle and Dr. Mary E. Collins, professor and assistant professor of Soil Science, respectively, University of Florida, Agricultural Experiment Station, Soil Science Department, prepared this section.

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

Typifying pedons were sampled from pits at carefully selected locations. Samples were airdried, crushed, and sieved through a 2-millimeter screen. Most analytical methods used are outlined in Soil Survey Investigations Report No. 1 *(17)*.

Particle-size distribution was determined using a modified pipette method with sodium hexametaphosphate dispersion. Hydraulic conductivity and bulk density were determined on undisturbed soil cores. Water retention parameters were obtained from duplicate undisturbed soil cores placed in tempe pressure cells. Weight percentages of water retained at 100 centimeters water (1/10 bar) and 345 centimeters water (1/3 bar) were calculated from volumetric water percentages divided by bulk density. Samples were ovendried, ground to pass a 2-millimeter sieve, and the 15-bar water retention was determined. Organic carbon was determined by a modification of the Walkley-Black wet combustion method.

Extractable bases were obtained by leaching soils with normal ammonium acetate buffered at pH 7.0. Sodium and potassium in the extract were determined by flame emission. Calcium and magnesium were determined by atomic absorption spectrophotometry. Extractable acidity was determined by the barium chloride-triethanolamine method at pH 8.2. The sum of cations, which may be considered a measure of cation-exchange capacity, was calculated by adding the values for extractable bases and extractable acidity. Base saturation is the ratio of extractable bases to cation-exchange capacity expressed in percent. The pH measurements were made with a glass electrode using a soil-water ratio of 1:1, a 0.01 molar calcium chloride solution in a 1:2 soil-solution ratio; and normal potassium chloride solution in a 1:1 soil-solution ratio.

Electrical conductivity determinations were made with a conductivity bridge on 1:1 soil to water mixtures. Iron and aluminum extractable in sodium dithionite-citrate were determined by atomic absorption

spectrophotometry. Aluminum, carbon, and iron were extracted from probable spodic horizons with 0.01 molar sodium pyrophosphate. Determination of aluminum and iron was by atomic absorption and extracted carbon by the Walkley-Black wet combustion method.

Mineralogy of the clay fraction less than 2 microns was ascertained by X-ray diffraction. Peak heights at 18 angstrom, 14 angstrom, 7.2 angstrom, and 4.31 angstrom positions represent montmorillonite, interstratified expandable vermiculite or 14 angstrom intergrades, kaolinite, and quartz, respectively. Peaks were measured, summed, and normalized to give the percent of soil minerals identified in the X-ray diffractograms. These percentage values do not indicate absolute determined quantities of soil minerals but do imply a relative distribution of minerals in a particular mineral suite. Absolute percentages would require additional knowledge of particle size, crystallinity, unit structure substitution, and matrix problems.

The inherently sandy nature of most Putnam County Area soils (table 18) is readily apparent. All pedons sampled contained one horizon or more in which the total sand content exceeded 90 percent. Adamsville, Astatula, Candler, Cassia, Deland, Florahome, Narcoossee, Orsino, Paola, Tavares, and Zolfo soils contained more than 90 percent sand to a depth of 2 meters or more. One horizon in Centenary soil and two horizons in Millhopper, Sparr, and Wauchula soils contained less than 90 percent sand.

Deep horizons of Apopka, Holopaw, Lochloosa, Millhopper, Mulat, Pomona, Sparr, Wauchula, and Winder soils contained about 11.3 to 27 percent clay. In addition, Lochloosa and Winder soils had high clay content in a combined horizon that was more than 1 meter thick.

Silt content was generally less than 4 percent; however, it exceeded 10 percent in one horizon of Pomona soil and in one horizon of Wauchula soil and was less than 2.5 percent in Adamsville, Astatula, Candler, Paola, and Tavares soils.

Fine sand dominated the sand fractions in Astatula, Candler, Cassia, Centenary, Deland, Holopaw, Lochloosa, Mulat, Narcoossee, Orsino, Paola, Pomona, Sparr, Tavares, Wauchula, Winder, and Zolfo soils. In all of these soils, except Lochloosa and Sparr soils, were horizons that contained more than 50 percent fine sand. Astatula, Candler, Cassia, Deland, Narcoossee, Orsino, Tavares, and Zolfo soils contained more than 80 percent fine sand. Medium sand dominated the sand fractions in Adamsville, Apopka, Florahome, and Millhopper soils; however, the medium sand content in these soils was generally less than 50 percent. The content of very coarse sand and coarse sand was generally less than 0.2 percent and 3 percent, respectively. Adamsville and Sparr soils contained more than 5 percent coarse sand, and Apopka soil contained more than 5 percent coarse sand except in it's deepest horizons. The content of very fine sand generally ranged from 3 to 7 percent; however, all horizons of Holopaw, Pomona, and Sparr soils greatly exceeded these values. Droughtiness is a common characteristic of sandy soils, particularly of those that are moderately well drained, well drained, and excessively drained.

Adamsville, Apopka, Astatula, Florahome, Mulat, Narcoossee, Orsino, Paola, and Wauchula soils contained horizons with hydraulic conductivity values of more than 60 centimeters per hour. The relatively high clay content that is in the deeper horizons of Holopaw, Lochloosa, Millhopper, Pomona, Sparr, and Winder soils resulted in hydraulic conductivity values of 1 centimeter or less per hour. Design and function of septic tank absorption fields are affected by such low hydraulic conductivity values. Centenary, Pomona, and Wauchula soils contained well developed spodic horizons that have low hydraulic conductivity values. The spodic horizons in Cassia, Deland, and Narcoossee soils had higher hydraulic conductivity values than are generally recorded for these horizons in most Florida soils. The available water for plants can be estimated from bulk density and water content data. Soils that have an excessive content of sand, such as Astatula fine sand, retain very low amounts of available water; conversely, soils that have a higher amount of fine-textured materials and a higher content of organic matter, such as Winder fine sand, retain much larger amounts of available water.

Chemical soil properties (table 19) show that a very low amount of extractable bases is present in most Putnam County Area soils. All horizons of Adamsville, Apopka, Astatula, Candler, Cassia, Centenary, Millhopper, Narcoossee, Orsino, Paola, and Zolfo soils contained less than 1 milliequivalent per hundred grams extractable bases. Holopaw, Pomona, and Winder soils contained horizons that had more than 5 milliequivalents per hundred grams extractable bases. The mild, humid climate of Putnam County Area results in depletion of basic soil cations (calcium, magnesium, sodium, and potassium) through leaching.

Calcium was the dominant base in all soils; however, more magnesium than calcium occurred in the deeper horizons of Apopka, Lochloosa, Millhopper, and Pomona soils. Some horizons in Deland, Florahome, Holopaw, Mulat, Pomona, Sparr, Wauchula, and Winder soils contained more than 2 milliequivalents per hundred grams extractable calcium. Extractable magnesium occurred in amounts of more than 1 milliequivalent per hundred grams in a few deeper horizons of Holopaw, Pomona, and Winder soils. Detectable amounts of magnesium occurred in all horizons of all other pedons. Sodium generally occurred in amounts of less than 0.1 milliequivalent per hundred grams; however, in one horizon or more, Holopaw, Mulat, Narcoossee, and Winder soils slightly exceeded this amount. Astatula, Paola, Sparr, and Tavares soils contained one horizon or more with nondetectable amounts of sodium. Most

Putnam County Area soils contained less than 0.1 milliequivalent per hundred grams potassium. Holopaw, Lochloosa, Pomona, Wauchula, and Winder soils contained one or two horizons that exceeded this amount. All soils contained one or more horizons with 0.01 or less milliequivalent per hundred grams extractable potassium.

Values for cation-exchange capacity, an indication of plant nutrient capacity, exceeded 10 milliequivalents per hundred grams in the surface layer of Florahome, Narcoossee, Pomona, and Winder soils. Cation-exchange capacity exceeded 10 milliequivalents per hundred grams in the argillic horizons of Holopaw, Lochloosa, Mulat, Pomona, and Winder soils and in the spodic horizons of Narcoossee, Pomona, and Wauchula soils. Soils, such as Astatula and Orsino soils, that have low cation-exchange capacities in the surface layer require only small amounts of lime to significantly alter the base status and soil reaction. Generally, soils of low inherent soil fertility are associated with low values for extractable bases and low cation-exchange capacities, and fertile soils are associated with high values for extractable bases, high base saturation values, and high cation-exchange capacities.

The content of organic carbon was less than 1 percent in Adamsville, Apopka, Astatula, Centenary, Holopaw, Orsino, Paola, Sparr, and Zolfo pedons. The surface layer of Pomona soil and Winder soil contained more than 3 percent organic carbon. The surface layer of Candler, Deland, Florahome, Lochloosa, Millhopper, Mulat, Narcoossee, and Tavares soils contained more than 1 percent organic carbon. The spodic horizon of Cassia, Centenary, Deland, Narcoossee, Pomona, Wauchula, and Zolfo soils contained enhanced amounts of organic carbon that range from 0.30 to 3.49 percent. In the other soils, the content of organic carbon decreased rapidly as depth increased. Since the content of organic carbon in the surface layer is directly related to soil nutrient and water retention capacities of sandy soils, management practices that conserve and maintain the amounts of organic carbon are highly desirable.

Electrical conductivity values were all very low, ranging from nondetectable amounts in many horizons to 0.24 millimhos per centimeter in the Bt1 horizon of the Pomona soils. These data indicate that the content of soluble salt in soils sampled in Putnam County Area was insufficient to detrimentally affect the growth of salt-sensitive plants.

Soil reaction in water generally ranged between pH 4.5 and 6.0. Higher reaction values were recorded for most horizons of the Winder soil. With few exceptions, soil reaction was 0.5 pH units lower in calcium chloride solution than in water. Maximum plant nutrient availability is generally attained when soil reaction is between pH 6.5 and 7.5; however, under Florida conditions, maintaining soil reaction above pH 6.5 is not economically feasible for most agricultural production purposes.

The ratio of pyrophosphate extractable carbon and aluminum to clay in the Bh horizon of Cassia, Deland, Narcoossee, Pomona, and Wauchula soils was sufficient to meet the chemical criteria for spodic horizons. Field morphology was used to determine spodic horizons in Centenary and Zolfo soils. The Bh horizon in these soils did not meet all chemical criteria for spodic horizons. Sodium pyrophosphate extractable iron was 0.03 percent or less in the spodic horizon in all of these soils except Cassia soils. In Cassia soils, 0.06 percent iron occurred.

Citrate-dithionite extractable iron in the argillic horizon of Alfisols and Ultisols ranged from 0.05 percent in Holopaw soil to 4.55 percent in Mulat soil. Similarly, these values in the Bh horizon of Spodosols ranged from 0.00 percent in Cassia soil to 0.12 percent in Deland soil. Aluminum extracted by citrate-dithionite from the Bt horizon ranged from 0.02 percent in Holopaw and Winder soils to 0.53 percent in Mulat soil. The amounts of iron and aluminum in Putnam County Area soils were not sufficient to detrimentally affect phosphorus availability.

Sand fractions of 2 to 0.05 millimeters were siliceous, and quartz was overwhelmingly dominant in all pedons. Varying amounts of heavy minerals occurred in most horizons with the greatest concentration in the very fine sand fraction. No weatherable minerals were observed. Crystalline mineral components of the clay fraction of 0.002 millimeters are reported in table 20 for major horizons of the pedons sampled. The clay mineralogical suite was composed of montmorillonite, a 14 angstrom intergrade, kaolinite, and quartz.

Montmorillonite was detected in most horizons of all pedons sampled except in Apopka soil. The 14 angstrom intergrade occurred in all pedons except Winder soil. Kaolinite occurred in all other horizons of all soils sampled except in the A and C2 horizon of Cassia soil and the A horizon of Pomona soil. All pedons contained varying amounts of quartz with larger amounts occurring in the Cassia soil.

Montmorillonitic clay, dominant in Putnam County Area soils, is probably the least stable mineral component in the present acidic environment. Large amounts of montmorillonite were in the deeper horizons of Holopaw and Pomona soils and were throughout the Winder series. Considerable volume change could result from shrinking when dry and swelling when wet of montmorillonitic soil materials that have a high content of clay. The occurrence of relatively large amounts of 14 angstrom intergrades and the general tendency of these minerals to decrease as depth increases suggests that the 14 angstrom intergrade minerals are among the most stable species in this weathering environment. The general, although inconsistent, tendency for kaolinite to increase with pedon depth indicates that this mineral species is less stable than the 14 angstrom intergrade in

the severe weathering environment near the soil surface. Clay-size quartz has primarily resulted from decrements of the silt fraction. Soils dominated by montmorillonite and 14 angstrom intergrades have much higher cation-exchange capacities and retain more plant nutrients than soils dominated by kaolinite or quartz. Clay mineralogy of Putnam County Area soils influences their use and management less frequently than the total clay content.

Engineering Index Test Data

Table 21 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by the Soils Laboratory, Bureau of Materials and Research, Florida Department of Transportation.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) *(1)* or the American Society for Testing and Materials (ASTM) *(2)*.

The tests and methods are: AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM).

Table 21 contains engineering test data about some of the major soils in Putnam County Area. These tests help evaluate the soils for engineering purposes. The classifications given are based on data obtained by mechanical analyses and by tests to determine liquid limits and plastic limits.

The mechanical analyses were made by a combined sieve and hydrometer method *(4)*. In this method, the various grain-size fractions are calculated on the basis of all the material in the soil sample, including that coarser than 2 millimeters in diameter. The mechanical analyses used in this method should not be used in naming textural classes of soils.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of the soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semisolid to a plastic state. If the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material changes from a semisolid to a plastic state, and the liquid limit is the moisture content at which the soil material changes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic. The data on liquid limit and plasticity index in table 21 are based on laboratory tests of soil samples.

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

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(16)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 22 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

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

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

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

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is siliceous, hyperthermic Typic Psammaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series. An example is the Pompano series, which is a member of the siliceous, hyperthermic family of Typic Psammaquents.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (15)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (16)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

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

Adamsville Series

The Adamsville series consists of soils that are nearly level, somewhat poorly drained, and rapidly permeable. These soils formed in sandy marine or eolian sediment. They are on low knolls on the flatwoods and on low side slopes on the uplands. The water table is at a depth of 20 to 40 inches for 2 to 6 months during most years. It is within 10 to 20 inches of the surface for up to 2 weeks in some years. The slopes range from 0 to 2 percent.

Adamsville soils are hyperthermic, uncoated Aquic Quartzipsamments.

Adamsville soils are geographically associated with Cassia, Myakka, Tavares, and Zolfo soils. Cassia, Myakka, and Zolfo soils have a spodic horizon. In addition, Myakka soils are in lower positions on the landscape than Adamsville soils and are poorly drained. Tavares soils are in higher positions and are moderately well drained.

Typical pedon of Adamsville sand; 0.7 mile west of Keuka Sand Mine on a jeep trail, 1 mile south of Putnam County Road 20A; 1,200 feet south and 2,400 feet west of the northeast corner of sec. 32, T. 10 S., R. 24 E.

A—0 to 6 inches; grayish brown (10YR 5/2) sand; single grained; loose; many fine and medium roots; very strongly acid; clear wavy boundary.
C1—6 to 15 inches; very pale brown (10YR 7/4) sand; single grained; loose; few fine and medium roots; very strongly acid; gradual wavy boundary.
C2—15 to 34 inches; light yellowish brown (10YR 6/4) sand; few coarse distinct reddish yellow (7.5YR 6/8) mottles; single grained; loose; few medium and coarse roots; few pockets of stripped sand grains; few sand-size particles of charcoal; very strongly acid; gradual wavy boundary.
C3—34 to 42 inches; light yellowish brown (10YR 6/4) sand; few fine distinct reddish yellow (7.5YR 6/6) mottles and few medium distinct light grayish brown (10YR 6/2) mottles; single grained; loose; few coarse roots; strongly acid; gradual wavy boundary.
C4—42 to 68 inches; light gray (10YR 7/1) sand; few fine distinct reddish yellow (7.5YR 6/6) mottles; single grained; loose; very strongly acid; gradual smooth boundary.
C5—68 to 80 inches; light gray (10YR 7/2) sand; single grained; loose; strongly acid.

Reaction ranges from very strongly acid to medium acid except where lime has been added.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. The thickness of this horizon ranges from 3 to 8 inches.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 2 or 3; hue of 10YR, value of 6, and chroma of 4; or hue of 10YR, value of 8, and chroma of 1. Chromas of 1 or 2 are at a depth of more than 30 inches. This horizon has mottles in shades of yellow, brown, or gray. The texture is sand or fine sand.

Apopka Series

The Apopka series consists of soils that are nearly level to sloping, well drained, and moderately permeable. These soils formed in sandy and loamy marine or eolian deposits. They are on ridges and side slopes on the uplands. The water table is at a depth of more than 80 inches. The slopes range from 0 to 8 percent. Apopka soils are loamy, siliceous, hyperthermic Grossarenic Paleudults.

Apopka soils are geographically associated with Candler, Lochloosa, Millhopper, and Sparr soils. Candler soils have lamellae at a depth of more than 50 inches. Lochloosa and Sparr soils are somewhat poorly drained. In addition, Lochloosa soils have an argillic horizon between depths of 20 and 40 inches. Millhopper soils are moderately well drained.

Typical pedon of Apopka sand, 0 to 5 percent slopes; on a 3 percent slope in a wooded area; 0.5 mile southeast of intersection of Baden-Powell Road and entrance to Baden-Powell Scout Reservation entrance; Land Grant 37, T. 10 S., R. 23 E.

A—0 to 7 inches; dark grayish brown (10YR 4/2) sand; weak fine granular structure; very friable; many fine, medium, and coarse roots; neutral; clear wavy boundary.
E1—7 to 16 inches; pale brown (10YR 6/3) sand; single grained; loose; few fine, many medium and coarse roots; medium acid; gradual wavy boundary.
E2—16 to 40 inches; very pale brown (10YR 7/4) sand; single grained; loose; many medium and coarse roots; medium acid; gradual wavy boundary.
EB—40 to 43 inches; brownish yellow (10YR 6/8) sand; weak fine granular structure; few medium roots; strongly acid; abrupt wavy boundary.
Bt1—43 to 68 inches; yellowish red (5YR 5/8) sandy clay loam; many coarse distinct red (2.5YR 4/6) mottles, brownish yellow (10YR 6/8) mottles and few fine distinct reddish yellow (7.5YR 7/8) mottles; weak fine subangular blocky structure; friable; few medium roots; sand grains coated and bridged with clay; few small pockets of uncoated sand grains; strongly acid; gradual wavy boundary.
Bt2—68 to 80 inches; yellowish red (5YR 5/8) sandy clay loam; many coarse faint light red (2.5YR 6/8) mottles and few fine distinct yellow (10YR 7/6) mottles; weak fine subangular blocky structure; friable; few medium roots; many sand grains coated and bridged with clay; few small pockets of uncoated sand grains; very strongly acid.

Reaction ranges from very strongly acid to medium acid except in areas where the A horizon has been limed.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1; or hue of 10YR, value of 4 or 5, and chroma of 1 or 2. The thickness of this horizon ranges from 4 to 8 inches.

The E horizon has hue of 10YR, value of 5, and chroma of 3; hue of 10YR, value of 6, and chroma of 3 to 8; or hue of 10YR, value of 7, and chroma of 3 to 6. The thickness of this horizon ranges from 36 to 72 inches. The texture is sand or fine sand.

The EB horizon has hue of 10YR, value of 7, and chroma of 6; hue of 7.5YR or 5YR, value of 5, and chroma of 6 or 8; or hue of 7.5YR or 5YR, value of 7, and chroma of 6. The EB horizon is 6 inches or less thick. The texture is loamy sand, loamy fine sand, or sand. Some pedons do not have an EB horizon.

The Bt horizon has hue of 10YR, value of 5, and chroma of 4 or 8; hue of 10YR, value of 6, and chroma of 4 to 8; hue of 7.5YR or 5YR, value of 5, and chroma of 8; hue of 7.5YR or 5YR, value of 6, and chroma of 6 or 8; hue of 2.5YR, value of 4 to 6, and chroma of 8; or hue of 2.5YR, value of 5, and chroma of 6. In some pedons, these colors are mixed; and some pedons have mottles in shades of brown, red, or yellow. The texture is sandy loam, fine sandy loam, or sandy clay loam. The Bt horizon extends to a depth of 80 inches or more.

Astatula Series

The Astatula series consists of soils that are nearly level to moderately steep, excessively drained, and very rapidly permeable. These soils formed in thick deposits of marine or eolian sand. They are on ridges and knolls on the uplands. The water table is at a depth of more than 72 inches. The slopes range from 0 to 15 percent. Astatula soils are hyperthermic, uncoated Typic Quartzipsamments.

Astatula soils are geographically associated with Adamsville and Tavares soils. The associated soils are in slightly lower positions on the landscape than Astatula soils. Adamsville soils are somewhat poorly drained, and Tavares soils are moderately well drained.

Typical pedon of Astatula fine sand, 0 to 8 percent slopes; in a wooded area; 2.75 miles north of intersection of Florida State Highway 100 and Holloway Road, 0.6 mile west of Holloway Road; 1,600 feet north and 800 feet east of the southwest corner of sec. 25, T. 8 S., R. 24 E.

A—0 to 4 inches; dark gray (10YR 4/1) fine sand; single grained; loose; many fine and medium and few coarse roots; very strongly acid; clear wavy boundary.

C1—4 to 12 inches; pale brown (10YR 6/3) fine sand; few coarse faint yellow (10YR 7/6) mottles; single grained; loose; few fine and coarse and many medium roots; many uncoated sand grains; few fine pockets of charcoal; very strongly acid; clear wavy boundary.

C2—12 to 26 inches; very pale brown (10YR 7/3) fine sand; few coarse faint yellow (10YR 7/6) mottles; single grained; loose; common dark yellowish brown (10YR 4/4) stains along old root channels; many pockets of uncoated sand grains; few fine and coarse and many medium roots; few pockets of charcoal; very strongly acid; gradual wavy boundary.

C3—26 to 80 inches; very pale brown (10YR 8/4) fine sand; single grained; loose; many fine and few coarse roots; many uncoated sand grains; dark yellowish brown (10YR 4/4) stains along old root channels; few fine pockets of charcoal; very strongly acid.

Reaction ranges from very strongly acid to medium acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2; or hue of 10YR, value of 7, and chroma of 1 or 2. The thickness of this horizon ranges from 2 to 7 inches.

Some pedons have an AC horizon that has hue of 10YR, value of 6, and chroma of 3 or 4. The AC horizon is mixed with pockets of material from the A horizon. This horizon is 4 inches or less thick. The texture is sand or fine sand.

The C horizon has hue of 10YR, value of 5 to 8, and chroma of 3 or 4; hue of 10YR, value of 5 or 7, and chroma of 6; hue of 7.5YR, value of 5, and chroma of 6 or 8; or hue of 7.5YR, value of 7, and chroma of 6. In some pedons, the lower part of the C horizon has mottles or pockets of sand or fine sand and has hue of 10YR, value of 7 or 8, and chroma of 1 or 2. These colors are not indicative of wetness, but are the colors of the sand grains. The texture is sand or fine sand.

Astor Series

The Astor series consists of soils that are deep, nearly level, very poorly drained, and rapidly permeable. These soils formed in sandy marine sediment. They are on the flood plains. These soils are frequently flooded for very long periods during rainy periods. During dry periods, the high water table is at a depth of 10 to 30 inches. The slopes are less than 1 percent. Astor soils are sandy, siliceous, hyperthermic Cumulic Haplaquolls.

Astor soils are geographically associated with Placid, Pompano, Riviera, and Terra Ceia soils. Placid soils have an umbric epipedon 10 to 24 inches thick and have less than 35 percent base saturation. Pompano soils have an ochric epipedon. Riviera soils have an argillic horizon. Terra Ceia soils are organic.

Typical pedon of Astor mucky fine sand, frequently flooded; in a wooded area; 1,500 feet north of Acosta Creek and Putnam County Road 309, 900 feet west of County Road 309; Land Grant 41, T. 11 S., R. 26 E.

A1—0 to 13 inches; black (10YR 2/1) mucky fine sand; weak fine granular structure; friable; many fine, medium, and coarse roots; slightly acid; gradual wavy boundary.

A2—13 to 32 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; common fine, medium, and coarse roots; many uncoated light gray sand grains; slightly acid; gradual wavy boundary.

A3—32 to 55 inches; very dark grayish brown (10YR 3/2) fine sand; common medium distinct dark brown

(10YR 4/3) mottles; weak fine granular structure; friable; few fine and medium roots; mildly alkaline; clear wavy boundary.
Cg—55 to 80 inches; dark grayish brown (10YR 4/2) fine sand; single grained; loose; mildly alkaline.

Reaction ranges from slightly acid to moderately alkaline.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The thickness of this horizon ranges from 24 to 58 inches.

The Cg horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. The texture is sand or fine sand.

Bluff Series

The Bluff series consists of soils that are nearly level, very poorly drained, and slowly permeable. These soils formed in fine marine sediment. They are in broad drainageways on the flatwoods. The water table is at a depth of less than 12 inches for 6 months or more in most years. These soils are subject to frequent flooding for long periods during rainy periods. The slopes range from 0 to 2 percent. Bluff soils are fine-loamy, siliceous, hyperthermic Typic Haplaquolls.

Bluff soils are geographically associated with Holopaw, Pomona, and Riviera soils. Holopaw and Riviera soils are in similar positions in drainageways as Bluff soils. In addition, these associated soils have an ochric epipedon and have an argillic horizon. Pomona soils are in higher positions on the flatwoods than Bluff soils and are sandy throughout.

Typical pedon of Bluff sandy clay loam, frequently flooded; in a wooded swamp; 2.6 miles east of intersection of Hoover Road and Florida State Highway 20, 50 feet south of State Highway 20; 1,700 feet south and 1,600 feet west of the northeast corner of sec. 14, T. 10 S., R. 25 E.

A1—0 to 16 inches; black (10YR 2/1) sandy clay loam; weak medium subangular blocky structure; friable; common fine, medium, and coarse roots; slightly acid; clear wavy boundary.
A2—16 to 19 inches; very dark gray (10YR 3/1) sandy clay loam; weak medium subangular blocky structure; firm; few fine, medium, and coarse roots; slightly acid; clear wavy boundary.
Bkg1—19 to 39 inches; dark gray (10YR 4/1) sandy clay loam; weak medium subangular blocky structure; firm; few fine pockets of soft white calcium carbonate; moderately alkaline; gradual wavy boundary.
Bkg2—39 to 49 inches; gray (10YR 5/1) sandy clay; common medium distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; firm; common medium pockets of white (10YR 8/1) calcium carbonate; moderately alkaline; gradual wavy boundary.
Bkg3—49 to 60 inches; olive gray (5Y 5/2) sandy clay; common medium distinct yellowish brown (10YR 5/8) mottles; massive; firm; common medium white (10YR 8/1) soft calcium carbonate accumulations and weakly cemented concretions; moderately alkaline; clear wavy boundary.
Cg—60 to 80 inches; light gray (10YR 7/2) sandy clay loam; massive; slightly sticky; many coarse lenses and pockets of white (10YR 8/1) soft calcium carbonate accumulations and hard calcium carbonate concretions; moderately alkaline.

Reaction ranges from medium acid to mildly alkaline in the A horizon. It ranges from slightly acid to moderately alkaline in the Bkg horizon and is mildly alkaline or moderately alkaline in the Cg horizon.

Some pedons have a thin layer of muck on the surface that ranges from 3 to 5 inches in thickness.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1; or hue of 5YR, value of 2, and chroma of 1. The thickness of this horizon ranges from 10 to 22 inches.

The Bkg1 horizon has hue of 10YR, value of 4 or 5, and chroma of 1. The thickness of this horizon ranges from 10 to 23 inches. The texture is sandy clay loam or sandy clay. The Bkg2 horizon has hue of 10YR, value of 4 to 6, and chroma of 1. The thickness of this horizon ranges from 6 to 12 inches. The Bkg3 horizon has hue of 10YR, value of 4 or 6, and chroma of 1; hue of 10YR, value of 5, and chroma of 2; or it is neutral (N) and has value of 5. The thickness of this horizon ranges from 4 to 23 inches. The texture is sandy clay loam or sandy clay.

The Cg horizon has hue of 10YR and value and chroma of 4; hue of 10YR, value of 7, and chroma of 1 or 2; or hue of 5GY, value of 5, and chroma of 1.

Bonneau Series

The Bonneau series consists of soils that are deep, nearly level to gently sloping, moderately well drained, and moderately permeable. These soils formed in sandy and loamy marine material (fig. 11). They are on the uplands. The water table is between depths of 40 and 60 inches for 1 month to 4 months in most years. The slopes range from 0 to 5 percent. Bonneau soils are loamy, siliceous, thermic Arenic Paleudults.

Bonneau soils are geographically associated with Apopka, Lochloosa, Millhopper, and Sparr soils. Apopka, Millhopper, and Sparr soils have a Bt horizon at a depth of more than 40 inches. In addition, Apopka soils are well drained, and Sparr soils are somewhat poorly drained. Lochloosa soils are in an aquic subgroup and are somewhat poorly drained.

Typical pedon of Bonneau fine sand, 0 to 5 percent slopes; in a pasture; 1,300 feet east and 400 feet north of the southwest corner of sec. 29 T. 9 S., R. 23 E.

Figure 11.—Soil profile of Bonneau fine sand, 0 to 5 percent slopes. The dark layer at a depth of about 25 inches is a loamy subsoil.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) fine sand; single grained; loose; many fine roots; slightly acid; abrupt wavy boundary.

E1—7 to 25 inches; yellowish brown (10YR 5/4) fine sand; single grained; loose; few fine roots; medium acid; gradual wavy boundary.

Bt1—25 to 31 inches; brownish yellow (10YR 6/8) fine sandy loam; few medium distinct red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; strongly acid; gradual wavy boundary.

Bt2—31 to 51 inches; brownish yellow (10YR 6/8) sandy clay loam; common coarse distinct red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; very strongly acid; gradual wavy boundary.

Bt3—51 to 64 inches; brownish yellow (10YR 6/6) sandy clay loam; common coarse distinct light grayish brown (10YR 6/2) mottles and dark yellowish brown (10YR 4/6) mottles; strong medium subangular blocky structure; friable; strongly acid; gradual wavy boundary.

Btg—64 to 80 inches; mixed light gray (10YR 7/2) and yellowish brown (10YR 5/6) sandy clay loam; common coarse distinct dark red (2.5YR 3/6) mottles; moderate medium subangular blocky structure; very friable; strongly acid.

Reaction ranges from medium acid to very strongly acid in the A and E horizons. If lime has been added, reaction is slightly acid or neutral in the A horizon. Reaction is very strongly acid or strongly acid in the B horizon.

The A horizon has hue of 10YR, value of 4, and chroma of 2; or hue of 10YR, value of 5, and chroma of 1. The thickness of this horizon ranges from 4 to 9 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 3 or 4; or hue of 10YR, value of 6, and chroma of 6. The thickness of this horizon ranges from 17 to 31 inches. The texture is sand or fine sand.

The Bt horizon has hue of 10YR, value of 5, and chroma of 6 or 8; hue of 10YR, value of 6, and chroma of 4 to 8; or hue of 10YR, value of 7, and chroma of 3 or 4. The upper part of the Bt horizon has mottles in shades of red, brown, and yellow that range from none to common. Mottles of chroma of 2 or less are at a depth of more than 40 inches. The texture is sandy loam, fine sandy loam, or sandy clay loam.

Candler Series

The Candler series consists of soils that are nearly level to steep, excessively drained, and rapidly permeable. These soils formed in thick deposits of marine or eolian sand. They are on ridges and knolls on the uplands. The water table is at a depth of more than 80 inches. The slopes range from 0 to 25 percent. Candler soils are hyperthermic, uncoated Typic Quartzipsamments.

Candler soils are geographically associated with Apopka, Millhopper, and Tavares soils. Apopka and Millhopper soils have an argillic horizon at a depth of more than 40 inches. In addition, Apopka soils are well drained, and Millhopper soils are moderately well drained. Tavares soils are moderately well drained and do not have lamellae.

Typical pedon of Candler fine sand, 0 to 5 percent slope; in a wooded area in the Putnam Manor subdivision; 0.8 mile east of intersection of Hoover Road and Pine Tree Street, 0.8 mile north of Pine Tree Street; 1,800 feet south and 800 feet west of the northeast corner of sec. 28, T. 9 S., R. 25 E.

A—0 to 4 inches; brownish gray (10YR 5/2) fine sand; loose; common fine and medium roots; very strongly acid; clear wavy boundary.
E1—4 to 28 inches; very pale brown (10YR 7/4) fine sand; single grained; loose; few fine, medium, and coarse roots; common pockets of white fine sand; very strongly acid; gradual wavy boundary.
E2—28 to 45 inches; very pale brown (10YR 7/4) fine sand; single grained; loose; few fine, medium, and coarse roots; few pockets of very pale brown (10YR 8/4) fine sand; very strongly acid; gradual smooth boundary.
E3—45 to 61 inches; very pale brown (10YR 7/3) fine sand; single grained; loose; few medium and coarse roots; common pockets of white (10YR 8/2) fine sand; very strongly acid; abrupt wavy boundary.
E&Bt—61 to 80 inches; very pale brown (10YR 7/3) fine sand (E); single grained; loose; few yellowish brown (10YR 5/6) loamy fine sand lamellae (B), 1 to 3 millimeters thick, increasing in abundance with depth; very strongly acid.

Depth to the lamellae ranges from 60 to 80 inches. Reaction ranges from very strongly acid to medium acid.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The thickness of this horizon ranges from 2 to 8 inches. The texture is sand or fine sand.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 3 to 6; or hue of 10YR, value of 8, and chroma of 4 or 6. The thickness of this horizon ranges from 45 to 66 inches. The texture is sand or fine sand.

The E part of the E&Bt horizon has hue of 10YR, value of 7, and chroma of 2 to 8; or hue of 10YR, value of 8, and chroma of 2 to 6. The Bt part has hue of 10YR, value of 5, and chroma of 6 or 8; hue of 10YR, value of 6, and chroma of 8; or hue of 7.5YR, value of 5 or 6, and chroma of 6 or 8. The Bt part occurs as thin layers of lamellae of loamy sand, loamy fine sand, or sandy loam in the sand or fine sand E part of this horizon. The lamellae range from about 1 millimeter to 1 centimeter in thickness and from 1 centimeter to 1 meter in length. Vertical spacing between lamellae ranges from 2 to 5 inches. The average texture of this horizon is sand or fine sand.

Cassia Series

The Cassia series consists of soils that are nearly level, somewhat poorly drained, and moderately permeable to moderately rapidly permeable. These soils formed in thick sandy deposits of marine or eolian origin. They are on slight ridges and knolls on the flatwoods and on the lower slopes on the uplands. The water table is at a depth of 15 to 40 inches for about 6 months during most years. During extended dry periods, it is at a depth of more than 40 inches. The slopes range from 0 to 2 percent. Cassia soils are sandy, siliceous, hyperthermic Typic Haplohumods.

Cassia soils are geographically associated with Adamsville, Myakka, and Narcoossee soils. Adamsville soils do not have a spodic horizon. Myakka soils are poorly drained and are in slightly lower positions on the landscape than Cassia soils. Narcoossee soils have a thin discontinuous Bh horizon.

Typical pedon of Cassia fine sand; in a wooded area; 1 mile north of intersection of U.S. Highway 17 and West River Road, 0.8 mile west of U.S. Highway 17; 50 feet south and 1,300 feet east of the northwest corner of sec. 12, T. 9 S., R. 36 E.

A—0 to 4 inches; gray (10YR 5/1) fine sand; single grained; loose; few fine and coarse roots; extremely acid; gradual wavy boundary.
E—4 to 9 inches; light gray (10YR 6/1) fine sand; single grained; loose; many fine and coarse roots; very strongly acid; gradual wavy boundary.
E2—9 to 24 inches; white (10YR 8/1) fine sand; single grained; loose; many medium and coarse roots; strongly acid; gradual wavy boundary.
E3—24 to 28 inches; gray (10YR 6/1) fine sand; few distinct reddish yellow (7.5YR 6/8) mottles; single grained; loose; common medium roots; very strongly acid; abrupt wavy boundary.
Bh1—28 to 32 inches; very dark grayish brown (10YR 3/2) fine sand; weak medium subangular blocky structure; friable; few fine and medium roots; extremely acid; clear wavy boundary.
Bh2—32 to 38 inches; dark brown (10YR 3/3) fine sand; moderate medium granular structure; friable; extremely acid; clear wavy boundary.
Bh3—38 to 46 inches; dark brown (7.5YR 3/2) fine sand; moderate medium granular structure; friable; very strongly acid; gradual wavy boundary.
C1—46 to 54 inches; pale brown (10YR 6/3) fine sand; many coarse distinct dark yellowish brown (10YR 4/4) mottles; single grained; loose; very strongly acid; gradual wavy boundary.
C2—54 to 80 inches; light gray (10YR 7/2) fine sand; many coarse distinct dark yellowish brown (10YR 4/4) mottles; single grained; loose; strongly acid.

Reaction ranges from extremely acid to medium acid.

The A horizon has hue of 10YR, value of 5 or 6, and chroma of 1. The thickness of this horizon ranges from 3 to 5 inches.

The E horizon has hue of 10YR, value of 6 to 8, and chroma of 1. The thickness of this horizon ranges from 17 to 25 inches. The texture is sand or fine sand.

The Bh horizon has hue of 10YR, value of 2, and chroma of 2; hue of 10YR, value of 3, and chroma of 1 to 3; hue of 5YR, value of 3 or 4, and chroma of 4; or hue of 7.5YR, value of 3, and chroma of 2. The thickness of this horizon ranges from 9 to 15 inches. The texture is sand, fine sand, or loamy sand.

Some pedons have a BC horizon that has hue of 10YR, value of 4, and chroma of 3; or hue of 7.5YR, value of 4, and chroma of 4. The thickness of this horizon ranges from 4 to 10 inches. The texture is sand or fine sand.

Some pedons have an E' horizon that has hue of 10YR, value of 5 or 6, and chroma of 3 or 4; or hue of 10YR, value of 7, and chroma of 1 or 2. The thickness of this horizon ranges from 9 to 32 inches. The texture is sand or fine sand.

Some pedons have a Bh' horizon that has hue of 10YR, value of 2, and chroma of 1; hue of 10YR, value of 3, and chroma of 2; hue of 7.5YR, value of 3 or 4, and chroma of 2; or hue of 5YR, value of 4, and chroma of 2. The texture is sand, fine sand, or loamy sand. This horizon extends to a depth of 80 inches or more.

The C horizon has hue of 10YR, value of 6, and chroma of 3; or hue of 10YR, value of 7, and chroma of 1 or 2. The texture is sand or fine sand.

Centenary Series

The Centenary series consists of soils that are nearly level, moderately well drained, and moderately rapidly permeable. These soils formed in sandy marine or eolian material. They are on ridges and knolls on the low uplands. The water table is at a depth of 40 to 60 inches for 2 to 6 months in most years. It is at a depth of more than 60 inches during dry periods. The slopes range from 0 to 2 percent. Centenary soils are sandy, siliceous, thermic Grossarenic Entic Haplohumods.

Centenary soils are geographically associated with Adamsville, Tavares, and Zolfo soils. Adamsville and Tavares soils do not have a spodic horizon. Adamsville and Zolfo soils are somewhat poorly drained.

Typical pedon of Centenary fine sand; in a wooded area; 0.5 mile west of intersection of Old Starke Road and Carroway Mail Route Road, 200 feet south of Old Starke Road; 200 feet south and 400 feet east of the northwest corner of sec. 15, T. 9 S., R. 25 E.

A—0 to 8 inches; dark gray (10YR 4/1) fine sand; single grained; loose; many fine and few medium roots; many uncoated gray sand grains; very strongly acid; clear irregular boundary.

E1—8 to 37 inches; yellow (10YR 7/6) fine sand; common medium distinct very pale brown (10YR 7/3) mottles and brown (10YR 5/3) mottles; single grained; loose; few fine, medium, and coarse roots; few fine black charcoal particles; strongly acid; gradual smooth boundary.

E2—37 to 50 inches; very pale brown (10YR 7/4) fine sand; common fine distinct brownish yellow (10YR 6/6) mottles and few coarse distinct light yellowish brown (10YR 6/4) mottles; single grained; loose; few fine, medium, and coarse roots; common pockets of light gray (10YR 7/1) uncoated sand grains; strongly acid; gradual smooth boundary.

E3—50 to 65 inches; light gray (10YR 7/2) fine sand; few medium distinct yellow (10YR 7/6) mottles; single grained; loose; few medium roots; strongly acid; gradual wavy boundary.

Bh1—65 to 76 inches; dark grayish brown (10YR 4/2) fine sand; few medium distinct very dark gray (5YR 3/1) mottles; single grained; loose; few medium roots; sand grains lightly coated with organic matter; strongly acid; clear wavy boundary.

Bh2—76 to 80 inches; dark reddish brown (5YR 2/2) fine sand; few coarse distinct dark brown (7.5YR 3/2) mottles; moderate medium granular structure; friable; sand grains well coated with organic matter; very strongly acid.

Reaction ranges from very strongly acid to medium acid.

The A or Ap horizon has hue of 10YR, value of 3, and chroma of 1; or hue of 10YR, value of 4, and chroma of 1 or 2. The thickness of this horizon ranges from 3 to 8 inches.

The E1 and E2 horizons have hue of 10YR, value of 5, and chroma of 3; hue of 10YR, value of 6 or 8, and chroma of 3 or 4; or hue of 10YR, value of 7, and chroma of 3 to 6. The combined thickness of the E1 and E2 horizons ranges from 38 to 62 inches. The E3 horizon has hue of 10YR, value of 5 to 8, and chroma of 2; or hue of 10YR, value of 7, and chroma of 1. The thickness of the E3 horizon ranges from 5 to 25 inches. In some pedons, mottles of reddish yellow, yellow, and brown occur throughout the E horizon. The soil colors or mottles that are indicative of wetness occur at a depth of more than 40 inches. The texture of these horizons is sand or fine sand.

The Bh horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2; hue of 5YR, value of 2, and chroma of 2; or hue of 5YR, value of 3, and chroma of 2. The texture is fine sand, sand, or loamy fine sand.

Deland Series

The Deland series consists of soils that are nearly level to sloping, well drained, and moderately rapidly permeable. These soils formed in thick deposits of marine or eolian sand. They are on broad ridges on the uplands. The water table is at a depth of more than 72 inches. The slopes range from 0 to 8 percent. Deland soils are sandy, siliceous, hyperthermic Grossarenic Entic Haplohumods.

Deland soils are geographically associated with Astatula, Centenary, and Tavares soils. Astatula soils are in higher positions on the landscape than Deland soils and are excessively drained. In addition, these soils do not have an E horizon or a Bh horizon. Centenary soils are similar to Deland soils, but they are in slightly lower positions on the landscape and are moderately well drained. Tavares soils are in lower positions on the landscape. In addition, they are moderately well drained and do not have an E horizon or a Bh horizon.

Typical pedon of Deland fine sand, 0 to 8 percent slopes; in a cleared field; 1,200 feet southwest of intersection of U.S. Highway 17 and Putnam County Road 309, 700 feet southeast of County Road 309; Land Grant 39, T. 11 S., R. 26 E.

A—0 to 6 inches; very dark grayish brown (10YR 3/2) fine sand; single grained; loose; many fine, medium, and coarse roots; strongly acid; abrupt smooth boundary.

E1—6 to 12 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; few fine and medium roots; common medium distinct pockets of very pale brown (10YR 7/3) fine sand; strongly acid; clear wavy boundary.

E2—12 to 46 inches; very pale brown (10YR 7/4) fine sand; single grained; loose; few fine and medium roots; many fine faint pockets of uncoated sand grains; few coarse distinct pockets and streaks of light brownish gray (10YR 6/2) along old root channels; very strongly acid; gradual wavy boundary.

E3—46 to 55 inches; light yellowish brown (10YR 6/4) fine sand; single grained; loose; few fine and medium roots; many coarse distinct streaks of dark yellowish brown (10YR 3/4); very strongly acid; clear wavy boundary.

Bh1—55 to 61 inches; dark brown (10YR 4/3) fine sand; weak fine granular structure; very friable; few fine and medium roots; very strongly acid; clear wavy boundary.

Bh2—61 to 74 inches; very dark brown (10YR 2/2) fine sand; weak medium subangular blocky structure; very friable; few old root channels 3 to 4 inches in diameter filled with very pale brown (10YR 7/4) fine sand; common uncoated sand grains; very strongly acid; diffused boundary.

Bh3—74 to 80 inches; very dark grayish brown (10YR 3/2) fine sand; weak medium subangular blocky structure; very friable; very strongly acid.

Reaction ranges from very strongly acid to medium acid in the A and E horizons. It ranges from extremely acid to strongly acid in the Bh horizon.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. The thickness of this horizon ranges from 4 to 6 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 2 to 4. Common pockets and discontinuous streaks of light gray to white fine sand commonly occur in the lower part of the E horizon. These colors are not indicative of wetness, but are the colors of uncoated sand grains. Many coarse distinct streaks of yellowish brown, pale brown, and light brownish gray mottles may occur along all root channels. Old root channels, 2 to 3 inches in diameter, are filled with light brownish gray and very pale brown fine sand. The combined thickness of the E horizons ranges from 49 to 66 inches. The texture is sand or fine sand.

The Bh1 horizon has hue of 10YR, value of 3, and chroma of 2 or 3; hue of 10YR, value of 4, and chroma of 3; or hue of 7.5YR, value of 4, and chroma of 2. Few to common uncoated sand grains are in this horizon. The Bh2 and Bh3 horizons have hue of 10YR, value of 2 or 3, and chroma of 1 or 2; hue of 5YR, value of 2, and chroma of 2; or hue of 5YR, value of 3, and chroma of 1 to 4. Sand grains are well coated with colloidal organic matter. The texture of the Bh horizon is sand or fine sand.

Electra Series

The Electra series consists of soils that are nearly level, somewhat poorly drained, and slowly permeable or very slowly permeable. These soils formed in massive, sandy and loamy sediment. They are on low ridges and knolls on the flatwoods and in areas on the uplands. The water table is between depths of 25 and 40 inches for 1 month to 4 months during most years. It is at a depth of more than 40 inches during dry periods. The slopes range from 0 to 2 percent. Electra soils are sandy, siliceous, hyperthermic Arenic Ultic Haplohumods.

Electra soils are geographically associated with Adamsville, Hobe, Palmetto, Pomona, and Sparr soils. Adamsville and Sparr soils are in similar positions on the landscape as Electra soils, but they do not have a spodic horizon. In addition, Adamsville soils do not have an argillic horizon. Hobe soils are somewhat excessively drained. Palmetto and Pompano soils are poorly drained.

Typical pedon of Electra fine sand; in a wooded area; 275 feet west of intersection of Browns Road and U.S. Highway 17, 125 feet south of Browns Road; Land Grant 48, T. 10 S., R. 27 E.

A—0 to 8 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; very friable; common fine and medium roots; few coarse roots; extremely acid; clear smooth boundary.

E1—8 to 31 inches; light gray (10YR 7/1) fine sand; single grained; loose; few fine, medium, and coarse roots; very strongly acid; gradual smooth boundary.

E2—31 to 48 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; few medium and coarse roots; strongly acid; abrupt irregular boundary.

Bh1—48 to 55 inches; black (5YR 2/1) fine sand; few coarse distinct (5YR 4/1) pockets of fine sand;

weak medium granular structure; friable; few medium roots; strongly acid; clear wavy boundary.
Bh2—55 to 64 inches; dark reddish brown (5YR 2/2) fine sand; moderate medium subangular blocky structure; friable; strongly acid; clear wavy boundary.
Bt1—64 to 80 inches; brown (10YR 5/3) fine sandy loam; few coarse distinct dark reddish brown (5YR 2/2) mottles in upper part; moderate medium subangular blocky structure; strongly acid.

Reaction ranges from extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1. The thickness of this horizon ranges from 4 to 8 inches.

The E horizon has hue of 10YR, value of 6 to 8, and chroma of 1 or 2. The thickness of this horizon ranges from 29 to 45 inches. The texture is sand or fine sand.

The Bh horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; hue of 5YR, value of 2, and chroma of 1 or 2; or hue of 7.5YR, value of 3, and chroma of 2. The thickness of this horizon ranges from 7 to 16 inches. The texture is sand or fine sand.

Some pedons have an E' horizon that has hue of 10YR, value of 6 or 7, and chroma of 1 or 2. The thickness of this horizon ranges from 0 to 18 inches. The texture is sand or fine sand.

The Bt horizon has hue of 10YR, value of 4, and chroma of 3; or hue of 10YR, value of 5 to 7, and chroma of 1 to 3 and has mottles of gray, yellow, brown, and red. The texture is sandy loam, fine sandy loam, or sandy clay loam. In some pedons, sandy clay is in the lower part of this horizon. Pockets of a coarser material range from none to common.

Some pedons have a BE horizon that has hue of 10YR, value of 5, and chroma of 3; or hue of 7.5YR, value of 5, and chroma of 2. The thickness of this horizon ranges from 0 to 8 inches. The texture is sand or fine sand.

Florahome Series

The Florahome series consists of soils that are nearly level to gently sloping, moderately well drained, and rapidly permeable. These soils formed in sandy marine or eolian deposits. They are on low ridges and side slopes on the uplands. The water table is at a depth of 42 to 72 inches for 4 to 6 months in most years. It recedes to a depth of more than 72 inches during periods of low rainfall. It is at a depth of 30 to 42 inches for up to 2 weeks in some years. The slopes range from 0 to 3 percent. Florahome soils are sandy, siliceous, hyperthermic Quartzipsammentic Haplumbrepts.

Florahome soils are geographically associated with Adamsville, Hontoon, Myakka, Ona, Placid, Samsula, and Tavares soils. The associated soils do not have an umbric epipedon except Ona and Placid soils. In addition, Adamsville soils are somewhat poorly drained, and Hontoon and Samsula soils are organic and very poorly drained, Myakka and Ona soils are poorly drained and have a spodic horizon, and Placid soils are very poorly drained.

Typical pedon of Florahome sand; in a bermudagrass pasture; 0.5 mile west of intersection of Coral Farms Road and Florida State Highway 100, 200 feet north of State Highway 100; 100 feet north and 200 feet west of the southeast corner of sec. 4, T. 9 S., R. 24 E.

A—0 to 11 inches; very dark grayish brown (10YR 3/2) sand; weak medium granular structure; very friable; few coarse, common medium, and many fine roots; very strongly acid; gradual wavy boundary.
A2—11 to 36 inches; dark brown (7.5YR 3/2) sand; common coarse distinct dark yellowish brown (10YR 4/4) mottles; weak fine granular structure; very friable; few fine, medium, and coarse roots; strongly acid; gradual smooth boundary.
C1—36 to 58 inches; brown (10YR 4/3) sand; single grained; loose; few fine, medium, and coarse roots; strongly acid; gradual smooth boundary.
C2—58 to 80 inches; grayish brown (10YR 5/2) sand; single grained; loose; strongly acid.

Reaction ranges from very strongly acid to slightly acid except where lime has been added. The texture of the surface layer is sand, and it is sand or fine sand below the surface layer.

The A horizon has hue of 10YR, value of 2, and chroma of 1 or 2; hue of 10YR, value of 3, and chroma of 1 to 3; or hue of 7.5YR, value of 3, and chroma of 2. The thickness of this horizon ranges from 20 to 38 inches.

The upper part of the C horizon, to a depth of 40 inches or more, has hue of 10YR, value of 4 to 7, and chroma of 3 or 4. The lower part has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. In some pedons, the lower part of the C horizon has few or common, fine or medium mottles in shades of brown, yellow, and gray.

Floridana Series

The Floridana series consists of soils that are nearly level, very poorly drained, and very slowly permeable or slowly permeable. These soils formed in thick beds of sandy and loamy marine sediment. They are on low, broad flats. The water table is at a depth of less than 12 inches for 6 to 9 months in most years. The slopes are less than 2 percent. Floridana soils are loamy, siliceous, hyperthermic Arenic Argiaquolls.

Floridana soils are geographically associated with Holopaw, Riviera, Wabasso, and Winder soils. The associated soils do not have a mollic epipedon. In addition, Holopaw soils have an argillic horizon at a depth of more than 40 inches. Wabasso soils have a spodic horizon, and Winder soils have an argillic horizon at a depth of less than 20 inches.

Typical pedon of Floridana fine sand; in a cleared subdivision lot; approximately 2,300 feet northeast of intersection of Florida State Highway 207 and Carter Crabtree Road, 75 feet south of State Highway 207; Land Grant 49, T. 9 S., R. 27 E.

A1—0 to 10 inches; very dark gray (10YR 3/1) fine sand; weak medium granular structure; very friable; few fine and medium roots; neutral; clear wavy boundary.

A2—10 to 12 inches; very dark grayish brown (10YR 3/2) fine sand; weak fine granular structure; very friable; few fine and medium roots; neutral; clear wavy boundary.

Eg1—12 to 21 inches; light gray (10YR 6/1) fine sand; common coarse faint dark gray (10YR 4/1) and light gray (10YR 7/1) mottles; single grained; loose; neutral; gradual wavy boundary.

Eg2—21 to 24 inches; light gray (10YR 6/1) fine sand; many coarse distinct yellowish brown (10YR 5/8) and brownish yellow (10YR 6/8) mottles; single grained; loose; neutral; abrupt wavy boundary.

Btg—24 to 35 inches; light gray (10YR 7/1) sandy clay loam; common coarse prominent yellowish brown (10YR 5/8) mottles and brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; friable; sand grains coated and bridged with clay; mildly alkaline; clear wavy boundary.

Cg1—35 to 45 inches; light gray (10YR 7/1) loamy fine sand; many coarse prominent yellowish brown (10YR 6/8) mottles and yellow (10YR 7/8) mottles; single grained; loose; mildly alkaline; gradual wavy boundary.

Cg2—45 to 80 inches; light gray (N 7/0) fine sand; single grained; loose; few shell fragments and calcium carbonate nodules; moderately alkaline.

Reaction ranges from very strongly acid to moderately alkaline.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The thickness of this horizon ranges from 10 to 18 inches.

The E horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. The thickness of the E horizon ranges from 8 to 18 inches. The combined thickness of the A and E horizons ranges from 20 to 36 inches.

The Btg horizon has hue of 10YR, value of 4, and chroma of 1; or hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Mottles in shades of gray, brown, and yellow range from few to many and from fine to coarse. The thickness of this horizon ranges from 7 to 18 inches. The texture is fine sandy loam, sandy loam, or sandy clay loam.

The Cg horizon has hue of 10YR or 5Y, value of 5 to 7, and chroma of 1; or it is neutral (N) and has value of 5 to 7. The texture is fine sand or loamy fine sand.

Hobe Series

The Hobe series consists of soils that are nearly level to gently sloping, somewhat excessively drained, and moderately permeable. These soils formed in sandy and loamy marine sediment. They are on knolls and ridges on the flatwoods and in low areas on the uplands. The water table is between depths of 60 and 72 inches for 1 month to 4 months during most years. It is at a depth of 40 to 60 inches for up to 3 weeks during wet periods. The slopes range from 0 to 5 percent. Hobe soils are sandy, siliceous, hyperthermic Grossarenic Ultic Haplohumods.

These soils are taxadjuncts to the Hobe series because the depth to the spodic horizon is less than 50 inches. Typically, the depth to the spodic horizon in the soils in this survey area is 42 inches. This difference does not significantly affect the use, management, and behavior of these soils.

Hobe soils are geographically associated with Cassia, Electra, Orsino, and Pomona soils. Cassia soils are somewhat poorly drained and do not have an argillic horizon. Electra soils are somewhat poorly drained. Orsino soils do not have a spodic horizon and argillic horizon and are moderately well drained. Pomona soils are poorly drained.

Typical pedon of Hobe fine sand, 0 to 5 percent slopes; in a wooded area; 2,600 feet south of the intersection of Clifton Road and U.S. Highway 17, 200 feet east of U.S. Highway 17; 1,000 feet south and 1,000 feet west of the northeast corner of sec. 18, T. 13 S., R. 27 E.

A—0 to 3 inches; gray (10YR 5/1) fine sand; single grained; loose; many fine and medium roots; very strongly acid; gradual wavy boundary.

E1—3 to 20 inches; light gray (10YR 7/1) fine sand; single grained; loose; common fine and medium roots; very strongly acid; gradual wavy boundary.

E2—20 to 42 inches; white (10YR 8/1) fine sand; single grained; loose; few fine and medium roots; very strongly acid; abrupt wavy boundary.

Bh—42 to 50 inches; dark brown (7.5YR 3/2) fine sand; weak medium granular structure; very friable; few fine and medium roots; sand grains well coated with organic matter; very strongly acid; gradual wavy boundary.

BE—50 to 62 inches; dark yellowish brown (10YR 4/4) fine sand; single grained; loose; few fine roots; very strongly acid; abrupt wavy boundary.

Bt—62 to 68 inches; yellowish brown (10YR 5/4) fine sandy loam; few fine faint brownish yellow mottles; moderate coarse granular structure; friable; sand grains coated and bridged with clay; very strongly acid; gradual wavy boundary.

Btg1—68 to 75 inches; light gray (10YR 7/2) sandy clay loam; common coarse distinct brownish yellow

(10YR 6/8) mottles and yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; firm; sand grains coated and bridged with clay; very strongly acid; gradual wavy boundary.

Btg2—75 to 80 inches; light gray (10YR 7/2) sandy clay loam; many medium distinct yellowish red (5YR 5/8) mottles, yellowish brown (10YR 6/8) mottles, and common fine distinct red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm; sand grains coated and bridged with clay; very strongly acid.

Reaction ranges from extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 4 to 6, and chroma of 1. The thickness of this horizon ranges from 3 to 7 inches.

The E horizon has hue of 10YR, value of 6 to 8, and chroma of 1 or 2. The thickness of this horizon ranges from 30 to 45 inches. The texture is sand or fine sand.

The Bh horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or hue of 7.5YR, value of 3, and chroma of 2. The thickness of this horizon ranges from 2 to 10 inches. The texture is sand or fine sand. The Btg horizon has hue of 10YR, value of 6 or 7, and chroma of 1 or 2. This horizon has mottles in shades of yellow, brown, and red. The texture is sandy loam, fine sandy loam, or sandy clay loam.

Holopaw Series

The Holopaw series consists of soils that are nearly level, poorly drained and very poorly drained, and moderately permeable. These soils formed in sandy and loamy marine sediment. They are in drainageways and depressions and on the low flatwoods. The water table is within 12 inches of the surface for 2 to 6 months of the year. Depressional areas are ponded for more than 6 months during most years. Some areas are flooded for 2 to 4 months during most years. The slopes range from 0 to 2 percent. Holopaw soils are loamy, siliceous, hyperthermic Grossarenic Ochraqualfs.

Holopaw soils are geographically associated with Malabar, Pompano, and Riviera soils. Malabar soils have a Bw horizon. Pompano soils do not have a Bt horizon. Riviera soils have a Bt horizon between depths of 20 and 40 inches.

Typical pedon of Holopaw fine sand; 2.4 miles northwest of intersection of Bardin Road and Florida State Highway 100, 0.6 mile south of State Highway 100; Land Grant 38, T. 9 S., R. 25 E.

A—0 to 6 inches; dark gray (10YR 4/1) fine sand; common medium distinct gray (10YR 6/1, 6/2) mottles; weak fine granular structure; very friable; many fine, medium, and coarse roots; extremely acid; gradual wavy boundary.

Eg1—6 to 17 inches; light gray (10YR 6/1) fine sand; common medium distinct dark gray (10YR 4/1) mottles; single grained; loose; few fine, medium, and coarse roots; strongly acid; gradual wavy boundary.

Eg2—17 to 35 inches; gray (10YR 5/1) fine sand; common medium distinct strong brown (7.5YR 5/8) mottles and light gray (10YR 7/1) mottles; single grained; loose; few medium and coarse roots; medium acid; gradual wavy boundary.

Eg3—35 to 55 inches; dark gray (10YR 4/1) fine sand; common medium distinct very dark gray (10YR 3/1) mottles and light gray (10YR 6/1) mottles; single grained; loose; few medium roots; medium acid; abrupt wavy boundary.

Btg1—55 to 69 inches; gray (5Y 5/1) fine sandy loam; strong coarse subangular blocky structure; friable; few medium roots; sand grains bridged with clay; few light olive brown (2.5Y 5/6) stains along root channels; few pockets of dark gray (10YR 4/1) fine sand 2 to 3 inches in diameter; medium acid; gradual wavy boundary.

Btg2—69 to 80 inches; greenish gray (5GY 5/1) sandy clay loam; moderate coarse subangular blocky structure; friable; few medium roots; clay bridging between sand grains; few pockets of dark gray fine sand; medium acid.

The thickness of the solum ranges from 50 to more than 80 inches. Reaction ranges from extremely acid to slightly acid in the A horizon and from strongly acid to moderately alkaline in the Eg and Btg horizons.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1. The thickness of this horizon ranges from 3 to 7 inches.

The Eg horizon has hue of 10YR, value of 4 to 7, and chroma of 2 or less and has mottles of gray, brown, or yellow. The thickness of this horizon ranges from 40 to 53 inches. The texture is fine sand or sand.

The Btg horizon has hue of 10YR, 5Y, or 5GY, value of 4 or 5, and chroma of 1 or 2; or it is neutral (N) and has value of 4 or 5. This horizon has mottles of gray, brown, or yellow. Pockets and lenses of sand or loamy sand range from none to common. The thickness of this horizon ranges from 10 to more than 25 inches. The texture is fine sandy loam, sandy loam, or sandy clay loam.

Some pedons have a Cg horizon that has hue of 10YR, value of 4, and chroma of 1; or hue of 5GY, value of 5, and chroma of 1. The texture is fine sand, sand, or loamy fine sand.

Hontoon Series

The Hontoon series consists of soils that are nearly level, very poorly drained, and rapidly permeable. These soils formed in thick beds of well decomposed hydrophytic, nonwoody plant remains. They are in depressional areas on the flatwoods and uplands. The high water table is at or above the surface except during

extended dry periods. The slopes are concave and are less than 1 percent. Hontoon soils are dysic, hyperthermic Typic Medisaprists.

Hontoon soils are geographically associated with Myakka, Placid, Samsula, and St. Johns soils. The associated soils are mineral soils except Samsula soils. Samsula soils have organic layers that are less than 51 inches thick.

Typical pedon of Hontoon muck; in a wooded area; 1.1 miles south of intersection of Putnam County Roads 21 and 20A, 0.6 mile east of County Road 21; 1,000 feet west and 50 feet south of the northeast corner of sec. 2, T. 10 S., R. 23 E.

Oa1—0 to 20 inches; black (10YR 2/1) muck; massive; slightly sticky; common coarse roots; about 15 percent fiber, 5 percent rubbed; dark grayish brown (10YR 4/2) sodium pyrophosphate extract; extremely acid; clear wavy boundary.

Oa2—20 to 80 inches; dark reddish brown (5YR 3/3) muck; massive; friable; about 25 percent fiber, 10 percent rubbed; pale brown (10YR 6/3) sodium pyrophosphate; extremely acid.

Reaction is less than 4.5 in 0.01 molar calcium chloride. The mineral content that consists of light gray sand grains ranges from 5 to 20 percent in the organic material.

The Oa horizon has hue of 10YR, value of 2, and chroma of 1 or 2; hue of 10YR, value of 3, and chroma of 2; hue of 5YR, value of 2, and chroma of 1 or 2; or hue of 5YR, value of 3, and chroma of 2 or 3. The thickness of this horizon ranges from 65 to 80 inches or more.

Some pedons have a C horizon at a depth of 65 inches or more. The C horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The texture is sand or fine sand.

Immokalee Series

The Immokalee series consists of soils that are nearly level, poorly drained, and moderately permeable. These soils formed in sandy marine or eolian deposits. They are in broad areas on the flatwoods and in a few long, narrow areas bordering drainageways. The water table is at a depth of less than 12 inches for about 2 months during most years. It is between depths of 12 and 40 inches for more than 8 months in most years. During extended dry periods, it is at a depth of more than 40 inches. The slopes range from 0 to 2 percent. Immokalee soils are sandy, siliceous, hyperthermic Arenic Haplaquods.

Immokalee soils are geographically associated with Myakka, Ona, Placid, and St. Johns soils. Myakka soils have a spodic horizon at a depth of 20 to 30 inches. Ona soils do not have an E horizon. Placid and St. Johns soils are in lower positions on the landscape than Immokalee soils and have a thick, dark color A horizon. In addition, Placid soils do not have a spodic horizon.

Typical pedon of Immokalee fine sand; in a wooded area; 0.7 mile south of University of Florida, Education and Research Center Headquarters at Welaka, 1,000 feet west of Putnam County Road 309; 2,640 feet north and 3,240 feet west of the southeast corner of Land Grant 40, 15, T. 12 S., R. 26 E.

A1—0 to 4 inches; black (10YR 2/1) fine sand; common uncoated light gray sand grains; weak medium granular structure; friable; common fine and medium roots; medium acid; clear smooth boundary.

A2—4 to 7 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; very friable; common fine and medium roots; medium acid; clear smooth boundary.

E—7 to 35 inches; light gray (10YR 7/1) fine sand; single grained; loose; few fine, medium, and coarse roots; medium acid; abrupt wavy boundary.

Bh1—35 to 41 inches; black (10YR 2/1) fine sand; weak medium subangular blocky structure; friable; common fine, medium, and coarse roots; medium acid; gradual smooth boundary.

Bh2—41 to 48 inches; dark reddish brown (5YR 3/2) fine sand; weak medium granular structure; friable; few fine, medium, and coarse roots; medium acid; gradual wavy boundary.

BC—48 to 68 inches; dark yellowish brown (10YR 4/4) fine sand; common medium distinct grayish brown (10YR 5/2) mottles; single grained; loose; medium acid; gradual smooth boundary.

C—68 to 80 inches; dark gray (10YR 4/1) fine sand; common coarse distinct gray (10YR 5/1) mottles; single grained; loose; medium acid.

Reaction ranges from extremely acid to medium acid except where lime has been added.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. The thickness of this horizon ranges from 5 to 9 inches.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2; or hue of 10YR, value of 7, and chroma of 2. The thickness of this horizon ranges from 25 to 40 inches. The texture is sand or fine sand.

The Bh horizon has hue of 10YR, value of 2, and chroma of 1; hue of 10YR, value of 3, and chroma of 1 to 3; hue of 7.5YR, value of 3, and chroma of 2; or hue of 5YR, value of 3, and chroma of 2 or 3. The thickness of this horizon ranges from 10 to 28 inches. The texture is sand, fine sand, or loamy fine sand.

The BC horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. The texture is sand or fine sand.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. The texture is sand or fine sand.

Lochloosa Series

The Lochloosa series consists of soils that are nearly level to gently sloping, somewhat poorly drained, and slowly permeable. These soils formed in sandy and loamy marine sediment. They are on low knolls, ridges, and side slopes on the uplands. The water table is at a depth of 30 to 60 inches for 1 month to 4 months during most years. It rises to a depth of about 15 inches for 1 week to 3 weeks. The slopes range from 0 to 5 percent. Lochloosa soils are loamy, siliceous, hyperthermic Aquic Arenic Paleudults.

Lochloosa soils are geographically associated with Apopka, Millhopper, and Sparr soils. The associated soils have an argillic horizon at a depth of more than 40 inches. In addition, Apopka and Millhopper soils are in higher positions on the landscape than Lochloosa soils; and Apopka soils are well drained, and Millhopper soils are moderately well drained.

Typical pedon of Lochloosa sand, 0 to 5 percent slopes; in a wooded area; 0.75 mile west of Putnam County Road 21; 30 feet northeast of center of sec. 29, T. 9 S., R. 23 E.

A—0 to 5 inches; dark gray (10YR 4/1) sand; weak medium subangular blocky structure; very friable; common fine and medium roots; many uncoated light gray sand grains; strongly acid; gradual wavy boundary.

E1—5 to 20 inches; brown (10YR 5/3) sand; single grained; loose; few fine and medium roots; strongly acid; gradual smooth boundary.

E2—20 to 27 inches; pale brown (10YR 6/3) sand; few fine faint light brownish gray mottles; single grained; loose; few fine and medium roots; few 1/2 inch dark brown ironstone nodules; very strongly acid; clear smooth boundary.

Bt—27 to 32 inches; yellowish brown (10YR 5/4) loamy sand; common coarse distinct light brownish gray (10YR 6/2) mottles and light gray (10YR 7/2) mottles; weak medium subangular blocky structure; friable; few fine and medium roots; strongly acid; clear smooth boundary.

Btg1—32 to 44 inches; light brownish gray (10YR 6/2) sandy clay loam; many coarse distinct light yellowish brown (10YR 6/4) mottles and few distinct reddish yellow (7.5YR 6/8) mottles; moderate medium subangular blocky structure; firm; sand grains coated and bridged with clay; strongly acid; gradual irregular boundary.

Btg2—44 to 62 inches; light gray (10YR 6/1) sandy clay loam; few fine distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; sand grains coated and bridged with clay; strongly acid; gradual smooth boundary.

BCg—62 to 80 inches; light gray (10YR 6/1) fine sandy loam; common coarse distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; very strongly acid.

Reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2; or hue of 10YR, value of 5, and chroma of 2. The thickness of this horizon ranges from 5 to 7 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 3 or 4 and has mottles of gray, brown, or yellow. The texture is sand or fine sand.

The Bt1 horizon has hue of 10YR, value of 5, and chroma of 5 to 8; hue of 10YR, value of 6, and chroma of 3 to 6; or hue of 10YR, value of 7, and chroma of 3 or 4 and has mottles of gray, brown, yellow, or red. The thickness of this horizon ranges from 3 to 7 inches. The texture is loamy sand to fine sandy loam. Some pedons have a Bt2 horizon that has colors that are the same as those of the Bt1 horizon and has mottles that increase in size and abundance. The texture is fine sandy loam, sandy loam, or sandy clay loam. The Btg horizon has hue of 10YR, value of 5, and chroma of 1 or 2. The combined thickness of the Bt horizons ranges from 25 to 40 inches. The texture is fine sandy loam or sandy clay loam. Plinthite is in the Bt horizon in some pedons. The content of plinthite ranges up to 5 percent.

The BCg horizon has hue of 10YR, value of 6, and chroma of 1 or 2; or hue of 10YR, value of 7, and chroma of 1. The texture is sandy clay loam or fine sandy loam. Some pedons do not have a BCg horizon.

The Cg horizon has hue of 10YR, value of 6, and chroma of 2; or hue of 10YR, value of 7, and chroma of 1. The texture is fine sandy loam or sandy clay loam and has lenses of sandy loam or loamy sand. Some pedons do not have a Cg horizon.

Malabar Series

The Malabar series consists of soils that are deep, nearly level, poorly drained, and slowly permeable or very slowly permeable. These soils formed in sandy and loamy marine sediment. They are on the low flatwoods. The high water table is at a depth of less than 12 inches for 2 to 6 months in most years. The slopes are less than 2 percent. Malabar soils are loamy, siliceous, hyperthermic Grossarenic Ochraqualfs.

Malabar soils are geographically associated with Holopaw, Myakka, Palmetto, Pomona, and Pompano soils. The associated soils are in slightly higher positions on the flatwoods than Malabar soils and do not have a Bw horizon. In addition, Myakka soils have a spodic horizon and do not have an argillic horizon, Palmetto and Pomona soils have a Bh horizon, and Pompano soils do not have an argillic horizon.

Typical pedon of Malabar fine sand; in a wooded area; 1.9 miles northwest of intersection of Bardin Road and

Florida State Highway 100, 0.3 mile north of State Highway 100; Land Grant 38, T. 9 S., R. 25 E.

A—0 to 4 inches; black (10YR 2/1) fine sand; weak medium granular structure; friable; common fine, medium, and coarse roots; many uncoated light gray sand grains; medium acid; gradual smooth boundary.
E1—4 to 7 inches; grayish brown (10YR 5/2) fine sand; common medium distinct very dark grayish brown (10YR 3/2) mottles and dark grayish brown (10YR 4/2) mottles; single grained; loose; few fine and medium roots; slightly acid; gradual wavy boundary.
E2—7 to 20 inches; very pale brown (10YR 8/3) fine sand; few medium distinct yellow (10YR 8/8) mottles; single grained; loose; few fine roots; slightly acid; clear wavy boundary.
Bw1—20 to 26 inches; brownish yellow (10YR 6/6) fine sand; single grained; loose; iron coatings on sand grains; neutral; clear wavy boundary.
Bw2—26 to 31 inches; yellowish brown (10YR 5/8) fine sand; common medium distinct grayish brown (10YR 5/2) mottles; single grained; loose; iron coatings on sand grains; neutral; clear wavy boundary.
Eg—31 to 60 inches; grayish brown (10YR 5/2) fine sand; common medium distinct dark gray (10YR 4/1) mottles; single grained; loose; moderately alkaline; abrupt wavy boundary.
Btg—60 to 75 inches; gray (5Y 5/1) sandy clay loam; moderate medium subangular blocky structure; friable; common pockets of gray (N 5/0) loamy fine sand and fine sandy loam; moderately alkaline; clear wavy boundary.
BCg—75 to 80 inches; gray (5Y 5/1) fine sandy loam; massive; friable; few pockets of gray fine sand; moderately alkaline.

The thickness of the solum ranges from 50 to 80 inches or more. Reaction ranges from strongly acid to moderately alkaline.

The A horizon has hue of 10YR, value of 2, and chroma of 1; or hue of 10YR, value of 3, and chroma of 2. The thickness of this horizon ranges from 4 to 7 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2; or hue of 10YR, value of 8, and chroma of 3. The thickness of this horizon ranges from 8 to 38 inches. The texture is sand or fine sand.

The Bw horizon has hue of 10YR, value of 5 or 6, and chroma of 3 to 8; or hue of 7.5YR, value of 5, and chroma of 8. The thickness of this horizon ranges from 10 to 35 inches. The texture is sand or fine sand.

The Eg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2; or hue of 10YR, value of 6, and chroma of 3. The thickness of this horizon ranges from 0 to 29 inches. The texture is sand or fine sand. Some pedons do not have an Eg horizon.

The Btg and BCg horizons have hue of 10YR or 5Y, value of 5 to 7, and chroma of 1. The texture is sandy loam, fine sandy loam, or sandy clay loam.

Millhopper Series

The Millhopper series consists of soils that are nearly level to sloping, moderately well drained, and moderately slowly permeable. These soils formed in sandy and loamy marine deposits. They are on ridges and side slopes on the uplands. The water table is between depths of 40 and 60 inches for 1 month to 4 months in most years. It may be between depths of 30 and 40 inches for 3 weeks or less in some years. The slopes range from 0 to 8 percent. Millhopper soils are loamy, siliceous, hyperthermic Grossarenic Paleudults.

Millhopper soils are geographically associated with Apopka, Candler, and Sparr soils. Apopka soils are well drained. Candler soils are excessively drained and have lamellae between depths of 40 and 80 inches. Sparr soils are somewhat poorly drained.

Typical pedon of Millhopper sand, 0 to 5 percent slopes; 1 mile west of Putnam County Road 21, 0.2 mile north of Orange Creek; 900 feet north and 2,100 feet east of the southwest corner of sec. 11, T. 11 S., R. 23 E.

A—0 to 3 inches; grayish brown (10YR 5/2) sand; single grained; loose; common fine and few medium and coarse roots; very strongly acid; clear wavy boundary.
E1—3 to 8 inches; light yellowish brown (10YR 6/4) sand; single grained; loose; many fine and medium roots; very strongly acid; gradual wavy boundary.
E2—8 to 40 inches; very pale brown (10YR 7/4) sand; single grained; loose; few fine and medium roots; strongly acid; clear wavy boundary.
E3—40 to 50 inches; very pale brown (10YR 7/3) sand; single grained; loose; few medium roots; few coarse pockets of light gray (10YR 7/2) uncoated sand grains; strongly acid; gradual wavy boundary.
E4—50 to 59 inches; very pale brown (10YR 8/3) sand; few fine distinct strong brown (7.5YR 5/8) mottles and few coarse distinct yellowish red (5YR 5/8) mottles; single grained; loose; few coarse pockets of light gray (10YR 7/2) uncoated sand grains; strongly acid; gradual wavy boundary.
E5—59 to 66 inches; light gray (10YR 7/2) sand; common coarse distinct strong brown (7.5YR 5/8) mottles; single grained; loose; strongly acid; abrupt wavy boundary.
Bt—66 to 70 inches; brown (10YR 5/3) fine sandy loam; many coarse distinct strong brown (7.5YR 5/6) mottles, grayish brown (10YR 5/2) mottles, and few medium distinct red (10R 4/8) mottles; weak fine subangular blocky structure; friable; few fine and medium roots; sand grains bridged and coated with

clay; few pockets of fine sand; strongly acid; clear wavy boundary.
Btg—70 to 80 inches; gray (10YR 5/1) sandy clay loam; many coarse prominent yellowish red (5YR 4/8) mottles and red (10YR 4/8) mottles; moderate medium subangular blocky structure; friable; sand grains bridged and coated with clay; very strongly acid.

The combined thickness of the A and E horizons is 40 to 70 inches. A few plinthite nodules, 5 to 15 millimeters, are in some pedons. Reaction ranges from very strongly acid to medium acid.

The A horizon has hue of 10YR, value of 3, and chroma of 1 or 2; or hue of 10YR, value of 4 or 5, and chroma of 2. The thickness of this horizon ranges from 3 to 8 inches. In pedons that have value of 3, the thickness of the A horizon is less than 6 inches.

The E horizon has hue of 10YR, value of 5, and chroma of 3. The upper part of the E horizon has hue of 10YR, value of 6 or 7, and chroma of 3 or 4, and the lower part has hue of 10YR, value of 7, and chroma of 1 to 3; or hue of 10YR, value of 8, and chroma of 1 to 4. Depth to mottles and matrix colors that are indicative of wetness is more than 40 inches. The thickness of this horizon ranges from 36 to 72 inches. The texture is sand or fine sand.

The Bt horizon has hue of 10YR, value of 5 to 7, and chroma of 3 or 4. In some pedons, the Bt horizon has mottles of gray, yellow, brown, or red. The Bt horizon is 8 inches or less thick. The texture is loamy fine sand, loamy sand, or fine sandy loam. Some pedons do not have a Bt horizon. The Btg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2 and has mottles of gray, brown, yellow, and red. The texture is fine sandy loam, sandy loam, or sandy clay loam. This horizon extends to a depth of 80 inches or more.

The field pH determination of very strongly acid is shown in the A horizon. The laboratory pH determination shown in table 19 is slightly below the range of very strongly acid. Very strongly acid is more representative of the soils in the survey area.

Monteocha Series

The Monteocha series consists of soils that are nearly level, very poorly drained, and moderately permeable or moderately slowly permeable. These soils formed in thick deposits of sandy and loamy marine sediment. They are in depressions on the flatwoods. The water table is above the surface of the soil for more than 4 months in most years. The slopes are concave and are less than 2 percent. Monteocha soils are sandy, siliceous, hyperthermic Ultic Haplaquods.

Monteocha soils are geographically associated with Placid, Pomona, and St. Johns soils. Placid and St. Johns soils are in similar positions on the landscape as Monteocha soils, but Placid soils do not have argillic and spodic horizons, and St. Johns soils do not have an argillic horizon. Pomona soils are in slightly higher positions on the landscape and do not have an umbric epipedon.

Typical pedon of Monteocha sand, depressional; in a wooded area; 1.2 miles west of Putnam County Road 21, 0.7 mile south of Orange Land Road; 2,000 feet south and 5,000 feet west of the northeast corner of sec. 19, T. 10 S., R. 23 E.

A—0 to 12 inches; black (10YR 2/1) sand; moderate medium granular structure; friable; many fine and medium roots; few large roots; extremely acid; clear smooth boundary.
E—12 to 25 inches; gray (10YR 6/1) sand; single grained; loose; common fine and few medium roots; extremely acid; abrupt wavy boundary.
Bh1—25 to 31 inches; black (10YR 2/1) sand; moderate medium subangular blocky structure; friable; common fine and few medium roots; sand grains well coated with organic matter; extremely acid; clear wavy boundary.
Bh2—31 to 34 inches; dark reddish brown (5YR 3/2) sand; moderate medium subangular blocky structure; friable; very strongly acid; clear wavy boundary.
BC—34 to 39 inches; dark brown (10YR 4/3) sand; weak medium granular structure; friable; strongly acid; clear wavy boundary.
E'—39 to 50 inches; brown (10YR 5/3) sand; single grained; loose; very strongly acid; clear wavy boundary.
Btg1—50 to 65 inches; gray (10YR 6/1) sandy loam; weak fine subangular blocky structure; friable; strong cementation in some small peds 1/4 to 1 inch in diameter; sand grains well coated and bridged with clay; very strongly acid; clear wavy boundary.
Btg2—65 to 80 inches; light gray (10YR 6/1) sandy loam; weak fine subangular blocky structure; friable; sand grains well coated and bridged with clay; very strongly acid.

The thickness of the solum is more than 60 inches. Reaction is extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1; or it is neutral (N) and has value of 2 or 3. The content of organic matter ranges from 5 to 12 percent. The thickness of this horizon ranges from 10 to 21 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. The E horizon is 6 to 17 inches thick. The combined thickness of the A and E horizons ranges from 17 to 27 inches. The texture is sand or fine sand.

The Bh horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3; or hue of 5YR, value of 3, and chroma of 2. The thickness of this horizon ranges from 6 to 15 inches. The texture is sand or fine sand.

The BC horizon has hue of 10YR, value of 4, and chroma of 2 or 3; or hue of 10YR, value of 5, and chroma of 3. The thickness of this horizon ranges from 4 to 7 inches. The texture is sand or fine sand.

The E' horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 3. This horizon may have few to common gray, yellow, or brown mottles. The thickness of this horizon ranges from 9 to 14 inches. The texture is sand or fine sand.

The Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 2 or less; or hue of 10YR, value of 4, and chroma of 1. In some pedons, the Btg horizon has mottles of yellow and brown. The texture is fine sandy loam, sandy loam, or sandy clay loam. The upper part of this horizon may contain a few masses of a coarser textured, weakly cemented material.

Mulat Series

The Mulat series consists of soils that are deep, nearly level, poorly drained, and slowly permeable or moderately slowly permeable. These soils formed in loamy marine material. They are in low areas on the uplands and on the flatwoods. The high water table is at a depth of less than 12 inches for 2 to 8 months of the year. It is between depths of 12 and 30 inches during periods of low rainfall. The slopes are less than 2 percent. Mulat soils are loamy, siliceous, thermic Arenic Ochraquults.

These soils are taxadjuncts to the Mulat series because the base saturation in the Cg horizon is higher than allowed in the series and is outside the range of the Ultisols. The higher base saturation in the sandy Cg horizon does not significantly affect the use, management, and behavior of these soils.

Mulat soils are geographically associated with Lochloosa, Millhopper, Palmetto, Pomona, Surrency, and Wauchula soils. Lochloosa, Millhopper, Palmetto, and Pomona soils have an argillic horizon at a depth of more than 40 inches. In addition, Palmetto soils have a weak Bh horizon and Pomona soils have a spodic horizon above the argillic horizon. Surrency soils have an umbric epipedon and are in depressional areas. Wauchula soils have a spodic horizon above the argillic horizon.

Typical pedon of Mulat fine sand; in a pecan grove; 2,000 feet south of intersection of Cutoff Road and Federal Point Road, 75 feet east of Federal Point Road; Land Grant 37, T. 9 S., R. 27 E.

A1—0 to 5 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; many fine and medium and few coarse roots; very strongly acid; clear wavy boundary.

A2—5 to 9 inches; dark gray (10YR 4/1) fine sand; many coarse distinct very dark gray (10YR 3/1) mottles; single grained; loose; few fine and medium roots; very strongly acid; clear wavy boundary.

Eg1—9 to 19 inches; grayish brown (10YR 5/2) fine sand; common medium distinct dark gray (10YR 3/1) mottles, gray (10YR 4/1) mottles, and dark grayish brown (10YR 4/2) mottles; single grained; loose; few medium and coarse roots; very strongly acid; gradual smooth boundary.

Eg2—19 to 33 inches; dark grayish brown (10YR 4/2) fine sand; common coarse distinct very dark gray (10YR 3/1) mottles, dark gray (10YR 4/1) mottles, and gray (10YR 5/1) mottles; few coarse distinct strong brown (10YR 4/3) mottles in lower 2 inches; single grained; loose; very strongly acid; clear wavy boundary.

Btg1—33 to 38 inches; gray (10YR 5/1) fine sandy loam; common coarse distinct yellowish brown (10YR 5/6, 5/8) mottles; moderate medium subangular blocky structure; slightly sticky; sand grains coated and bridged with clay; common coarse pockets of gray (10YR 5/1) fine sand; extremely acid; gradual wavy boundary.

Btg2—38 to 58 inches; gray (10YR 5/1) sandy clay loam; common coarse distinct yellowish brown (10YR 5/6, 5/8) mottles; weak medium subangular blocky structure; slightly sticky; extremely acid; clear smooth boundary.

Cg1—58 to 63 inches; gray (10YR 5/1) loamy fine sand; common coarse distinct light olive brown (2.5Y 5/4) mottles; single grained; loose; extremely acid; clear smooth boundary.

Cg2—63 to 80 inches; light gray (10YR 7/1) fine sand; few medium distinct light olive brown (2.5Y 5/4) mottles; single grained; loose; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. Reaction ranges from extremely acid to medium acid except where lime has been added.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1. The thickness of this horizon ranges from 4 to 11 inches. In pedons that have value of 3 or less, the thickness of the A horizon is less than 5 inches.

The Eg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2; or hue of 10YR, value of 4, and chroma of 2. In some pedons, this horizon has mottles of gray, brown, and yellow. The thickness of this horizon ranges from 20 to 32 inches. The texture is sand or fine sand.

The Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2; or hue of 10YR, value of 7, and chroma of 2. In most pedons, this horizon has mottles in shades of red, brown, yellow, or gray. The thickness of this horizon ranges from 12 to 25 inches. The texture is sandy loam, fine sandy loam, or sandy clay loam.

The Cg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. The texture is loamy fine sand, sand, or fine sand.

Myakka Series

The Myakka series consists of soils that are nearly level, poorly drained and very poorly drained, and moderately permeable. These soils formed in sandy marine or eolian material. They are on the broad flatwoods. The water table is at a depth of less than 12 inches for 1 month to 4 months in most years. It is at a depth of more than 40 inches during long, dry periods. The slopes range from 0 to 2 percent. Myakka soils are sandy, siliceous, hyperthermic Aeric Haplaquods.

Myakka soils are geographically associated with Immokalee, Ona, St. Johns, and Zolfo soils. Immokalee soils have a spodic horizon between depths of 30 and 50 inches. Ona soils have an indistinct, thin, and discontinuous E horizon. St. Johns soils are very poorly drained and have an A horizon that is thicker than that of Myakka soils. Zolfo soils have a spodic horizon at a depth of more than 50 inches and are somewhat poorly drained.

Typical pedon of Myakka fine sand; 1.5 miles north of intersection of U.S. Highway 17 and Putnam County Road 209, 1.8 miles west of U.S. Highway 17; 600 feet south and 2,500 feet east of the northwest corner of sec. 11, T. 9 S., R. 26 E.

A1—0 to 5 inches; black (10YR 2/1) fine sand; common medium distinct dark gray (10YR 4/1) mottles; weak medium granular structure; very friable; common fine and medium roots; strongly acid; clear smooth boundary.

A2—5 to 8 inches; dark gray (10YR 4/1) fine sand; common medium distinct (10YR 3/1) mottles; weak fine granular structure; friable; common fine and medium roots; strongly acid; clear wavy boundary.

E—8 to 21 inches; gray (10YR 5/1) fine sand; single grained; loose; common fine and medium roots; strongly acid; abrupt wavy boundary.

Bh1—21 to 33 inches; black (N 2/0) fine sand; moderate medium subangular blocky structure; friable; common fine, medium, and coarse roots; strongly acid; clear wavy boundary.

Bh2—33 to 38 inches; very dark gray (10YR 3/1) fine sand; weak fine subangular blocky structure; common fine, medium, and coarse roots; few fine pockets of uncoated light gray sand grains; strongly acid; clear wavy boundary.

E'—38 to 42 inches; gray (10YR 5/1) fine sand; common coarse distinct very dark gray (10YR 3/1) mottles; single grained; loose; strongly acid; clear wavy boundary.

B'h1—42 to 50 inches; very dark gray (10YR 3/1) fine sand; moderate medium subangular blocky structure; friable; very strongly acid; clear smooth boundary.

B'h2—50 to 60 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; strongly acid; clear smooth boundary.

C—60 to 80 inches; dark gray (10YR 4/1) fine sand; single grained; loose; strongly acid.

Reaction ranges from extremely acid to medium acid.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1. The thickness of this horizon ranges from 4 to 8 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. The thickness of this horizon ranges from 13 to 20 inches. The texture is sand or fine sand.

The Bh horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; hue of 7.5YR or 5YR, value of 3, and chroma of 2; or it is neutral (N) and has value of 2. The thickness of this horizon ranges from 4 to 7 inches. The texture is sand, fine sand, or loamy fine sand.

The E' horizon has colors that are the same as those of the E horizon. Some pedons do not have an E' horizon.

The B'h horizon has colors that are the same as those of the Bh horizon. Some pedons do not have a B'h horizon.

Some pedons have a BC horizon that has hue of 10YR, value of 4 or 5, and chroma of 4; hue of 10YR, value of 6, and chroma of 3; or hue of 5YR, value of 4, and chroma of 3. The texture is sand or fine sand.

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

Narcoossee Series

The Narcoossee series consists of soils that are nearly level, somewhat poorly drained, and moderately rapidly permeable. These soils formed in thick deposits of marine or eolian sand. They are on ridges and knolls that are slightly higher than the adjacent flatwoods. The water table is at a depth of 24 to 40 inches for 4 to 6 months in most years. The slopes range from 0 to 2 percent. Narcoossee soils are sandy, siliceous, hyperthermic Entic Haplohumods.

Narcoossee soils are geographically associated with Adamsville, Cassia, Tavares, and Zolfo soils. Adamsville and Tavares soils do not have a spodic horizon. Cassia soils have a continuous, well developed spodic horizon at a depth of less than 30 inches. Zolfo soils have a spodic horizon at a depth of more than 50 inches.

Typical pedon of Narcoossee fine sand; in a wooded area; 100 yards west of the north end of Hoover Road and 50 yards south; 200 feet south and 600 feet west of the northeast corner of sec. 32, T. 9 S., R. 25 E.

A—0 to 4 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; few fine, medium, and coarse roots; extremely acid; gradual smooth boundary.

E—4 to 22 inches; light gray (10YR 7/1) fine sand; few common distinct very dark gray (10YR 3/1) mottles;

single grained; loose; few medium and coarse roots; very strongly acid; abrupt irregular boundary.
Bh1—22 to 25 inches; dark reddish brown (5YR 3/3) fine sand; weak medium subangular blocky structure; friable; few medium and coarse roots; common coarse masses of dark reddish gray (5YR 4/2) fine sand and dark reddish brown (5YR 2/2) fine sand; about 20 percent discontinuous; very strongly acid; clear wavy boundary.
Bh2—25 to 29 inches; dark reddish brown (5YR 3/4) fine sand; weak medium subangular blocky structure; friable; few fine, medium, and coarse roots; about 15 percent discontinuous; very strongly acid; gradual wavy boundary.
BC—29 to 33 inches; brown (10YR 5/3) fine sand; few coarse distinct reddish gray (5YR 5/2) mottles and gray (5YR 5/1) mottles; single grained; loose; few fine, medium, and coarse roots; very strongly acid; gradual smooth boundary.
C1—33 to 40 inches; pale brown (10YR 6/3) fine sand; few fine distinct dark yellowish brown (10YR 4/4) mottles; single grained; loose; few fine roots; strongly acid; gradual smooth boundary.
C2—40 to 80 inches; light gray (10YR 7/2) fine sand; few medium distinct dark yellowish brown (10YR 4/4) mottles; single grained; loose; few fine roots; strongly acid.

Reaction ranges from extremely acid to medium acid. The texture of the A horizon is fine sand. It is sand or fine sand below that horizon.

The A or Ap horizon has hue of 10YR, value of 3, and chroma of 1 or 2. The thickness of the A or Ap horizon ranges from 3 to 7 inches.

The E horizon has hue of 10YR, value of 4, and chroma of 1; or hue of 10YR, value of 5 to 7, and chroma of 1 or 2. The thickness of this horizon ranges from 13 to 18 inches.

The Bh horizon has hue of 10YR, value of 2, and chroma of 1; hue of 7.5YR, value of 3, and chroma of 2 or 3; hue of 7.5YR, value of 4, and chroma of 3 or 4; hue of 5YR, value of 2, and chroma of 2; or hue of 5YR, value of 3, and chroma of 2 or 3. The thickness of this horizon ranges from 3 to 7 inches. This horizon is discontinuous in some pedons.

The BC horizon has hue of 10YR, value of 4, and chroma of 4; hue of 10YR, value of 5, and chroma of 3 or 4; hue of 7.5YR, value of 4, and chroma of 4; or hue of 5YR, value of 4, and chroma of 6. The thickness of this horizon ranges from 4 to 16 inches.

The C horizon has hue of 10YR, value of 6, and chroma of 1 to 4; or hue of 10YR, value of 7, and chroma of 1 or 2.

Newnan Series

The Newnan series consists of soils that are nearly level, somewhat poorly drained, and moderately slowly permeable to slowly permeable. These soils formed in sandy and loamy marine sediment. They are along the edges of well defined drainageways and depressions and on low ridges and knolls on the flatwoods and on the uplands. The water table is between depths of 18 and 30 inches for 1 month to 2 months and at a depth of 30 to 60 inches for 2 to 5 months in most years. The slopes range from 0 to 2 percent. Newnan soils are sandy, siliceous, hyperthermic Ultic Haplohumods.

Newnan soils are geographically associated with Cassia, Electra, Millhopper, Pomona, and Sparr soils. Cassia soils do not have an argillic horizon. Electra soils have a spodic horizon at a depth of more than 30 inches. Millhopper soils are in higher positions on the landscape than Newnan soils, do not have a spodic horizon, and are moderately well drained. Pomona soils are in lower positions on the landscape and are poorly drained. Sparr soils do not have a spodic horizon.

Typical pedon of Newnan fine sand; in a pine plantation; 0.75 mile north of Marion County boundary, 0.15 mile west of Alachua County boundary; 1,000 feet south and 700 feet east of the northwest corner of sec. 6, T. 12 S., R. 23 E.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) fine sand; weak medium granular structure; very friable; many fine and few medium roots; very strongly acid; gradual wavy boundary.
E—4 to 22 inches; light gray (10YR 7/2) fine sand; single grained; loose; few fine and medium roots; strongly acid; clear wavy boundary.
Bh1—22 to 26 inches; dark brown (7.5YR 3/2) fine sand; weak medium granular structure; very friable; few fine and medium roots; very strongly acid; gradual wavy boundary.
Bh2—26 to 30 inches; dark yellowish brown (10YR 3/4) fine sand; single grained; loose; few fine roots; very strongly acid; gradual wavy boundary.
BE—30 to 36 inches; yellowish brown (10YR 5/4) fine sand; single grained; loose; strongly acid; gradual wavy boundary.
E'—36 to 58 inches; very pale brown (10YR 7/3) fine sand; single grained; loose; strongly acid; gradual wavy boundary.
Btg1—58 to 65 inches; light brownish gray (10YR 6/2) sandy loam; few coarse distinct dark yellowish brown (10YR 4/4) mottles; few lenses of brown (10YR 4/2) fine sand; weak medium subangular blocky structure; friable; very strongly acid; gradual wavy boundary.
Btg2—65 to 80 inches; light brownish gray (10YR 6/2) sandy clay loam; few medium distinct brownish yellow (10YR 6/6) mottles and few coarse distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; friable; very strongly acid.

Reaction ranges from extremely acid to medium acid.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2; or it is neutral (N) and has value of 3 or 4. The thickness of this horizon ranges from 4 to 8 inches. In pedons that have value of 3, the thickness of the A horizon is less than 5 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. The thickness of this horizon ranges from 6 to 20 inches. The texture is sand or fine sand.

The Bh horizon has hue of 10YR, value of 2, and chroma of 1 or 2; or hue of 10YR, value of 3, and chroma of 2 to 4; or hue of 7.5YR, value of 3, and chroma of 2. The thickness of this horizon ranges from 4 to 12 inches. The texture is sand or fine sand.

The BE horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4; or hue of 7.5YR, value of 4, and chroma of 2 or 4. The thickness of this horizon ranges up to 6 inches. The texture is sand or fine sand. Some pedons do not have a BE horizon.

The E' horizon has hue of 10YR, value of 6 to 8, and chroma of 1 to 4. In some pedons, mottles of various shades of gray, yellow, and brown are common. The thickness of this horizon ranges from 18 to 30 inches. The texture is sand or fine sand.

The Btg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Mottles of red, brown, and yellow are common. The texture is sandy loam, fine sandy loam, or sandy clay loam. Pockets of fine sand or sand range from none to common.

Okeechobee Series

The Okeechobee series consists of soils that are nearly level, very poorly drained, and rapidly permeable. These soils formed in nonwoody, hydrophytic plant remains. They are in large depressions. The water table is at or above the surface except during extended dry periods. The slopes are less than 1 percent. Okeechobee soils are euic, hyperthermic, Hemic Medisaprists.

Okeechobee soils are geographically associated with Hontoon, Placid, and Samsula soils. Hontoon and Samsula soils are dysic and are composed of sapric materials. Placid soils are mineral.

Typical pedon of Okeechobee muck; 1.2 miles west of intersection of Putnam County Road 21 and Florida State Highway 20, 0.35 mile west of County Road 21; 1,700 feet south and 1,800 feet west of the northeast corner of sec. 19, T. 10 S., R. 23 E.

Oa—0 to 25 inches; black (10YR 2/1) muck; massive; slightly sticky; many fine roots; about 25 percent fiber, unrubbed, 10 percent fiber, rubbed; brown (10YR 4/3) sodium pyrophosphate; medium acid; gradual wavy boundary.

Oe—25 to 46 inches; brown (10YR 4/3) hemic material; massive; slightly sticky; few fine roots; about 65 percent fiber, unrubbed, 25 percent fiber, rubbed; very pale brown (10YR 7/3) sodium pyrophosphate extract; few lenses of light gray fine sand; medium acid; gradual wavy boundary.

O'a—46 to 80 inches; dark reddish brown (5YR 3/4) sapric material; massive; slightly sticky; about 25 percent fiber, unrubbed, 10 percent fiber, rubbed; slightly acid.

The thickness of the organic horizon is 51 to 80 inches or more. Reaction ranges from medium acid to mildly alkaline in 1:1 water. pH is more than 4.5 in 0.01 molar calcium chloride.

The Oa and O'a horizons have hue of 10YR, value of 2, and chroma of 1 or 2; or hue of 5YR, value of 2 or 3, and chroma of 2 to 4. The content of fiber ranges from 20 to 30 percent, unrubbed, and from 5 to 15 percent, rubbed.

The Oe horizon has hue of 10YR, value of 3 or 4, and chroma of 3 or 4. The content of fiber ranges from 30 to 65 percent, unrubbed, and from 20 to 35 percent, rubbed. The mineral content in the control section ranges from 10 to 30 percent.

Ona Series

The Ona series consists of soils that are nearly level, poorly drained, and moderately permeable. These soils formed in sandy marine or eolian deposits. They are in broad to narrow areas on the flatwoods. The high water table is at a depth of less than 12 inches for 1 month to 2 months during rainy periods. It is between depths of 12 and 40 inches for 4 to 6 months in most years. The slopes range from 0 to 2 percent. Ona soils are sandy, siliceous, hyperthermic Typic Haplaquods.

Ona soils are geographically associated with Myakka, Narcoossee, Placid, and St. Johns soils. Myakka soils have an A horizon and an E horizon that combined are 20 to 30 inches thick. Narcoossee soils are in slightly higher positions than Ona soils and have a discontinuous spodic horizon. Placid and St. Johns soils are in depressions and are very poorly drained. In addition, Placid soils do not have a spodic horizon.

Typical pedon of Ona fine sand; in a slash pine plantation; 3.2 miles north of intersection of Florida State Highway 20 and Hoover Road, 300 feet east of Hoover Road; 100 feet south and 400 feet east of the northwest corner of sec. 33, T. 9 S., R. 25 E.

A—0 to 9 inches; very dark gray (10YR 3/1) fine sand; weak medium granular structure; very friable; common fine and medium roots; many uncoated light gray sand grains; very strongly acid; clear smooth boundary.

E—9 to 11 inches; dark gray (10YR 4/1) fine sand; single grained; loose; common fine and medium roots; many uncoated sand grains; strongly acid; clear smooth boundary.

Bh1—11 to 21 inches; dark reddish brown (5YR 3/2) fine sand; moderate medium subangular blocky structure; friable; common fine and medium roots; sand grains well coated with organic matter; very strongly acid; gradual wavy boundary.
Bh2—21 to 26 inches; dark brown (7.5YR 3/2) fine sand; weak fine granular structure; friable; common fine and medium roots; sand grains coated with organic matter; very strongly acid; clear wavy boundary.
E'1—26 to 32 inches; pale brown (10YR 6/3) fine sand; single grained; loose; few fine and medium roots; strongly acid; gradual smooth boundary.
E'2—32 to 50 inches; gray (10YR 6/1) fine sand; single grained; loose; strongly acid; gradual wavy boundary.
E'3—50 to 55 inches; brown (10YR 5/3) fine sand; single grained; loose; strongly acid; gradual wavy boundary.
B'h—55 to 80 inches; very dark gray (5YR 3/1) fine sand; single grained; loose; strongly acid.

Reaction ranges from extremely acid to medium acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1. The thickness of this horizon ranges from 5 to 9 inches.

The E horizon is thin and indistinct. It has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. This horizon is 2 inches or less thick. The texture is sand or fine sand. Some pedons do not have an E horizon.

The Bh horizon has hue of 10YR or 5YR, value of 2 or 3, and chroma of 1 or 2; hue of 5YR, value of 3, and chroma of 3; or hue of 7.5YR, value of 3, and chroma of 2. The thickness of this horizon ranges from 7 to 32 inches. The texture is sand or fine sand.

The E' horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 3. The thickness of this horizon ranges from 19 to 29 inches. The texture is sand or fine sand. Some pedons do not have an E' horizon.

The B'h horizon has colors that are the same as those of the Bh horizon. The B'h horizon extends to a depth of 80 inches or more. The texture is sand or fine sand. Some pedons do not have a B'h horizon.

Some pedons have a C horizon that has hue of 10YR, value of 5 to 7, and chroma of 1 or 3. The texture is sand or fine sand.

Orsino Series

The Orsino series consists of soils that are deep, nearly level to sloping, moderately well drained, and very rapidly permeable. These soils formed in sandy marine or eolian deposits. They are on moderately high ridges and slopes on the uplands. The water table is at a depth of 40 to 60 inches for up to 6 months in most years. The slopes range from 0 to 8 percent. Orsino soils are hyperthermic, uncoated Spodic Quartzipsamments.

Orsino soils are geographically associated with Astatula, Cassia, Hobe, Paola, and Tavares soils. Astatula soils do not have a B/E horizon and are excessively drained. Cassia soils have a spodic horizon and are somewhat poorly drained. Hobe soils have spodic horizon and a Bt horizon and are somewhat excessively drained. Paola soils are similar to Orsino soils but are excessively drained. Tavares soils do not have a B/E horizon.

Typical pedon of Orsino fine sand, 0 to 8 percent slopes; 1,000 feet east of the intersection of Putnam County Road 207A and East River Road; Land Grant 40, T. 9 S., R. 27 E.

O—2 to 0 inches; undecomposed root and leaf litter.
A—0 to 6 inches; gray (10YR 6/1) fine sand; weak fine granular structure; very friable; very dark brown (10YR 2/2) stains along old root channels; common fine, medium, and coarse roots; very strongly acid; clear wavy boundary.
E—6 to 24 inches; light gray (10YR 7/2) fine sand; single grained; loose; few coarse distinct dark brown (10YR 4/3) mottles; common medium and coarse roots; extremely acid; abrupt irregular boundary.
B/E—24 to 36 inches; brownish yellow (10YR 6/8) fine sand (B); single grained; loose; common tongues, 1 inch to 5 inches wide, of light gray (10YR 7/2) fine sand (E) from overlying horizon; outer edges of the tongues discontinuously stained with dark grayish brown (10YR 3/2) organic matter; common fine and medium and few coarse roots; extremely acid; gradual wavy boundary.
Bw1—36 to 45 inches; brownish yellow (10YR 6/6) fine sand; single grained; loose; few coarse distinct dark yellowish brown (10YR 4/4) mottles; few fine and medium roots; extremely acid; gradual wavy boundary.
Bw2—45 to 64 inches; yellowish brown (10YR 5/4) fine sand; single grained; loose; few coarse distinct yellowish red (5YR 5/8) mottles; few medium roots; very strongly acid; gradual wavy boundary.
C—64 to 80 inches; light gray (10YR 7/2) fine sand; single grained; loose; few coarse distinct yellowish red (5YR 5/8) mottles; strongly acid.

Reaction ranges from extremely acid to medium acid.

The A horizon has hue of 10YR, value of 4 to 6, and chroma of 1. The thickness of this horizon ranges from 2 to 6 inches.

The E horizon has hue of 10YR, value of 6, and chroma of 1; or hue of 10YR, value of 7 or 8, and chroma of 1 or 2. The thickness of this horizon ranges from 15 to 18 inches. The texture is sand or fine sand.

The B part of the B/E horizon has hue of 10YR, value of 5, and chroma of 4 or 6; or hue of 10YR, value of 6 or 7, and chroma of 4 to 8. The E part of this horizon has the same colors as those of the E horizon. The organic

stained sand has hue of 5YR to 10YR, value of 3, and chroma of 1 or 2. At contact of the E and B horizon, these stains occur as discontinuous layers, 1/2 inch to 2 inches thick, and occur as separate Bh fragments in the B/E horizon. The thickness of the B/E horizon ranges from 12 to 47 inches. The texture is sand or fine sand. The Bw horizon has hue of 10YR, value of 5, and chroma of 4; or hue of 10YR, value of 6, and chroma of 3 to 6. The thickness of this horizon ranges from 0 to 28 inches. The texture is sand or fine sand. Some pedons do not have a Bw horizon.

The C horizon has hue of 10YR, value of 7, and chroma of 2 or 3. In some pedons, the C horizon has mottles in shades of red, brown, and yellow. The texture is sand or fine sand. This horizon extends to a depth of 80 inches or more.

Paisley Series

The Paisley series consists of soils that are nearly level, poorly drained, and slowly permeable. These soils formed in clayey marine sediment. They are in low, broad to narrow areas on the flatwoods. The high water table is at a depth of 12 inches or less for 2 to 6 months in most years. The slopes are less than 1 percent. Paisley soils are fine, montmorillonitic, hyperthermic Typic Albaqualfs.

Paisley soils are geographically associated with Holopaw, Riviera, Wabasso, and Winder soils. Holopaw soils have a sandy A horizon and E horizon that combined are more than 40 inches thick. Riviera soils have sandy A and E horizons that combined are less than 40 inches thick. Wabasso soils have a Bt horizon at a depth of less than 40 inches and have a spodic horizon. Winder soils have tongues of sandy material that extend from the E horizon into the upper part of the Bt horizon.

Typical pedon of Paisley loamy fine sand; in a slash pine plantation; 400 feet north of the intersection of Bardin Road and Florida State Highway 100, 50 feet west of Bardin Road; Land Grant 38, T. 9 S., R. 26 E.

A—0 to 5 inches; very dark gray (10YR 3/1) loamy fine sand; moderate medium granular structure; friable; many fine and few medium and coarse roots; medium acid; clear smooth boundary.

E—5 to 9 inches; grayish brown (10YR 5/2) loamy fine sand; weak fine granular structure; very friable; common fine, medium, and coarse roots; medium acid; abrupt wavy boundary.

Btg1—9 to 25 inches; gray (10YR 6/1) sandy clay; common coarse distinct brownish yellow (10YR 6/6, 6/8) mottles; moderate medium subangular blocky structure; firm, slightly sticky; common medium and coarse roots; few thin clay films on ped faces; medium acid; gradual smooth boundary.

Btg2—25 to 42 inches; light gray (10YR 7/1) sandy clay; common medium distinct yellow (10YR 7/8) mottles; weak fine subangular blocky structure; firm, slightly sticky; few distinct clay films on ped faces; medium acid; gradual wavy boundary.

Btg3—42 to 54 inches; light gray (10YR 7/1) sandy clay; common medium distinct brownish yellow (10YR 6/8) mottles and strong brown (7.5YR 5/8) mottles; weak moderate subangular blocky structure; firm, very sticky; few medium roots; few distinct clay films on ped faces; slightly acid; gradual wavy boundary.

BCg—54 to 65 inches; gray (N 7/0) sandy clay; common medium distinct brownish yellow (10YR 6/8) mottles and many coarse prominent dark red (2.5YR 3/6) mottles; weak medium subangular blocky structure; firm, slightly sticky; few fine roots; few thin discontinuous clay films on ped faces; slightly acid; clear wavy boundary.

Cg—65 to 80 inches; gray (N 7/0) sandy clay; common coarse prominent brownish yellow (10YR 6/8) mottles; massive; firm, slightly sticky; few pockets and lenses of white fine sand and carbonatic material; few hard calcareous nodules, 1/2 to 1 inch in diameter; mildly alkaline.

Reaction ranges from strongly acid to slightly acid in the A horizon and from medium acid to moderately alkaline in the B and C horizons. Carbonate nodules and accumulations range from none to common in the B horizon.

The A horizon has hue of 10YR, value of 2 or 3 and chroma of 1. The thickness of this horizon ranges from 3 to 5 inches.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. The thickness of this horizon ranges from 4 to 11 inches. The texture is loamy sand or loamy fine sand.

The Btg horizon has hue of 10YR, value of 5 to 7, and chroma of 1. It has mottles of yellow, brown, and red that range from few to many. The thickness of this horizon ranges from 43 to 52 inches. The texture is sandy clay or clay.

The BCg horizon has hue of 10YR, value of 6 or 7, and chroma of 1; or it is neutral (N) and has value of 6 or 7. This horizon has mottles of yellow, red, and brown that range from few to common. In some pedons, this horizon has lenses of white fine sand and carbonatic material. The thickness of this horizon ranges from 10 to 18 inches. The texture is sandy clay or clay.

The Cg horizon has hue of 10YR, value of 6 or 7, and chroma of 1; or it is neutral (N) and has value of 6 or 7. Lenses and pockets of fine sand; hard, calcareous nodules and soft, white carbonatic accumulations range from few to many. The Cg horizon extends to a depth of 80 inches or more. The texture is sandy clay or clay.

Palmetto Series

The Palmetto series consists of soils that are nearly level, poorly drained, and moderately slowly permeable. These soils formed in deposits of sandy and loamy marine material. They are in low, broad areas on the flatwoods and in narrow bands along streams and drainageways. The water table is at a depth of less than 12 inches for 2 to 6 months in most years. The slopes range from 0 to 2 percent. Palmetto soils are loamy, siliceous, hyperthermic Grossarenic Paleaquults.

Palmetto soils are geographically associated with Pomona soils. Pomona soils have a spodic horizon, and they are in slightly higher positions on the flatwoods landscape than Palmetto soils.

Typical pedon of Palmetto fine sand; in a wooded area; 1.2 miles southwest of intersection of Florida State Highway 100 and private road to Rice Plantation Recreation Area, 25 feet southeast of private road; Land Grant 37, T. 9 S., R. 25 E.

A1—0 to 6 inches; very dark gray (10YR 3/1) fine sand; moderate medium granular structure; very friable; common fine and few coarse roots; very strongly acid; clear wavy boundary.

A2—6 to 10 inches; dark gray (10YR 4/1) fine sand; single grained; loose; few medium and coarse roots; very strongly acid; gradual smooth boundary.

E1—10 to 15 inches; gray (10YR 6/1) fine sand; single grained; loose; few medium and coarse roots; very strongly acid; gradual smooth boundary.

E2—15 to 21 inches; light gray (10YR 7/1) fine sand; common coarse distinct dark gray (10YR 4/1) mottles and gray (10YR 5/1) mottles; single grained; loose; few medium and coarse roots; strongly acid; clear wavy boundary.

E/Bh—21 to 26 inches; gray (10YR 6/1) fine sand (E); few medium distinct dark reddish brown (5YR 3/2) fine sand Bh fragments; single grained; loose; very strongly acid; gradual wavy boundary.

Bh1—26 to 30 inches; dark yellowish brown (10YR 4/4) fine sand; few medium distinct dark reddish brown (5YR 3/2) fine sand Bh fragments; single grained; loose; many uncoated sand grains; very strongly acid; clear smooth boundary.

Bh2—30 to 34 inches; yellowish brown (10YR 5/4) fine sand; common medium distinct light gray (10YR 7/1) mottles; single grained; loose; very strongly acid; clear smooth boundary.

E'—34 to 52 inches; light gray (10YR 7/1) fine sand; single grained; loose; very strongly acid; clear wavy boundary.

Btg—52 to 75 inches; light gray (10YR 7/2) fine sandy loam; common medium distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; very strongly acid; clear wavy boundary.

BCg—75 to 80 inches; gray (10YR 6/1) loamy fine sand; single grained; loose; strongly acid.

Reaction ranges from extremely acid to strongly acid in the A and Bh horizons. It is very strongly acid or strongly acid in the Btg and BCg horizons.

The A horizon has hue of 10YR, value of 1 to 4, and chroma of 2 or less. The thickness of this horizon ranges from 6 to 10 inches. In pedons that have value of less than 3, the thickness of the A horizon is 8 inches or less.

The E horizon has hue of 10YR, value of 5 to 8, and chroma of 2 or less. The thickness of this horizon ranges from 6 to 26 inches. The texture is sand or fine sand.

The E/Bh horizon has colors similar to those of the component parts. The thickness of this horizon ranges from 0 to 6 inches. The texture is sand or fine sand.

The Bh horizon has hue of 10YR, value of 3, and chroma of 2 or 3; hue of 10YR, value of 4, and chroma of 2 to 4; or hue of 7.5YR, value of 4, and chroma of 2 or 4. If the E horizon has value of 7, the value of the Bh horizon will range from 3 to 5. Spodic fragments have hue of 5YR or 10YR, value of 2 or 3, and chroma of 2 or 3. Uncoated sand grains range from common to many. The thickness of the Bh horizon ranges from 5 to 12 inches. The texture is sand or fine sand.

The E' horizon has hue of 10YR, value of 5 to 7, and chroma of 3 or less. The thickness of this horizon ranges from 0 to 27 inches. The texture is sand or fine sand.

The Btg horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. In some pedons, this horizon has mottles in shades of red, yellow, or brown. The thickness of the Btg horizon ranges from 10 to 24 inches. The texture is fine sandy loam or sandy clay loam.

Some pedons have a BCg horizon that has hue of 10YR, value of 5, and chroma of 1. The texture is fine sandy loam.

Some pedons have a Cg horizon that has hue of 10YR or 5Y, value of 6 or 8, and chroma of 1. The texture is fine sand or loamy fine sand.

Paola Series

The Paola series consists of soils that are nearly level to sloping, excessively drained, and very rapidly permeable. These soils formed in sandy marine or eolian material. They are on slopes and ridges on the uplands. The water table is at a depth of more than 72 inches. The slopes range from 0 to 8 percent. Paola soils are hyperthermic, uncoated Spodic Quartzipsamments.

Paola soils are geographically associated with Adamsville, Astatula, Candler, Cassia, Orsino, and Tavares soils. The associated soils do not have a B/E horizon. Adamsville, Cassia, Orsino, and Tavares soils are in lower positions on the landscape than Paola soils. In addition, Adamsville soils are somewhat poorly drained. Candler soils have a Bt horizon comprised of lamellae. Cassia soils are somewhat poorly drained, and

they have a spodic horizon. Orsino and Tavares soils are moderately well drained.

Typical pedon of Paola fine sand, 0 to 8 percent slopes; 2.5 miles north of the intersection of Florida State Highway 100 and Holloway Road, 0.8 mile west of Holloway Road; 600 feet south and 400 feet east of the northwest corner of sec. 36, T. 8 S., R. 24 E.

A—0 to 3 inches; dark gray (10YR 4/1) fine sand; weak medium granular structure; very friable; many fine and medium and few coarse roots; many uncoated light gray sand grains and organic matter mixed; extremely acid; clear wavy boundary.
E—3 to 27 inches; light gray (10YR 7/1) fine sand; single grained; loose; common fine and medium and few coarse roots; dark reddish brown (5YR 3/2, 3/3) stains along old root channels; very strongly acid; abrupt irregular boundary.
B/E1—27 to 52 inches; yellow (10YR 7/6) fine sand (B); single grained; loose; common tongues, 1 1/2 to 2 inches wide, light gray (10YR 7/1) fine sand (E), outer edges stained dark reddish brown (5YR 3/2); few medium and fine roots; extremely acid; gradual smooth boundary.
B/E2—52 to 80 inches; very pale brown (10YR 7/4) fine sand (B); single grained; loose; few medium roots; few vertical pockets of light gray (10YR 7/1) fine sand (E), 1 inch to 2 inches wide and 5 to 10 inches long, center of pockets of brown (7.5YR 5/4) and edges of black (5YR 2/1); extremely acid.

Reaction ranges from extremely acid to neutral.

The A horizon has hue of 10YR, value of 4, and chroma of 1 or 2; or hue of 10YR, value of 5, and chroma of 1. The thickness of this horizon ranges from 3 to 5 inches.

The E horizon has hue of 10YR, value of 7 or 8, and chroma of 1 or 2. The texture is sand or fine sand.

The B/E horizon has hue of 10YR, value of 6 or 7, and chroma of 6 or 8; or hue of 7.5YR, value of 7, and chroma of 8. Fragments or bodies of dark reddish brown or dark brown fine sand range from few to common. Tongues of E material are in this horizon. The thickness of this horizon ranges from 12 to 53 inches. The texture is fine sand or sand.

Some pedons have a C horizon that has hue of 10YR, value of 5, and chroma of 6; hue of 10YR, value of 6, and chroma of 4 or 8; hue of 10YR, value of 7, and chroma of 3 to 6; or hue of 10YR, value of 8, and chroma of 3. The texture is sand or fine sand.

Placid Series

The Placid series consists of soils that are nearly level, very poorly drained, and rapidly permeable. These soils formed in sandy marine sediment. They are in depressional areas on the flatwoods and uplands. The water table is above the surface for more than 6 months in most years. The slopes are less than 2 percent. Placid soils are sandy, siliceous, hyperthermic Typic Humaquepts.

Placid soils are geographically associated with Hontoon, Samsula, St. Johns, and Ona soils. Hontoon and Samsula soils are organic. St. Johns and Ona soils have spodic horizons. In addition, Ona soils are in slightly higher positions on the landscape than Placid soils.

Typical pedon of Placid fine sand, depressional; 2,000 feet east of intersection of Putnam County Road 20A and Strickland Road, 1,000 feet north of Strickland Road; 2,300 feet north and 1,300 feet east of southwest corner of sec. 21, T. 10 S., R. 24 E.

A1—0 to 11 inches; black (10YR 2/1) fine sand; weak medium granular structure; friable; common fine roots; few uncoated light gray sand grains; very strongly acid; clear wavy boundary.
A2—11 to 14 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; few small pockets of dark gray (10YR 4/1) fine sand; very strongly acid; clear wavy boundary.
Cg1—14 to 26 inches; dark grayish brown (10YR 4/2) fine sand; few fine faint very dark brown mottles; single grained; loose; very strongly acid; gradual wavy boundary.
Cg2—26 to 46 inches; grayish brown (10YR 5/2) fine sand; few fine faint very dark gray mottles; single grained; loose; very strongly acid; gradual wavy boundary.
Cg3—46 to 80 inches; light gray (10YR 7/1) fine sand; few fine faint dark gray mottles; single grained; loose; strongly acid.

Reaction ranges from extremely acid to strongly acid in the A horizon and upper part of the Cg horizon and from extremely acid to slightly acid in the lower part of the Cg horizon. If lime has been added, the A horizon may have a reaction of slightly acid or neutral.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The thickness of this horizon ranges from 10 to 21 inches.

The Cg horizon has hue of 10YR, value of 4, and chroma of 2; or hue of 10YR, value of 5 to 7, and chroma of 1 or 2. In some pedons, this horizon has mottles of gray, brown, yellow, or red. The texture of the Cg horizon is fine sand or sand.

Pomona Series

The Pomona series consists of soils that are deep, nearly level, poorly drained and very poorly drained, and moderately slowly permeable or moderately permeable. These soils formed in sandy and loamy marine sediment. They are in broad areas and in depressions on the flatwoods. The high water table is at a depth of less than

12 inches for 1 month to 3 months and at a depth of 12 to 40 inches for more than 6 months in most years. Depressional areas are covered with standing water for 6 to 9 months in most years. The slopes range from 0 to 2 percent. Pomona soils are sandy, siliceous, hyperthermic Ultic Haplaquods.

Pomona soils are geographically associated with Holopaw, Myakka, Palmetto, and Wauchula soils. Holopaw soils do not have a spodic horizon. Myakka soils do not have an argillic horizon. Palmetto soils have a weakly developed Bh horizon. Wauchula soils have an argillic horizon at a depth of less than 40 inches.

Typical pedon of Pomona fine sand; in a wooded area; 1.45 miles northwest of the intersection of Florida State Highway 100 and Bardin Road, 75 feet south of State Highway 100; Land Grant 40, T. 9 S., R. 26 E.

A—0 to 6 inches; black (10YR 2/1) fine sand; weak medium granular structure; friable; few fine, medium, and coarse roots; few light gray uncoated sand grains; extremely acid; clear wavy boundary.

E1—6 to 10 inches; gray (10YR 5/1) fine sand; many coarse distinct very dark gray (10YR 3/1) mottles; single grained; loose; few fine, medium, and coarse roots; very strongly acid; gradual smooth boundary.

E2—10 to 20 inches; light gray (10YR 6/1) fine sand; common coarse distinct very dark gray (10YR 3/1) mottles; single grained; loose; few fine, medium, and coarse roots; very strongly acid; abrupt irregular boundary.

Bh1—20 to 23 inches; dark reddish brown (5YR 2/2) loamy fine sand; weak medium subangular blocky structure; friable; few fine, medium, and coarse roots; few coarse distinct pockets of dark gray (10YR 4/1) fine sand in upper 1 inch; very strongly acid; clear wavy boundary.

Bh2—23 to 28 inches; dark reddish brown (5YR 3/2) loamy fine sand; moderate medium subangular blocky structure; friable; few fine, medium, and coarse roots; very strongly acid; clear wavy boundary.

BE—28 to 35 inches; dark brown (7.5YR 4/4) fine sand; common coarse distinct dark reddish brown (5YR 3/3) mottles and Bh bodies; weak medium granular structure; friable; few fine and medium roots; very strongly acid; clear wavy boundary.

E'—35 to 42 inches; light brownish gray (10YR 6/2) fine sand; common coarse distinct yellowish brown (10YR 5/4) mottles; single grained; loose; few fine and medium roots; very strongly acid; clear wavy boundary.

Btg1—42 to 55 inches; gray (10YR 6/1) fine sandy loam; common coarse distinct brownish yellow (10YR 6/6) mottles and reddish yellow (7.5YR 6/8) mottles; moderate medium subangular blocky structure; friable; few fine and medium roots; sand grains coated and bridged with clay; extremely acid; gradual smooth boundary.

Btg2—55 to 73 inches; light gray (10YR 6/1) fine sandy loam; moderate medium subangular blocky structure; friable; few fine and medium roots; few pockets of light gray (10YR 7/1) sandy clay loam; sand grains bridged and coated with clay; extremely acid; gradual smooth boundary.

Cg—73 to 80 inches; greenish gray (5GY 5/1) fine sandy loam; many coarse distinct light olive brown (2.5Y 5/6) mottles; massive; firm; extremely acid.

Reaction ranges from extremely acid to strongly acid. Reaction may be medium acid in the A horizon and some of the underlying horizons if lime has been added.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1; or it is neutral (N) and has value of 2. The thickness of this horizon ranges from 4 to 8 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Mottles or vertical streaks in shades of yellow, brown, or gray ranges from none to common. The thickness of this horizon ranges from 12 to 22 inches. The texture is fine sand or sand.

The Bh horizon has hue of 10YR, value of 2, and chroma of 1 or 2; hue of 10YR, value of 3, and chroma of 2; hue of 5YR, value of 2, and chroma of 1 or 2; or hue of 5YR, value of 3, and chroma of 2 to 4. The thickness of this horizon ranges from 8 to 18 inches. The texture is sand, fine sand, or loamy fine sand.

The BE horizon has hue of 10YR, value of 3 or 4, and chroma of 3; hue of 7.5YR, value of 3, and chroma of 2; or hue of 7.5YR, value of 4, and chroma of 4. The thickness of this horizon ranges from 5 to 9 inches.

The E' horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. The thickness of this horizon ranges from 7 to 18 inches.

The Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2; or it is neutral (N) and has value of 5 to 7. This horizon has mottles in shades of red, yellow, and brown that range from few to common. In some pedons, this horizon extends to a depth of 80 inches or more. The texture is fine sandy loam or sandy clay loam.

The Cg horizon has hue of 5Y, value of 5 or 6, and chroma of 1; or hue of 5GY, value of 5, and chroma of 1. The texture ranges from sandy loam to sandy clay loam.

Pompano Series

The Pompano series consists of soils that are nearly level, poorly drained, and rapidly permeable. These soils formed in sandy marine or eolian deposits. They are on low, broad flatwoods and in narrow areas that border streams or drainageways. The water table is at a depth of less than 12 inches for 2 to 6 months in most years. The slopes range from 0 to 2 percent. Pompano soils are siliceous, hyperthermic Typic Psammaquents.

Pompano soils are geographically associated with Holopaw, Malabar, and Palmetto soils. Holopaw and Malabar soils have a Bt horizon. Palmetto soils have a Bh horizon and a Bt horizon.

Typical pedon of Pompano fine sand; in a slash pine plantation; 0.3 mile south of intersection of Florida State Highway 100 and Putnam County Road 309, 100 feet west of County Road 309; 2,300 feet north and 250 feet west of the southeast corner of sec. 32, T. 9 S., R. 26 E.

A1—0 to 6 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; few medium and coarse roots; strongly acid; gradual smooth boundary.
A2—6 to 19 inches; dark grayish brown (10YR 4/2) fine sand; common medium distinct brown (10YR 5/3) mottles and yellowish brown (10YR 5/6) mottles; single grained; loose; few medium and coarse roots; strongly acid; gradual wavy boundary.
Cg1—19 to 50 inches; gray (10YR 5/1) fine sand; common medium distinct very dark gray (10YR 3/1) mottles; single grained; loose; strongly acid; gradual wavy boundary.
Cg2—50 to 61 inches; light gray (10YR 6/1) fine sand; single grained; loose; medium acid; clear wavy boundary.
Cg3—61 to 80 inches; gray (5Y 6/1) fine sand; common medium distinct greenish gray (5GY 5/1) mottles; single grained; loose; few small bodies of loamy fine sand and fine sandy loam; slightly acid.

Reaction is strongly acid to medium acid in the A horizon and upper part of the C horizon. It ranges from medium acid to mildly alkaline in the lower part of the C horizon.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. The thickness of this horizon ranges from 3 to 20 inches.

The Cg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2; or hue of 5Y or 5GY, value of 5 or 6, and chroma of 1. This horizon has mottles in shades of gray, brown, and yellow. In some pedons, the lower part of this horizon has few small pockets or bodies of loamy fine sand or fine sandy loam. The average texture is sand or fine sand.

Riviera Series

The Riviera series consists of soils that are nearly level, poorly drained and very poorly drained, and slowly permeable to very slowly permeable. These soils formed in stratified, sandy and loamy marine sediment. They are in low, broad to narrow areas on the flatwoods, in depressional areas, and in poorly defined to well defined drainageways. The water table is within 12 inches of the surface for 2 to 4 months in most years and between depths of 12 and 30 inches for most of the remainder of the year. Depressions are ponded for 6 to 12 months. The areas of this soil that are in drainageways are flooded for periods ranging from a few days to 3 months. The slopes range from 0 to 2 percent. Riviera soils are loamy, siliceous, hyperthermic Arenic Glossaqualfs.

Riviera soils are geographically associated with Bluff, Holopaw, Malabar, and Pompano soils. Bluff soils have a mollic epipedon and a cambic horizon. Holopaw soils have an argillic horizon at a depth of more than 40 inches. Malabar soils have a Bw horizon. Pompano soils do not have an argillic horizon.

Typical pedon of Riviera fine sand; in a pine plantation; 1.5 miles south of intersection of Putnam County Road 209 and Millican Road, 0.5 mile west of Millican Road; 200 feet south and 2,700 feet west of the northeast corner of sec. 4, T. 9 S., R. 27 E.

A—0 to 5 inches; black (10YR 2/1) fine sand; weak medium granular structure; friable; common fine and medium roots; very strongly acid; gradual smooth boundary.
Eg—5 to 25 inches; gray (10YR 6/1) fine sand; single grained; loose; few fine and medium roots; very strongly acid; abrupt irregular boundary.
B/E—25 to 31 inches; gray (10YR 6/1) sandy clay loam (B); common medium distinct grayish brown (10YR 5/2) mottles and brownish yellow (10YR 6/6) mottles; tongues of gray fine sand (E), up to 3 inches wide, from the overlying E horizon; moderate medium subangular blocky structure; friable; sand grains (B) bridged and coated with clay; slightly acid; gradual wavy boundary.
Btg1—31 to 41 inches; gray (10YR 6/1) sandy clay loam; moderate medium granular structure; friable; sand grains bridged and coated with clay; slightly acid; clear wavy boundary.
Btg2—41 to 50 inches; gray (10YR 5/1) fine sandy loam; weak medium subangular blocky structure; friable; sand grains bridged and coated with clay; slightly acid; clear wavy boundary.
Cg—50 to 80 inches; grayish brown (10YR 5/2) loamy fine sand; single grained; loose; slightly acid.

Reaction ranges from very strongly acid to neutral in the A and E horizons. It ranges from slightly acid to moderately alkaline in the B and C horizons.

The A horizon has hue of 10YR, value of 2, and chroma of 1; or hue of 10YR, value of 3 to 5, and chroma of 1 or 2. The thickness of this horizon ranges from 4 to 10 inches. In pedons that have value of 3 or less, the thickness of the A horizon is less than 6 inches.

The Eg horizon has hue of 10YR, value of 5 to 8, and chroma of 1; or hue of 10YR, value of 7, and chroma of 2. The thickness of this horizon ranges from 15 to 29 inches.

The B/E horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. In some pedons, the B/E horizon has mottles of brown, yellow, or gray. The B part of the

B/E horizon is sandy loam, fine sandy loam, or sandy clay loam. Tongues of the overlying E horizon extend into the B part of this horizon. The E part is sand or fine sand. The thickness of this horizon ranges from 6 to 18 inches.

The Btg horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2; hue of 5Y, value of 6, and chroma of 1; or it is neutral (N) and has value of 4 to 6. The texture is sandy loam, fine sandy loam, or sandy clay loam. The thickness of this horizon ranges from 5 to 49 inches or more. In some pedons, this horizon extends to a depth of 80 inches or more.

The Cg horizon has hue of 10YR, value of 4 to 6, and chroma of 2; or hue of 5GY, value of 4, and chroma of 1. In some pedons, this horizon has a high content of calcium carbonate. The texture ranges from sand to loamy fine sand.

Samsula Series

The Samsula series consists of soils that are nearly level, very poorly drained, and rapidly permeable. These soils formed in moderately thick beds of hydrophytic, nonwoody plant remains. They are in depressional areas on the flatwoods and uplands. The high water table is at or above the surface except during extended dry periods. The slopes are concave and are less than 1 percent. Samsula soils are sandy or sandy-skeletal, siliceous, dysic, hyperthermic Terric Medisaprists.

Samsula soils are geographically associated with Hontoon, Myakka, Placid, St. Johns, and Tomoka soils. Myakka, Placid, and St. Johns soils are mineral soils. Hontoon soils have organic layers that are more than 52 inches thick. Tomoka soils have loamy material in the control section.

Typical pedon of Samsula muck; in a wooded area; 1,500 feet south of intersection of Tinsley Road and Holloway Road, 0.5 mile east of Holloway Road; 3,000 feet east and 1,000 feet south of the northwest corner of sec. 30, T. 8 S., R. 25 E.

Oa1—0 to 12 inches; dark reddish brown (5YR 2/2) muck; moderate medium granular structure; friable; many fine and medium and few coarse roots; about 25 percent fiber, unrubbed, 7 percent fiber, rubbed; about 15 percent mineral matter; dark grayish brown (10YR 4/2) sodium pyrophosphate; extremely acid; gradual smooth boundary.

Oa2—12 to 29 inches; black (5YR 2/1) muck; moderate medium granular structure; friable; few fine, medium, and coarse roots; about 20 percent fiber, unrubbed, 10 percent fiber, rubbed; about 10 percent mineral matter; very dark grayish brown (10YR 3/2) sodium pyrophosphate; extremely acid; abrupt wavy boundary.

C—29 to 40 inches; black (10YR 2/1) fine sand; common medium distinct dark gray (10YR 4/1) mottles; single grained; loose; extremely acid; clear wavy boundary.

Cg1—40 to 50 inches; gray (10YR 5/1) fine sand; single grained; loose; extremely acid; gradual wavy boundary.

Cg2—50 to 80 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; extremely acid.

The thickness of the organic material ranges from 16 to 40 inches. Reaction in the organic material is less than 4.5 in 0.1 molar calcium chloride and ranges from less than 4.5 to 5.5 in 1:1 water. It ranges from extremely acid to medium acid in the mineral material.

The Oa horizon has hue of 10YR, value of 2, and chroma of 1; hue of 5YR, value of 2, and chroma of 1 or 2; or hue of 5YR, value of 3, and chroma of 3. The content of fiber ranges from 10 to 75 percent, unrubbed, and from 5 to 18 percent, rubbed. Sodium pyrophosphate extract has hue of 10YR, value of 3 or 4, and chroma of 1 to 4; or hue of 10YR, value of 5 or 6, and chroma of 3 to 7.

The C horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. The thickness of this horizon ranges from 9 to 17 inches. The texture is sand or fine sand.

The Cg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. In some pedons, this horizon has mottles of gray and brown. The texture is sand or fine sand.

Shenks Series

The Shenks series consists of soils that are nearly level, very poorly drained, and slowly permeable or very slowly permeable. These soils formed in moderately thick deposits of sapric organic material underlain by clayey marine sediment. They are on the broad flood plains of major rivers and streams. The water table is within less than 12 inches of the surface for 6 months or more in most years. These soils are frequently flooded for 4 to 6 months during rainy periods. The slopes are less than 2 percent. Shenks soils are clayey, montmorillonitic, dysic, hyperthermic Terric Medisaprists.

Shenks soils are geographically associated with Bluff, Holopaw, Placid, Pompano, Riviera, and Terra Ceia soils. The associated soils are mineral except Terra Ceia soils. Terra Ceia soils have organic material that is more than 52 inches thick.

Typical pedon of Shenks muck, frequently flooded; in a wooded area on the Oklawaha River flood plain; about 4.5 miles south of intersection of Florida State Highway 19 and Putnam County Road 310, 500 feet east of State Highway 19; 200 feet south and 300 feet east of the northwest corner of sec. 6, T. 12 S., R. 26 E.

Oa—0 to 18 inches; dark reddish brown (5YR 3/2) muck; about 40 percent fiber, unrubbed, 10 percent fiber, rubbed; massive; friable; brown (10YR 5/3)

sodium pyrophosphate extract; extremely acid; abrupt wavy boundary.
C1—18 to 60 inches; black (10YR 2/1) clay; massive; very sticky; common fine and medium roots; slightly acid; clear smooth boundary.
C2—60 to 70 inches; very dark gray (10YR 3/1) loamy sand; single grained; loose; slightly acid; gradual wavy boundary.
Cg—70 to 80 inches; dark gray (10YR 4/1) sand; single grained; loose; slightly acid.

The thickness of the organic material ranges from 16 to 28 inches. Reaction is medium acid or slightly acid in the C and Cg horizons. Base saturation of the C and Cg horizons is more than 35 percent.

The Oa horizon has hue of 5YR, value of 2 or 3, and chroma of 1 or 2; hue of 5YR, value of 3, and chroma of 3; or hue of 10YR, value of 2, and chroma of 1. The content of rubbed fiber ranges from 5 to 15 percent. Sodium pyrophosphate extract has hue of 10YR, value of 3 to 5, and chroma of 3 to 6.

The C1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1; or hue of 7.5YR, value of 3, and chroma of 1. The thickness of this horizon ranges from 27 to 47 inches. The texture is sandy clay or clay. The C2 horizon has hue of 10YR, value of 3 or 4, and chroma of 1. The thickness of this horizon ranges from 5 to 12 inches. The texture is loamy sand or sand. The Cg horizon has hue of 10YR, value of 4 or 5, and chroma of 1. The texture is loamy sand or sand.

Sparr Series

The Sparr series consists of soils that are nearly level to gently sloping, somewhat poorly drained, and moderately permeable. These soils formed in thick beds of sandy and loamy marine sediment. They are on low ridges and knolls on the flatwoods, on slopes adjacent to well defined streams on the flatwoods, and in areas on the uplands that are slightly lower than adjacent ridges and knolls. The water table is at a depth of 20 to 40 inches for 1 month to 4 months. The slopes range form 0 to 5 percent. Sparr soils are loamy, siliceous, hyperthermic Grossarenic Paleudults.

Sparr soils are geographically associated with Apopka, Candler, and Millhopper soils. Apopka soils are well drained. Candler soils have an E/B horizon that has lamellae and are excessively drained. Millhopper soils are moderately well drained.

Typical pedon of Sparr sand, 0 to 5 percent slopes; 2 miles south of intersection of Florida State Highway 26 and Putnam County Road 21, 100 feet east of County Road 21; 2,300 feet north and 2,200 feet west of the southeast corner of sec. 30, T. 9 S., R. 23 E.

A—0 to 9 inches; dark grayish brown (10YR 4/2) sand; weak medium granular structure; friable; common fine roots; few medium prominent light yellowish brown (10YR 6/4) pockets of sand; strongly acid; clear wavy boundary.
E1—9 to 17 inches; very pale brown (10YR 7/3) sand; common coarse distinct light gray (10YR 7/1) mottles, few fine distinct brownish yellow (10YR 6/8) mottles, and yellowish red (5YR 5/8) mottles; single grained; loose; medium acid; gradual wavy boundary.
E2—17 to 30 inches; very pale brown (10YR 8/3) sand; few fine distinct yellowish brown (10YR 5/8) mottles; single grained; loose; few fine roots; common coarse distinct pockets of white (10YR 8/2); medium acid; gradual wavy boundary.
E3—30 to 44 inches; white (10YR 8/2) sand; common coarse distinct brownish yellow (10YR 6/8) mottles, yellowish red (5YR 5/8) mottles, and few coarse faint white (10YR 8/1) mottles; single grained; loose; few fine and medium roots; medium acid; gradual smooth boundary.
E4—44 to 65 inches; white (10YR 8/1) sand; few coarse distinct yellowish brown (10YR 5/8) mottles; single grained; loose; medium acid; abrupt wavy boundary.
BE—65 to 70 inches; yellowish brown (10YR 5/8) loamy sand; few coarse prominent red (2.5YR 4/6) mottles, weakly cemented appearance, and few fine faint gray mottles; weak medium granular structure; friable; few medium and fine roots; few coarse rounded plinthite nodules, yellowish brown (10YR 5/8) exterior and red (2.5YR 4/6) interior; medium acid; abrupt wavy boundary.
Bt—70 to 80 inches; yellowish brown (10YR 5/8) fine sandy loam; few coarse prominent red (2.5YR 4/6) mottles; few fine faint gray sandy clay loam bodies; moderate medium subangular blocky; firm; strongly acid.

Reaction ranges from very strongly acid to medium acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1; or hue of 10YR, value of 4 or 5, and chroma of 2. The thickness of this horizon ranges from 3 to 10 inches.

The E horizon has hue of 10YR, value of 5, and chroma of 3 or 4; hue of 10YR, value of 6 or 7, and chroma of 1 to 4; or hue of 10YR, value of 8, and chroma of 1 to 3. This horizon has mottles of gray, brown, red, or yellow. Mottles with chroma of 2 or less, at a depth of less than 20 inches, are the color of uncoated sand grains and are not indicative of wetness. The thickness of this horizon ranges from 47 to 67 inches. The texture is sand or fine sand.

The BE horizon has hue of 10YR, value of 5, and chroma of 6 or 8. This horizon has gray mottles that are indicative of wetness. This horizon is 8 inches or less thick. The texture is loamy fine sand or loamy sand. Some pedons do not have a BE horizon.

The Bt horizon has hue of 10YR, value of 5, and chroma of 8; hue of 10YR, value of 6, and chroma of 6; or hue of 10YR, value of 7, and chroma of 3 to 6. The thickness of this horizon ranges from 0 to 10 inches. The texture is fine sandy loam, sandy loam, or sandy clay loam. Some pedons have a Btg horizon that has hue of 10YR, value of 6 or 7, and chroma of 1 or 2; or it is neutral (N) and has value of 7. This horizon has mottles of gray, brown, yellow, or red that range from few to many. The texture is fine sandy loam, sandy loam, or sandy clay loam. In some pedons, the Bt and Btg horizons have up to 5 percent plinthite.

St. Johns Series

The St. Johns series consists of soils that are nearly level, very poorly drained, and moderately permeable. These soils formed in sandy marine or eolian material. They are in depressional areas on the flatwoods and uplands. The water table is above the surface of the soil for 6 months or more in most years. The slopes range from 0 to 2 percent. St. Johns soils are sandy, siliceous, hyperthermic Typic Haplaquods.

St. Johns soils are geographically associated with Candler, Myakka, Ona, Placid, Samsula, and Tavares soils. The associated soils are in higher positions on the landscape than St. Johns soils except Placid and Samsula soils. In addition, Candler soils are excessively drained and do not have a spodic horizon, Myakka and Ona soils are poorly drained, Placid soils do not have a spodic horizon, Samsula soils are organic, and Tavares soils do not have a spodic horizon and are moderately well drained.

Typical pedon of St. Johns fine sand, depressional; 1.6 miles south of Bostwick, 2,500 feet west of U.S. Highway 17; 1,700 feet north and 1,200 feet west of the southeast corner of sec. 36, T. 8 S., R. 26 E.

OA—0 to 12 inches; black (10YR 2/1) fine sand; moderate medium granular structure; friable; common fine roots; strongly acid; gradual smooth boundary.

E—12 to 28 inches; gray (10YR 5/1) fine sand; single grained; loose; few fine roots; very strongly acid; abrupt wavy boundary.

Bh1—28 to 34 inches; black (10YR 2/1) fine sand; strong medium subangular blocky structure; friable; common fine and medium roots; few pockets of dark gray (10YR 4/1) fine sand; very strongly acid; gradual smooth boundary.

Bh2—34 to 50 inches; black (10YR 2/1) fine sand; moderate medium subangular blocky structure; common fine and medium roots; very strongly acid; gradual wavy boundary.

BC—50 to 55 inches; dark brown (10YR 3/3) fine sand; single grained; loose; strongly acid; gradual wavy boundary.

C—55 to 80 inches; dark gray (10YR 4/1) fine sand; single grained; loose; strongly acid.

The combined thickness of the A and E horizons ranges from 25 to 30 inches. Reaction ranges from extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 2, and chroma of 1 or 2; or hue of 10YR, value of 3, and chroma of 1. The thickness of this horizon ranges from 10 to 15 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. The thickness of this horizon ranges from 10 to 20 inches. The texture is sand or fine sand.

The Bh horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; hue of 5YR, value of 2, and chroma of 1 or 2; or hue of 5YR, value of 3, and chroma of 2. The thickness of this horizon ranges from 12 to 26 inches. The texture is sand, fine sand, or loamy fine sand.

The BC horizon has hue of 10YR, value of 3 or 4, and chroma of 3 or 4. The thickness of this horizon ranges from 5 to 13 inches. The texture is sand or fine sand.

The C horizon has hue of 10YR, value of 6 to 4, and chroma of 1 to 3. The texture is sand or fine sand.

Some pedons have a bisequum of E'2 and B'h horizons. The E'2 horizon has colors similar to those of the E horizon, and the B'h horizon has colors similar to those of the Bh horizon.

Surrency Series

The Surrency series consists of soils that are deep, nearly level, very poorly drained, and moderately permeable. These soils formed in sandy and loamy marine sediment. They are in depressional areas on the uplands and in a few places on the flatwoods. In most years, the high water table is above the surface for more than 6 months. The slopes are less than 2 percent. Surrency soils are loamy, siliceous, thermic Arenic Umbric Paleaquults.

Surrency soils are geographically associated with Lochloosa, Millhopper, and Pompano soils. The associated soils do not have an umbric epipedon. In addition, Lochloosa soils are somewhat poorly drained, Millhopper soils are moderately well drained, and Pompano soils are poorly drained.

Typical pedon of Surrency fine sand, depressional; in a marshy depressional area; about 1 mile northwest of intersection of Carroway Mail Route Road and Florida State Highway 100, 1.5 miles south of State Highway 100; 1,600 feet south and 1,000 feet west of the northeast corner of sec. 21, T. 9 S., R. 25 E.

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

A2—10 to 13 inches; very dark gray (5Y 3/1) fine sand; weak fine granular structure; very friable; few fine roots; very strongly acid; clear wavy boundary.
Eg—13 to 25 inches; light gray (10YR 7/1) fine sand; common medium distinct yellowish brown (10YR 5/8) mottles; single grained; loose; very strongly acid; clear smooth boundary.
Btg1—25 to 40 inches; light brownish gray (10YR 6/2) fine sandy loam; common medium distinct yellowish brown (10YR 5/8) mottles and red (2.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; sand grains bridged and coated with clay; strongly acid; gradual wavy boundary.
Btg2—40 to 80 inches; grayish brown (10YR 5/2) sandy clay loam; common coarse distinct yellowish brown (10YR 5/8) mottles; massive; sand grains bridged and coated with clay; strongly acid.

The thickness of the solum ranges from 60 to 80 inches or more. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR or 5Y, value of 2 or 3, and chroma of 1. The thickness of this horizon ranges from 10 to 21 inches.

The Eg horizon has hue of 10YR, value of 4, and chroma of 2; or hue of 10YR, value of 6 or 7, and chroma of 1 or 2. This horizon has mottles of yellowish brown, brownish yellow, gray, dark gray, or very dark gray that range from few to common. The thickness of this horizon ranges from 7 to 20 inches. The texture is fine sand or loamy fine sand.

The Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. This horizon has mottles of yellowish brown that range from none to common. The texture is fine sandy loam, sandy loam, or sandy clay loam.

Tavares Series

The Tavares series consists of soils that are nearly level to gently sloping, moderately well drained, and rapidly permeable or very rapidly permeable. These soils formed in sandy marine or eolian material. They are on the uplands. A few areas of this soil are on knolls and ridges on the flatwoods. The water table is at a depth of 40 to 80 inches for more than 6 months in most years. It is at a depth of more than 80 inches during long, dry periods. The slopes range from 0 to 5 percent. Tavares soils are hyperthermic, uncoated Typic Quartzipsamments.

Tavares soils are geographically associated with Adamsville, Astatula, Candler, Centenary, and Zolfo soils. Adamsville and Zolfo soils are somewhat poorly drained. Astatula and Candler soils are excessively drained; and, in addition, Candler soils have lamellae at a depth of more than 50 inches. Centenary soils have a spodic horizon.

Typical pedon of Tavares fine sand, 0 to 5 percent slopes; in a wooded area; 1.1 miles northwest of the intersection of Florida State Highway 100 and Carroway Mail Route Road, 0.7 mile south of State Highway 100; 100 feet north and 2,500 feet east of the southeast corner of sec. 16, T. 9 S., R. 25 E.

A—0 to 5 inches; dark grayish brown (10YR 4/2) fine sand; few fine distinct masses of light yellowish brown (10YR 6/4) fine sand; weak medium granular structure; friable; many fine and few medium and coarse roots; many uncoated light gray (10YR 6/1) sand grains; strongly acid; clear wavy boundary.
C1—5 to 27 inches; very pale brown (10YR 7/4) fine sand; common fine distinct masses of white (10YR 8/2) fine sand; single grained; loose; common fine and few medium and coarse roots; common fine particles of charcoal; strongly acid; gradual smooth boundary.
C2—27 to 45 inches; yellow (10YR 8/6) fine sand; common coarse distinct masses of very pale brown (10YR 8/3) fine sand; single grained; loose; few fine and medium roots; few coarse particles of charcoal; strongly acid; gradual smooth boundary.
C3—45 to 67 inches; very pale brown (10YR 8/3) fine sand; common coarse distinct strong brown (7.5YR 5/8) mottles; masses of white (10YR 8/1) uncoated sand grains; single grained; loose; strongly acid; clear irregular boundary.
C4—67 to 80 inches; white (10YR 8/1) fine sand; few fine faint yellow mottles and common medium distinct yellowish red (5YR 5/8) mottles; single grained; loose; strongly acid.

Reaction ranges from very strongly acid to medium acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. The thickness of this horizon ranges from 3 to 9 inches.

The C1 and C2 horizons have hue of 10YR, value of 5, and chroma of 2 to 4; or hue of 10YR, value of 6 to 8, and chroma of 3 to 6. The thickness of the C1 horizon ranges from 5 to 22 inches, and the thickness of the C2 horizon ranges from 15 to 33 inches. The C3 and C4 horizons have hue of 10YR, value of 6, and chroma of 2 or 3; hue of 10YR, value of 7, and chroma of 2 to 4; or hue of 10YR, value of 8, and chroma of 1 to 4. In some pedons, the C3 and C4 horizons have mottles of gray, brown, yellow, or red. Gray mottles that are indicative of wetness are at a depth of 40 inches or more.

Terra Ceia Series

The Terra Ceia series consists of soils that are nearly level, very poorly drained, and rapidly permeable. These soils formed in nonwoody, hydrophytic plant remains. They are on the flood plains, mainly along the St. Johns and Oklawaha Rivers. The water table is at or above the surface except during extended dry periods. These soils

are flooded after heavy rains. The slopes are less than 1 percent. Terra Ceia soils are euic, hyperthermic Typic Medisaprists.

Terra Ceia soils are geographically associated with Astor, Holopaw, Riviera, and Shenks soils. Astor, Holopaw, and Riviera soils are mineral soils. These soils are in drainageways and depressions. Shenks soils are organic soils and are in similar positions on the landscape as Terra Ceia soils.

Typical pedon of Terra Ceia muck, frequently flooded; 2,000 feet north of intersection of Putnam County Road 216 and U.S. Highway 17, 3,200 feet east of U.S. Highway 17; Land Grant 37, T. 9 S., R. 26 E.

Oa1—0 to 28 inches; dark reddish brown (5YR 2/2) muck; weak medium granular structure; very friable; many medium and coarse roots; 25 percent fiber, unrubbed, 10 percent fiber, rubbed; pale brown (10YR 6/3) sodium pyrophosphate extract; slightly acid; gradual wavy boundary.

Oa2—28 to 80 inches; black (5YR 2/1) muck; moderate medium granular structure; friable; few woody fragments; about 20 percent fiber, unrubbed, 5 percent fiber, rubbed; dark grayish brown (10YR 4/2) sodium pyrophosphate extract; mildly alkaline.

Reaction ranges from slightly acid to mildly alkaline in 1:1 water. pH is 4.5 or more in 0.01 molar calcium chloride.

The Oa horizon has hue of 10YR or 5YR, value of 2, and chroma of 1 or 2; or hue of 5YR, value of 3, and chroma of 2. The content of rubbed fiber ranges from 5 to 15 percent. The thickness of this horizon is more than 52 inches.

Tomoka Series

The Tomoka series consists of soils that are nearly level, very poorly drained, and moderately permeable. These soils formed in moderately thick beds of hydrophytic, nonwoody plant remains underlain by loamy mineral material. They are in depressional areas on the flatwoods and in a few upland areas. The high water table is at or above the surface except during extended dry periods. The slopes are concave and are less than 1 percent. Tomoka soils are loamy, siliceous, dysic, hyperthermic Terric Medisaprists.

Tomoka soils are geographically associated with Hontoon, Myakka, Placid, St. Johns, and Samsula soils. Hontoon soils have organic layers more than 52 inches thick. Myakka, Placid, and St. Johns soils are mineral soils. Samsula soils have sandy material in the control section.

Typical pedon of Tomoka muck; in a wooded area; 1.9 miles east of intersection of U.S. Highway 17 and Putnam County Road 309, 1.7 miles north of County Road 309; 300 feet south and 1,300 feet east of the northwest corner of sec. 21, T. 8 S., R. 27 E.

Oa1—0 to 12 inches; black (10YR 2/1) muck; moderate medium granular structure; friable; many fine and medium and few coarse roots; about 20 percent fiber, unrubbed, 10 percent fiber, rubbed; about 15 percent mineral matter; dark grayish brown (10YR 4/2) sodium pyrophosphate; extremely acid; gradual smooth boundary.

Oa2—12 to 24 inches; dark reddish brown (5YR 3/2) muck; moderate medium granular structure; friable; few fine, medium, and coarse roots; about 30 percent fiber, unrubbed, 15 percent fiber, rubbed; about 10 percent mineral matter; very dark grayish brown (10YR 3/2) sodium pyrophosphate; extremely acid; abrupt wavy boundary.

C—24 to 28 inches; black (10YR 2/1) fine sand; common medium distinct dark gray (10YR 4/1) mottles; single grained; loose; extremely acid; clear wavy boundary.

Cg1—28 to 31 inches; light gray (10YR 6/1) fine sand; single grained; loose; extremely acid; gradual wavy boundary.

Cg2—31 to 38 inches; dark grayish brown (10YR 4/2) fine sandy loam; few fine faint gray mottles; moderate medium subangular blocky structure; strongly acid; gradual wavy boundary.

Cg3—38 to 59 inches; grayish brown (10YR 5/2) fine sandy loam; common medium faint dark grayish brown (10YR 4/2) mottles; moderate medium subangular blocky structure; strongly acid; clear smooth boundary.

Cg4—59 to 80 inches; gray (5Y 6/1) fine sandy loam; massive; slightly sticky; common lenses of fine sand; strongly acid.

The thickness of the organic material ranges from 16 to 28 inches. Reaction in the organic material is less than 4.5 in 0.01 molar calcium chloride and ranges from less than 4.5 to 5.5 in 1:1 water. Reaction ranges from extremely acid to strongly acid in the mineral material.

The Oa horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; hue of 5YR, value of 2, and chroma of 1 or 2; or hue of 5YR, value of 3, and chroma of 2. The content of fiber ranges from 10 to 45 percent, unrubbed, and from 5 to 18 percent, rubbed. Sodium pyrophosphate extract has hue of 10YR, value of 3 or 4, and chroma of 1 to 4; or hue of 10YR, value of 5 or 6, and chroma of 3 to 7.

The C horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The Cg1 horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. The combined thickness of the C and Cg1 horizons ranges from 6 to 9 inches. The texture of the C and Cg1 horizons is sand, fine sand, or loamy sand. The Cg2, Cg3, and Cg4 horizons have hue of 10YR, value of 4 to 7, and chroma of 1 or 2; or hue of 5Y, value of 5 or 6, and chroma of 1. The texture is sandy loam, fine sandy loam, or sandy clay loam.

Wabasso Series

The Wabasso series consists of soils that are nearly level and poorly drained. These soils have friable, noncemented, spodic horizons underlain by slowly permeable or very slowly permeable argillic horizons. These soils formed in sandy and loamy marine sediment. They are on the broad flatwoods. The water table is at a depth of 12 to 40 inches for more than 6 months in most years. It is at a depth of less than 12 inches for less than 60 days in wet periods, and it is at a depth of more than 40 inches during dry periods. The slopes are less than 2 percent. Wabasso soils are sandy, siliceous, hyperthermic Alfic Haplaquods.

Wabasso soils are geographically associated with Myakka, Malabar, Pomona, and Riviera soils. Myakka soils do not have an argillic horizon. Malabar soils have an argillic horizon at a depth of 40 inches or more and do not have a spodic horizon. Pomona soils have an argillic horizon at a depth of more than 40 inches, and the base saturation in the argillic horizon is less than 35 percent. Riviera soils do not have a spodic horizon.

Typical pedon of Wabasso fine sand; in a cultivated vegetable field; 100 feet southwest of intersection of Steward Road and Carter-Crabtree Road, 40 feet southeast of Steward Road; Land Grant 48, T. 9 S., R. 27 E.

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

E—4 to 21 inches; light gray (10YR 7/1) fine sand; single grained; loose; common fine and medium roots; strongly acid; gradual wavy boundary.

Bh1—21 to 25 inches; black (10YR 2/1) fine sand; weak medium subangular blocky structure; friable; few fine and medium roots; strongly acid; gradual smooth boundary.

Bh2—25 to 28 inches; dark reddish brown (5YR 2/2) fine sand; weak medium subangular blocky structure; friable; few fine and medium roots; medium acid; gradual smooth boundary.

BE—28 to 31 inches; brown (10YR 4/3) fine sand; weak medium granular structure; friable; common medium distinct dark reddish brown (5YR 3/2) mottles; slightly acid; clear wavy boundary.

Btg1—31 to 35 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium subangular blocky structure; friable; slightly acid; gradual wavy boundary.

Btg2—35 to 49 inches; grayish brown (2.5Y 5/2) sandy clay loam; common medium distinct olive brown (2.5Y 4/4) mottles and clay flows; moderate medium subangular blocky structure; firm; neutral; gradual wavy boundary.

Btg3—49 to 57 inches; light gray (10YR 6/1) fine sandy loam; weak medium subangular blocky structure; friable; neutral; gradual wavy boundary.

Cg—57 to 80 inches; light gray (10YR 7/1) fine sand; common coarse distinct dark grayish brown (10YR 4/2) mottles; single grained; loose; neutral.

Reaction ranges from very strongly acid to slightly acid in the A, E, and Bh horizons. It ranges from very strongly acid to mildly alkaline in the Bt horizon.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1. The thickness of this horizon ranges from 4 to 8 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. The thickness of this horizon ranges from 4 to 17 inches. The texture is sand or fine sand.

The Bh horizon has hue of 10YR, value of 2, and chroma of 1; hue of 10YR, value of 3, and chroma of 2 or 3; or hue of 5YR, value of 2 or 3, and chroma of 2. The thickness of this horizon ranges from 7 to 12 inches. The texture is sand, fine sand, or loamy fine sand.

The BE horizon has hue of 10YR, value of 4, and chroma of 3 or 4. The thickness of this horizon ranges from 0 to 7 inches. The texture is sand or fine sand.

Some pedons have an E' horizon that has hue of 10YR, value of 5, and chroma of 2 or 3. The thickness of this horizon ranges from 0 to 15 inches. The texture is sand or fine sand.

The Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2; hue of 10YR, value of 4, and chroma of 2; hue of 5Y, value of 5, and chroma of 1; or hue of 2.5Y, value of 5, and chroma of 2. Mottles of yellow, red, and brown range from none to common and from fine to coarse. The thickness of this horizon ranges from 14 to 26 inches. The texture is sandy loam, fine sandy loam, or sandy clay loam.

The Cg horizon has hue of 10YR, value of 6 or 7, and chroma of 1. The texture is sand, fine sand, or loamy fine sand.

Wauchula Series

The Wauchula series consists of soils that are nearly level, poorly drained, and slowly permeable. These soils formed in sandy and loamy marine sediment. They are are on the broad, low flatwoods. The water table is at a depth of 12 to 40 inches for about 6 months in most years. It is at a depth of less than 12 inches for 1 month to 4 months in wet periods, and it is at a depth of more than 40 inches during dry periods. The slopes are less than 2 percent. Wauchula soils are sandy, siliceous, hyperthermic Ultic Haplaquods.

Wauchula soils are geographically associated with Mulat, Myakka, and Pomona soils. Mulat soils have an argillic horizon between depths of 20 and 40 inches and does not have a spodic horizon. Myakka soils do not

have an argillic horizon. Pomona soils have an argillic horizon at a depth of more than 40 inches.

Typical pedon of Wauchula fine sand; in a cleared subdivision lot; 3,200 feet east of intersection of Florida State Highway 207 and Cracker Swamp Road, 50 feet north of Cracker Swamp Road; Land Grant 49, T. 9 S., R. 27 E.

Ap—0 to 6 inches; black (10YR 2/1) fine sand; single grained; loose; common fine and medium roots; very strongly acid; gradual wavy boundary.

E—6 to 12 inches; light gray (10YR 7/1) fine sand; single grained; loose; common fine and medium roots; strongly acid; gradual wavy boundary.

Bh1—12 to 16 inches; black (5YR 2/1) loamy fine sand; moderate coarse subangular blocky structure; friable; few fine and medium roots; extremely acid; gradual smooth boundary.

Bh2—16 to 22 inches; very dark grayish brown (10YR 3/2) fine sand; weak medium subangular blocky structure; friable; few fine and medium roots; few vertical lenses and few pockets of gray and grayish brown fine sand; extremely acid; gradual smooth boundary.

BE—22 to 34 inches; brown (10YR 4/3) fine sand; weak medium granular structure; friable; few fine and medium roots; common medium distinct dark reddish brown (5YR 3/2) mottles; stains along root channels; very strongly acid; clear wavy boundary.

Btg—34 to 44 inches; gray (10YR 5/1) fine sandy loam; common medium distinct olive brown (2.5Y 4/4) mottles; medium subangular blocky structure; friable; very strongly acid; gradual wavy boundary.

Cg—44 to 80 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; very strongly acid.

Reaction ranges from strongly acid to extremely acid except where lime has been added.

The A horizon has hue of 10YR, value of 2, and chroma of 1; hue of 10YR, value of 3, and chroma of 2; or hue of 10YR, value of 4, and chroma of 1. The thickness of this horizon ranges from 4 to 8 inches.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. The thickness of this horizon ranges from 6 to 17 inches. The texture is sand or fine sand.

The Bh horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; hue of 7.5YR, value of 3, and chroma of 2; hue of 5YR, value of 2, and chroma of 1; or it is neutral (N) and has value of 2. The thickness of this horizon ranges from 7 to 11 inches. The texture is sand, fine sand, or loamy fine sand.

The BE horizon has hue of 10YR, value of 4, and chroma of 2 or 3. The thickness of this horizon ranges from 0 to 12 inches. The texture is sand or fine sand.

Some pedons have an E' horizon that has hue of 10YR, value of 5, and chroma of 2 to 4. This horizon is 5 inches or less thick. The texture is sand or fine sand.

The Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2; hue of 5Y, value of 5, and chroma of 1; or it is neutral (N) and has value of 6. This horizon has mottles of yellow, red, and brown that range from none to common and from fine to coarse. The thickness of this horizon ranges from 8 to 26 inches. The texture is sandy loam, fine sandy loam, or sandy clay loam.

The Cg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. The texture is sand, fine sand, or loamy fine sand.

Winder Series

The Winder series consists of soils that are deep, nearly level, poorly drained, and slowly permeable to very slowly permeable. These soils formed in unconsolidated, sandy and loamy marine material. They are in broad, low areas on the flatwoods. In most years, the high water table is at a depth of 0 to 12 inches for 2 to 6 months. The slopes are less than 2 percent. Winder soils are fine-loamy, siliceous, hyperthermic Typic Glossaqualfs.

Winder soils are geographically associated with Riviera, Holopaw, Malabar, and Pomona soils. Except for Pomona soils, the associated soils are in similar positions on the landscape as Winder soils and have a spodic horizon. In addition, Riviera soils have sandy A and E horizons 20 to 40 inches thick over the Bt horizon, Holopaw and Malabar soils have a Bt horizon at a depth of more than 40 inches, and Malabar soils also have a Bw horizon.

Typical pedon of Winder fine sand; in a wooded area; about 3.2 miles east of the intersection of Florida State Highway 207 and Cracker Swamp Road, 3.4 miles north of Cracker Swamp Road; 700 feet south and 700 feet west of the northeast corner of sec. 36, T. 9 S., R. 27 E.

A—0 to 6 inches; black (10YR 2/1) fine sand; weak medium granular structure; very friable; many fine and few medium and coarse roots; strongly acid; abrupt wavy boundary.

Eg1—6 to 11 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; many medium and coarse roots; slightly acid; gradual wavy boundary.

Eg2—11 to 17 inches; light grayish brown (10YR 6/2) fine sand; single grained; loose; few medium and coarse roots; slightly acid; abrupt irregular boundary.

B/E—17 to 27 inches; dark gray (10YR 4/1) sandy clay loam (B); few medium distinct brownish yellow (10YR 6/8) mottles; few coarse distinct tongues of gray (10YR 5/1) fine sand (E); moderate medium subangular blocky structure; friable; few medium roots; few fine distinct light gray calcium carbonate accumulations; sand grains (B) coated and bridged with clay; mildly alkaline; gradual wavy boundary.

Btg—27 to 39 inches; grayish brown (10YR 5/2) fine sandy loam; few medium distinct brownish yellow

(10YR 6/8) mottles; weak medium subangular blocky structure; few fine faint light gray calcium carbonate accumulations; sand grains coated and bridged with clay; moderately alkaline; clear wavy boundary.

2Cg1—39 to 65 inches; light gray (5Y 7/1) fine sandy loam; many coarse distinct brownish yellow (10YR 6/8) mottles, few fine prominent yellowish red (5YR 5/8) mottles, and few fine faint dark gray mottles; massive; friable; many medium pockets of calcium carbonate and shell fragments; moderately alkaline; gradual wavy boundary.

2Cg2—65 to 80 inches; light gray (5YR 7/1) fine sandy loam; many coarse distinct brownish yellow (10YR 6/8) mottles and few fine and medium prominent yellowish red (5YR 4/6) mottles; massive; friable; few coarse pockets of calcium carbonate and shell fragments; few medium pockets of fine sand; moderately alkaline.

The thickness of the solum ranges from 25 to 60 inches. Reaction ranges from strongly acid to mildly alkaline in the A horizon, slightly acid to mildly alkaline in the E horizon, neutral to moderately alkaline in the B horizon, and mildly alkaline or moderately alkaline in the 2C horizon.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1. The thickness of this horizon ranges from 2 to 6 inches.

The E horizon has hue of 10YR, value of 4, and chroma of 1; or hue of 10YR, value of 5 to 7, and chroma of 2. The thickness of this horizon ranges from 4 to 12 inches. The texture is sand, fine sand, or loamy sand.

The B/E horizon has hue of 10YR, value of 4, and chroma of 1 or 2; hue of 10YR, value of 6, and chroma of 2; or hue of 2.5Y, value of 4, and chroma of 2. The texture of the B part of this horizon is sandy loam, fine sandy loam, or sandy clay loam. Tongues of albic material extend 3 to 10 inches into the B horizon.

The Btg horizon has hue of 10YR, value of 4 or 5, and chroma of 1; hue of 10YR, value of 5 to 7, and chroma of 2; or it is neutral (N) and has value of 6. Some pedons do not have accumulations of calcium carbonate in the Btg horizon. The thickness of this horizon ranges from 26 to 40 inches. The texture is fine sandy loam, sandy loam, or sandy clay loam.

The 2Cg horizon has hue of 10YR or 5Y, value of 5 to 7, and chroma of 1. Some pedons do not have accumulations of calcium carbonate in the 2Cg horizon. Some pedons have marine shells in this horizon. The texture is sandy loam, fine sandy loam, or sandy clay loam.

Zolfo Series

The Zolfo series consists of soils that are nearly level, somewhat poorly drained, and moderately permeable. These soils formed in sandy marine or eolian material. They are on low knolls and ridges on the flatwoods and on side slopes on the uplands. The water table is at a depth of 24 to 40 inches for 2 to 6 months during most years. The slopes range from 0 to 2 percent. Zolfo soils are sandy, siliceous, hyperthermic Grossarenic Entic Haplohumods.

Zolfo soils are geographically associated with Adamsville, Centenary, Narcoossee, and Tavares soils. Adamsville and Tavares soils do not have a Bh horizon. Centenary soils are moderately well drained. Narcoossee soils have a discontinuous spodic horizon.

Typical pedon of Zolfo fine sand; 2.3 miles north of intersection of Florida State Highway 20 and Hoover Road, 75 feet west of Hoover Road; 300 feet north and 100 feet west of the southeast corner of sec. 32, T. 9 S., R. 25 E.

A—0 to 6 inches; very dark gray (10YR 3/1) fine sand; weak medium granular structure; friable; common fine and few medium and coarse roots; many uncoated light gray sand grains; very strongly acid; clear smooth boundary.

E1—6 to 13 inches; pale brown (10YR 6/3) fine sand; many coarse distinct light yellowish brown (10YR 6/4) mottles and few fine faint yellowish brown mottles; single grained; loose; few fine, medium, and coarse roots; very strongly acid; clear smooth boundary.

E2—13 to 32 inches; very pale brown (10YR 7/3) fine sand; few fine distinct yellow (10YR 7/6) mottles; single grained; loose; few fine, medium, and coarse roots; root channels stained dark yellowish brown; strongly acid; gradual wavy boundary.

E3—32 to 53 inches; light gray (10YR 7/2) fine sand; few fine distinct reddish yellow (7.5YR 6/6) mottles and brown (7.5YR 5/4) mottles; single grained; loose; strongly acid; clear wavy boundary.

EB—53 to 64 inches; dark grayish brown (10YR 4/2) fine sand; weak fine granular structure; very friable; sand grains lightly coated with organic matter; very strongly acid; clear wavy boundary.

Bh—64 to 80 inches; dark reddish brown (5YR 3/2) fine sand; weak medium granular structure; very friable; sand grains well coated with organic matter; very strongly acid.

Reaction ranges from very strongly acid to neutral in the A and E horizons. It ranges from extremely acid to slightly acid in the Bh horizon.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2. The thickness of this horizon ranges from 4 to 6 inches.

The E1 and E2 horizons have hue of 10YR, value of 5 to 7, and chroma of 2 to 4. The E3 horizon has hue of 10YR, value of 6 to 8, and chroma of 1; or hue of 10YR, value of 8, and chroma of 2. The E horizons have

mottles of gray, brown, or yellow. The combined thickness of these horizons ranges from 47 to 70 inches. The texture is sand or fine sand.

The Bh horizon has hue of 10YR, value of 3 or 4, and chroma of 2; hue of 7.5YR, value of 2, and chroma of 2; hue of 7.5YR, value of 4, and chroma of 2; or hue of 5YR, value of 3, and chroma of 2 or 3. In some pedons, common or many uncoated sand grains are in this horizon. The texture is sand or fine sand.

Formation of the Soils

In this section, the factors of soil formation are discussed and related to the soils in the survey area, and the processes of soil formation are also explained.

Factors of Soil Formation

Soil is produced by forces of weathering and soil forming processes acting on the parent material. The kind of soil that forms depends on five major factors. These factors are—

- the type of parent material
- the climate under which soil material has existed since accumulation
- the plant and animal life in and on the soil
- the relief, or lay of the land
- the length of time the forces of soil formation have acted on the soil material.

The five soil-forming factors are interdependent; each modifies the effects of the others. Any one of the five factors can have more influence than the others on the formation of a soil and can account for most of its properties. For example, if the parent material is quartz sand, the soil generally has only weakly expressed horizons. In some places, the effect of the parent material is modified greatly by the effects of climate, relief, and plants and animals in and on the soil. If a soil is located on the flatwoods, it is mostly quartz sand and generally will have a distinct horizon of a dark color that is high in organic matter. In this case, relief and vegetation are important factors that modify parent material and form a different soil. As a soil forms, it is influenced by the five factors, but in some places one factor can have a predominant effect. A modification or variation in any of these factors results in a different kind of soil.

Parent Material

The parent material of the soils in the Putnam County Area consists of beds of sandy and loamy materials that were transported by ocean currents that covered the area a number of times during the Pleistocene Epoch. During the high stands of the sea, the Miocene-Pliocene sediments were eroded and redeposited or were reworked on the shallow sea bottom to form marine terraces.

Nearly all of the survey area is underlain by the Hawthorn Group *(5)*. On the uplands in the western part of Putnam County, the Citronelle Formation outcrops in a few places. Apopka, Candler, and Millhopper soils are the major soils in that area.

The parent material differs widely in mineral and chemical composition and in physical constitution. The main physical differences, such as those between sand, silt, and clay, are apparent. Other differences, such as mineral and chemical composition, are important to soil formation and affect the present physical and chemical characteristics of the soils. Many differences among soils in the survey area reflect original differences in the parent material as it was laid down.

Climate

Precipitation, temperature, humidity, and wind are the climatic forces that act on the parent material of soils. These forces also cause some variation in the plant and animal life on and in the soils. They influence changes in parent material and, consequently, soil development.

Putnam County Area has a warm, humid climate. The Atlantic Ocean and many inland lakes have a moderating effect on temperature in summer and winter. In summer, the day-to-day temperature is fairly uniform from year to year. In winter, however, the day-to-day temperature varies considerably. The average rainfall is about 56 inches a year.

Plants and Animals

Plants have been the principal biological factor in the formation of soils in the survey area. Animals, insects, bacteria, and fungi have also been important agents. Their chief functions have been to add organic matter to the soil and to bring plant nutrients from the lower horizons to the upper horizons. Plants and animals have caused differences in the content of organic matter, nitrogen, and nutrients in the soils and differences in soil structure and porosity.

Relief

Relief, or lay of the land, has affected the formation of the soils in the county mainly through its influence on soil-water relationships and through its effect on erosion in the upland part of the county. Other factors of soil formation generally associated with relief, such as temperature and plant cover, are of minor importance.

The survey area is made up of flatwoods, swamps, and the uplands. Some differences in the soils are directly related to relief.

The soils on the flatwoods have a high water table, and periodically, the surface is wet. The soils in the swamps are covered by water for long periods, and in many places the content of organic matter in the surface layer is high. The soils on the uplands are at higher elevations than those on the flatwoods and in the swamps. Most of the deep, sandy soils on the uplands are better drained than the soils on the flatwoods and in the swamps and are not influenced by a ground water table. Some of the soils on the uplands are influenced by a ground water table and also are subject to more erosion than soils in other parts of the county.

Time

Time is an important factor in soil formation. The physical and chemical changes brought about by climate, plants and animals, and relief are slow. The length of time needed for soil to form in geologic material varies according to the nature of the geologic material and the interaction of the other factors. Some minerals from which the soils formed weather fairly rapidly, but other minerals are chemically inert and show little change over long periods. The translocation of fine particles in the soil to form the various horizons varies under different conditions, but the processes always take a relatively long time.

The dominant geologic material, sand, is inactive. The sand is almost pure quartz and is highly resistant to weathering. The finer textured silt and clay are products of earlier weathering.

Relatively little geologic time has elapsed since the parent material, in which the soils in Putnam County formed, was laid down or emerged from the sea. The loamy and clayey horizons formed in place through the process of clay translocation.

Processes of Soil Formation

Soil morphology refers to the process of formation of soil horizons. The differentiation of horizons in soils in Putnam County Area is the result of accumulation of organic matter, leaching of carbonates, reduction and transfer of iron, or accumulation of silicate clay minerals. Sometimes more than one of these processes are involved.

Some organic matter has accumulated in the upper layers of most of the soils to form an A horizon. The content of organic matter is low in some of the soils but relatively high in others.

Leaching of carbonates and salts has occurred in nearly all of the soils. Because the leaching permitted the subsequent translocation of silicate clay material in some soils, the effects of leaching have been indirect. The soils in the survey area are leached to varying degrees.

The reduction and transfer of iron have occurred in all of the soils except the organic soils. In some of the wet soils, iron has been segregated in the deeper horizons to form reddish brown mottles and concretions. Wetness and movement or the alteration of clay are evident in the Sparr soils; for example, in a leached E horizon of light color and in a Bt horizon that is loamy and has sand grains coated and bridged with clay material.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity is expressed as—

	Inches of water per inch of soil
Very low	less than 0.05
Low	0.05 to 0.10
Moderate	0.10 to 0.15
High	0.15 to 0.20
Very high	more than 0.20

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels, i.e., clay coating, clay skin.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among

different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic).—Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated).—Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay are in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The movement of water into the soil is rapid.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Forb. Any herbaceous plant that is not a grass or a sedge.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—*Sprinkler.*—Water is sprayed over the soil surface through pipes or nozzles from a pressure system. *Subirrigation.*—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Lamellae. Thin, slightly wavy layers of soil enriched with clay and sometimes with iron or organic matter, or both. These layers are brighter in color than the soil between the layers. Individual layers are generally 1/8 to 1 inch or more thick and are generally repeated vertically at intervals of 1 inch to 6 inches.

Large stones (in tables). Rock fragments that are 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move through the profile. Permeability is

measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). In these areas, surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of the acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). There is a shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average

height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slippage (in tables). The soil mass is susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed on the contour or at a slight angle to the contour across sloping soils. The terrace intercepts surface runoff, so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). An otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, such as zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). There is a risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a

new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. This contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Based on data recorded in the period 1952-1984 at Hastings, Florida]

Month	Temperature					Precipitation				
	Monthly normal mean	Normal daily maximum	Normal daily minimum	Mean number of days with temperature of		Normal total	Maximum total	Minimum total	Mean number of days with rainfall of	
				90°F or higher	32°F or lower				0.10 inch or more	0.50 inch or more
	°F	°F	°F			In	In	In		
January----	54.7	64.1	43.2	0	5	3.23	8.56	0.16	5	3
February---	57.6	67.8	46.7	0	3	3.94	10.67	0.74	6	3
March------	61.4	73.9	51.5	0	2	4.38	11.02	0.41	7	3
April------	67.8	78.1	56.3	1	0	2.72	8.24	0.06	4	2
May--------	72.8	83.6	61.7	5	0	3.48	9.16	0.31	5	3
June-------	77.6	88.2	68.8	13	0	7.69	14.01	0.22	8	5
July-------	81.3	90.2	71.2	18	0	6.49	10.56	2.51	9	4
August-----	80.5	90.2	71.2	17	0	6.59	19.15	0.40	8	4
September--	77.1	86.0	69.2	8	0	8.08	21.80	1.99	9	4
October----	70.8	80.9	62.5	1	0	4.43	11.74	1.22	8	4
November---	62.3	72.9	53.4	0	1	2.37	9.51	0.03	5	2
December---	56.4	68.4	47.8	0	4	2.88	5.91	0.04	5	2
Year:	68.4	78.7	54.6	63	15	56.28	140.33	8.09	79	39

TABLE 2.--FREEZE DATA

[Based on data recorded in the period 1952-1984 at Hastings, Florida]

Freeze threshold temperature	Mean date of late spring occurrence	Mean date of first fall occurrence	Mean number of days between dates	Number of occurrences in spring	Number of occurrences in fall
32 °F	February 20	December 8	292	48	30
28 °F	January 24	December 24	334	26	15
24 °F	(*)	(*)	(*)	11	5
20 °F	(*)	(*)	(*)	2	3
16 °F	---	---	0	0	0

*Number of occurrences insufficient to compute mean.

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Candler fine sand, 0 to 5 percent slopes	34,000	7.7
2	Candler fine sand, 5 to 8 percent slopes	9,697	2.2
3	Myakka fine sand	43,295	9.7
4	Zolfo fine sand	15,784	3.6
5	Placid fine sand, depressional	8,925	2.0
6	Tavares fine sand, 0 to 5 percent slopes	20,960	4.7
7	Immokalee fine sand	8,272	1.9
8	Arents, 0 to 2 percent slopes	2,982	0.7
9	Pomona fine sand	40,764	9.2
10	Pompano fine sand	3,376	0.8
11	Udorthents, excavated	1,829	0.4
12	Electra fine sand	2,856	0.6
13	St. Johns fine sand, depressional	8,225	1.9
14	Cassia fine sand	7,194	1.6
15	Apopka sand, 0 to 5 percent slopes	7,942	1.8
16	Adamsville sand	6,168	1.4
17	Millhopper sand, 0 to 5 percent slopes	8,212	1.8
18	Lochloosa sand, 0 to 5 percent slopes	801	0.2
19	Pomona fine sand, depressional	1,351	0.3
20	Bluff sandy clay loam, frequently flooded	4,789	1.1
21	Apopka sand, 5 to 8 percent slopes	2,701	0.6
22	Tomoka muck	5,198	1.2
23	Palmetto fine sand	12,470	2.8
24	Holopaw fine sand, frequently flooded	8,292	1.9
25	Narcoossee fine sand	3,859	0.9
26	Terra Ceia muck, frequently flooded	18,181	4.1
27	Samsula muck	16,694	3.8
28	Centenary fine sand	11,750	2.6
29	Riviera fine sand, frequently flooded	5,788	1.3
30	Hontoon muck	9,026	2.0
31	Myakka fine sand, depressional	3,248	0.7
32	Sparr sand, 0 to 5 percent slopes	6,413	1.4
33	Winder fine sand	3,355	0.8
34	Riviera fine sand	7,384	1.7
35	Malabar fine sand	3,170	0.7
36	Shenks muck, frequently flooded	2,168	0.5
37	Ona fine sand	6,683	1.5
38	Holopaw fine sand	5,407	1.2
39	Holopaw fine sand, depressional	2,790	0.6
40	Paola fine sand, 0 to 8 percent slopes	2,234	0.5
41	Millhopper sand, 5 to 8 percent slopes	2,132	0.5
42	Riviera fine sand, depressional	2,858	0.6
43	Placid-Pompano association, frequently flooded	15,725	3.5
44	Candler sand, 12 to 25 percent slopes	665	0.1
45	Astatula fine sand, 0 to 8 percent slopes	13,408	3.0
46	Astatula fine sand, 8 to 15 percent slopes	1,236	0.3
47	Myakka-Urban land complex	1,165	0.3
48	Florahome sand	1,703	0.4
49	Bonneau fine sand, 0 to 5 percent slopes	1,092	0.2
50	Wabasso fine sand	1,592	0.4
51	Surrency fine sand, depressional	816	0.2
52	Orsino fine sand, 0 to 8 percent slopes	3,067	0.7
53	Zolfo-Urban land complex	653	0.1
54	Candler-Urban land complex, 0 to 8 percent slopes	871	0.2
55	Centenary-Urban land complex, 0 to 5 percent slopes	844	0.2
56	Mulat fine sand	2,720	0.6
57	Deland fine sand, 0 to 8 percent slopes	1,983	0.4
58	Wauchula fine sand	2,756	0.6
59	Floridana fine sand	321	0.1
60	Astor mucky fine sand, frequently flooded	1,017	0.2
61	Newnan fine sand	1,040	0.2
62	Monteocha sand, depressional	921	0.2
63	Okeechobee muck	2,862	0.6

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
64	Paisley loamy fine sand	927	0.2
65	Hobe fine sand, 0 to 5 percent slopes	816	0.2
	Water	7,181	1.6
	Total	444,604	100.0

TABLE 4.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Land capability	Irish potatoes	Cabbage	Watermelons	Oranges	Improved bermudagrass	Improved bermudagrass hay	Leatherleaf fern
		Cwt	Crates	Tons	Boxes	AUM*	Tons	Boxes
1---------- Candler	IVs	---	---	10	425	5	3	625
2---------- Candler	VIs	---	---	---	400	4	2	---
3---------- Myakka	IVw	200	320	---	350	8	4	---
4---------- Zolfo	IIIw	---	400	---	375	7	4	---
5---------- Placid	VIIw	---	---	---	---	---	---	---
6---------- Tavares	IIIs	---	---	8	425	6	3	675
7---------- Immokalee	IVw	200	300	---	350	8	4	---
8. Arents								
9---------- Pomona	IVw	225	320	---	---	8	4	---
10---------- Pompano	IVw	200	260	---	300	7	3	---
11. Udorthents								
12---------- Electra	VIs	---	---	---	---	4	2	400
13---------- St. Johns	VIIw	---	---	---	---	---	---	---
14---------- Cassia	VIs	---	---	---	250	13	2	400
15---------- Apopka	IIIs	---	---	20	500	7	4	600
16---------- Adamsville	IIIw	---	400	---	375	7	4	400
17---------- Millhopper	IIIs	---	---	10	450	7	4	625
18---------- Lochloosa	IIw	---	---	11	475	8	5	450
19---------- Pomona	VIIw	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 4.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Irish potatoes	Cabbage	Watermelons	Oranges	Improved bermudagrass	Improved bermudagrass hay	Leatherleaf fern
		Cwt	Crates	Tons	Boxes	AUM*	Tons	Boxes
20--Bluff	Vw	---	---	---	---	---	---	---
21--Apopka	IVs	---	---	---	500	---	---	575
22--Tomoka	VIIw	---	---	---	---	---	---	---
23--Palmetto	IVw	180	240	---	---	8	4	---
24--Holopaw	VIw	---	---	---	---	---	---	---
25--Narcoossee	IIIw	---	---	---	350	7	4	400
26--Terra Ceia	VIIw	---	---	---	---	---	---	---
27--Samsula	VIIw	---	---	---	---	---	---	---
28--Centenary	IIIs	---	---	10	450	6	3	575
29--Riviera	Vw	---	---	---	---	---	---	---
30--Hontoon	VIIw	---	---	---	---	---	---	---
31--Myakka	VIIw	---	---	---	---	---	---	---
32--Sparr	IIIw	---	---	10	415	8	4	400
33--Winder	IIIw	200	300	---	---	9	5	---
34--Riviera	IIIw	275	400	---	425	8	4	---
35--Malabar	IVw	275	300	---	325	8	4	---
36--Shenks	VIw	---	---	---	---	---	---	---
37--Ona	IIIw	200	300	---	---	9	4	---
38--Holopaw	IVw	---	240	---	375	---	---	---
39--Holopaw	VIIw	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 4.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Irish potatoes	Cabbage	Watermelons	Oranges	Improved bermudagrass	Improved bermudagrass hay	Leatherleaf fern
		Cwt	Crates	Tons	Boxes	AUM*	Tons	Boxes
40--Paola	VIs	---	---	10	250	4	3	575
41--Millhopper	IVs	---	---	9.5	450	6	3	550
42--Riviera	VIIw	---	---	---	---	---	---	---
43:								
Placid	VIw	---	---	---	---	---	---	---
Pompano	VIw	---	---	---	---	---	---	---
44--Candler	VIIs	---	---	---	---	---	---	---
45--Astatula	VIs	---	---	---	350	---	---	---
46--Astatula	VIIs	---	---	---	---	---	---	---
47--Myakka-Urban land	---	---	---	---	---	---	---	---
48--Florahome	IIIs	---	---	15	---	10	6	500
49--Bonneau	IIs	---	---	18	---	9	5	600
50--Wabasso	IIIw	250	250	---	---	8	4	---
51--Surrency	VIw	---	---	---	---	---	---	---
52--Orsino	IVs	---	---	10	350	4	3	575
53--Zolfo-Urban land	---	---	---	---	---	---	---	---
54--Candler-Urban land	---	---	---	---	---	---	---	---
55--Centenary-Urban land	---	---	---	---	---	---	---	---
56--Mulat	IIIw	275	400	---	---	8	4	---
57--Deland	IVs	---	---	---	300	9	5	600

See footnote at end of table.

TABLE 4.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Irish potatoes	Cabbage	Watermelons	Oranges	Improved bermudagrass	Improved bermudagrass hay	Leatherleaf fern
		Cwt	Crates	Tons	Boxes	AUM*	Tons	Boxes
58--Wauchula	IIIw	225	300	---	---	8	4	---
59--Floridana	IIIw	250	600	---	---	10	5	---
60--Astor	VIw	---	---	---	---	---	---	---
61--Newnan	IIIs	---	---	9	---	---	---	425
62--Monteocha	VIIw	---	---	---	---	---	---	---
63--Okeechobee	VIIw	---	---	---	---	---	---	---
64--Paisley	IIIw	180	450	---	---	10	5	---
65--Hobe	VIs	---	---	---	---	4	3	550

*Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 5.--GRAZEABLE WOODLAND SITES

Map symbol	Soil name	Woodland sites
1	Candler fine sand, 0 to 5 percent slopes	Longleaf Pine-Turkey Oak Hills
2	Candler fine sand, 5 to 8 percent slopes	Longleaf Pine-Turkey Oak Hills
3	Myakka fine sand	North Florida Flatwoods
4	Zolfo fine sand	North Florida Flatwoods
5	Placid fine sand, depressional	Freshwater Marshes and Ponds
6	Tavares fine sand, 0 to 5 percent slopes	Longleaf Pine-Turkey Oak Hills
7	Immokalee fine sand	North Florida Flatwoods
8	Arents, 0 to 2 percent slopes	*
9	Pomona fine sand	North Florida Flatwoods
10	Pompano fine sand	North Florida Flatwoods
11	Udorthents, excavated	*
12	Electra fine sand	North Florida Flatwoods
13	St. Johns fine sand, depressional	Swamp Hardwoods
14	Cassia fine sand	Sand Pine-Scrub Oak
15	Apopka sand, 0 to 5 percent slopes	Upland Hardwood Hammock
16	Adamsville sand	Oak Hammock
17	Millhopper sand, 0 to 5 percent slopes	Upland Hardwood Hammock
18	Lochloosa sand, 0 to 5 percent slopes	Oak Hammock
19	Pomona fine sand, depressional	Freshwater Marshes and Ponds
20	Bluff sandy clay loam, frequently flooded	Freshwater Marshes and Ponds
21	Apopka sand, 5 to 8 percent slopes	Upland Hardwood Hammock
22	Tomoka muck	Freshwater Marshes and Ponds
23	Palmetto fine sand	North Florida Flatwoods
24	Holopaw fine sand, frequently flooded	Swamp Hardwoods
25	Narcoossee fine sand	Oak Hammock
26	Terra Ceia muck, frequently flooded	Swamp Hardwoods
27	Samsula muck	Freshwater Marshes and Ponds
28	Centenary fine sand	Upland Hardwood Hammock
29	Riviera fine sand, frequently flooded	Swamp Hardwoods
30	Hontoon muck	Freshwater Marshes and Ponds

See footnote at end of table.

TABLE 5.--GRAZEABLE WOODLAND SITES--Continued

Map symbol	Soil name	Woodland sites
31	Myakka fine sand, depressional	Swamp Hardwoods
32	Sparr sand, 0 to 5 percent slopes	Oak Hammock
33	Winder fine sand	North Florida Flatwoods
34	Riviera fine sand	North Florida Flatwoods
35	Malabar fine sand	North Florida Flatwoods
36	Shenks muck, frequently flooded	Swamp Hardwoods
37	Ona fine sand	North Florida Flatwoods
38	Holopaw fine sand	North Florida Flatwoods
39	Holopaw fine sand, depressional	Swamp Hardwoods
40	Paola fine sand, 0 to 8 percent slopes	Sand Pine-Scrub Oak
41	Millhopper sand, 5 to 8 percent slopes	Upland Hardwood Hammock
42	Riviera fine sand, depressional	Swamp Hardwoods
43	Placid-Pompano association, frequently flooded	Swamp Hardwoods
44	Candler sand, 12 to 25 percent slopes	Longleaf Pine-Turkey Oak Hills
45	Astatula fine sand, 0 to 8 percent slopes	Longleaf Pine-Turkey Oak Hills
46	Astatula fine sand, 8 to 15 percent slopes	Longleaf Pine-Turkey Oak Hills
47	Myakka-Urban land complex	*
48	Florahome sand	Upland Hardwood Hammock
49	Bonneau sand, 0 to 5 percent slopes	Upland Hardwood Hammock
50	Wabasso fine sand	North Florida Flatwoods
51	Surrency fine sand, depressional	Swamp Hardwoods
52	Orsino fine sand, 0 to 8 percent slopes	Sand Pine-Scrub Oak
53	Zolfo-Urban land complex	*
54	Candler-Urban land complex, 0 to 8 percent slopes	*
55	Centenary-Urban land complex, 0 to 5 percent slopes	*
56	Mulat fine sand	North Florida Flatwoods
57	Deland fine sand, 0 to 8 percent slopes	Upland Hardwood Hammock
58	Wauchula fine sand	North Florida Flatwoods

See footnote at end of table.

TABLE 5.--GRAZEABLE WOODLAND SITES--Continued

Map symbol	Soil name	Woodland sites
59	Floridana fine sand	North Florida Flatwoods
60	Astor mucky fine sand, frequently flooded	Swamp Hardwoods
61	Newnan fine sand	Oak Hammock
62	Monteocha sand, depressional	Swamp Hardwoods
63	Okeechobee muck	Freshwater Marshes and Ponds
64	Paisley loamy fine sand	North Florida Flatwoods
65	Hobe fine sand, 0 to 5 percent slopes	Sand Pine-Scrub Oak

*Land use of these soils does not permit woodland grazing.

TABLE 6.--GRAZEABLE WOODLAND SITES POTENTIAL PRODUCTIVITY

Woodland sites	Annual production in excellent grazing condition	Air-dry weight herbage	Important grazing plants	Cover in excellent condition
		lb/acre		Pct
Freshwater Marshes and Ponds	good growth year	9,000	Maidencane	50
	fair growth year	7,500	Chalky bluestem	10
	poor growth year	5,000	Blue maidencane	5
			Bluejoint panicum	5
Oak Hammock	good growth year	3,500	Eastern gamagrass	5
	fair growth year	2,500	Maidencane	5
	poor growth year	2,000	Switchgrass	5
			Creeping bluestem	5
Sand Pine-Scrub Oak	good growth year	3,500	Indiangrass	10
	fair growth year	2,500	Beaked panicum	5
	poor growth year	1,500	Creeping bluestem	5
			Purple bluestem	5
Slough	good growth year	8,000	Blue maidencane	50
	fair growth year	6,000	Chalky bluestem	10
	poor growth year	3,000	Bluejoint panicum	10
			Other sedges & rushes	10
North Florida Flatwoods	good growth year	6,000	Creeping bluestem	25
	fair growth year	4,500	Chalky bluestem	25
	poor growth year	3,000	Indiangrass	15
			Blue maidencane	10
			Other sedges & rushes	10
Longleaf Pine-Turkey Oak Hills	good growth year	4,000	Creeping bluestem	15
	fair growth year	3,000	Indiangrass	15
	poor growth year	3,000	Other bluestems	5
			Legumes	5
			Greenbrier	5
Upland Hardwood Hammock	good growth year	4,500	Indiangrass	10
	fair growth year	4,000	Stitchgrass	10
	poor growth year	3,000	Chalky bluestem	10
			Longleaf uniola	10
			Legumes	5
			Greenbrier	5
Swamp Hardwoods*				

*Not used for woodland grazing.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index ***	Productivity class*	
1, 2---------- Candler	8S	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	70	8	Sand pine, slash pine, longleaf pine
							Longleaf pine-------	60	4	
							Live oak----------	---	---	
							Turkey oak----------	---	---	
3---------- Myakka	8W	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine----------	70	8	Slash pine.
							Longleaf pine-------	60	4	
							Loblolly pine-------	70	7	
							Live oak----------	---	---	
							Water oak----------	---	---	
4---------- Zolfo	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	80	10	Slash pine, longleaf pine.
							Longleaf pine-------	65	5	
							Loblolly pine-------	70	7	
							Turkey oak----------	---	---	
							Laurel oak----------	---	---	
							Water oak----------	---	---	
5---------- Placid	6W	Slight	Severe	Severe	Severe	Severe	Baldcypress---------	100	6	**
							Blackgum----------	---	---	
							Carolina ash--------	---	---	
							Loblollybay gordonia	---	---	
							Red maple----------	---	---	
							Sweetbay----------	---	---	
6---------- Tavares	10S	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	80	10	Slash pine, longleaf pine.
							Longleaf pine-------	70	6	
							Loblolly pine-------	70	7	
							Turkey oak----------	---	---	
							Live oak----------	---	---	
7---------- Immokalee	8W	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine----------	70	8	Slash pine, longleaf pine.
							Longleaf pine-------	65	5	
							Loblolly pine-------	70	7	
							Live oak----------	---	---	
							Water oak----------	---	---	
9---------- Pomona	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	80	10	Slash pine, loblolly pine, longleaf pine.
							Loblolly pine-------	80	8	
							Longleaf pine-------	70	6	
							Live oak----------	---	---	
							Water oak----------	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index ***	Productivity class*	
10---------- Pompano	8W	Slight	Severe	Severe	Slight	Moderate	Slash pine----------	70	8	Slash pine.
							Longleaf pine-------	60	4	
							Loblolly pine-------	70	7	
12---------- Electra	8S	Slight	Moderate	Severe	Slight	Slight	Slash pine----------	70	8	Slash pine, loblolly pine, longleaf pine.
							Loblolly pine-------	80	8	
							Longleaf pine-------	65	5	
							Live oak----------	---	---	
							Laurel oak----------	---	---	
							Water oak----------	---	---	
13---------- St. Johns	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress---------	75	2	**
							Baldcypress---------	---	---	
							Blackgum----------	---	---	
							Pond pine----------	---	---	
							Loblollybay gordonia	---	---	
							Red maple----------	---	---	
							Sweetbay----------	---	---	
14---------- Cassia	8S	Slight	Moderate	Severe	Slight	Moderate	Slash pine----------	70	8	Slash pine, longleaf pine.
							Longleaf pine-------	60	4	
							Loblolly pine-------	65	6	
							Water oak----------	---	---	
							Live oak----------	---	---	
							Laurel oak----------	---	---	
15---------- Apopka	10S	Slight	Moderate	Moderate	Slight	Slight	Slash pine----------	80	10	Slash pine, loblolly pine, longleaf pine.
							Loblolly pine-------	80	8	
							Longleaf pine-------	70	6	
							Turkey oak----------	---	---	
							Live oak----------	---	---	
16---------- Adamsville	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	80	10	Slash pine, longleaf pine.
							Longleaf pine-------	65	5	
							Loblolly pine-------	70	7	
							Water oak----------	---	---	
							Live oak----------	---	---	
							Hickory----------	---	---	
							Black cherry--------	---	---	
17---------- Millhopper	10S	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	80	10	Slash pine, loblolly pine, longleaf pine.
							Loblolly pine-------	80	8	
							Longleaf pine-------	65	5	
							Turkey oak----------	---	---	
							Live oak----------	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index ***	Productivity class*	
18---------- Lochloosa	11A	Slight	Slight	Slight	Slight	Slight	Slash pine----------	90	11	Slash pine, loblolly pine, longleaf pine.
							Loblolly pine-------	90	9	
							Longleaf pine-------	70	6	
							Live oak----------	---	---	
							Laurel oak----------	---	---	
							Water oak----------	---	---	
19---------- Pomona	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress---------	75	2	**
							Baldcypress---------	---	---	
							Blackgum----------	---	---	
							Pond pine----------	---	---	
							Loblollybay gordonia	---	---	
							Red maple----------	---	---	
							Sweetbay----------	---	---	
20---------- Bluff	6W	Slight	Severe	Severe	Moderate	Moderate	Baldcypress---------	100	6	**
							Cabbage palm--------	---	---	
							Laurel oak----------	---	---	
							Red maple----------	---	---	
							Sweetgum----------	---	---	
							Water oak----------	---	---	
21---------- Apopka	10S	Slight	Moderate	Moderate	Slight	Slight	Slash pine----------	80	10	Slash pine, loblolly pine, longleaf pine.
							Loblolly pine-------	80	8	
							Longleaf pine-------	70	6	
							Turkey oak----------	---	---	
							Bluejack oak--------	---	---	
							Live oak----------	---	---	
22---------- Tomoka	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress---------	75	2	**
							Sweetbay----------	---	---	
							Red maple----------	---	---	
							Pond pine----------	---	---	
							Baldcypress---------	---	---	
							Blackgum----------	---	---	
							White ash----------	---	---	
							Loblollybay gordonia	---	---	
23---------- Palmetto	10W	Slight	Severe	Severe	Slight	Severe	Slash pine----------	80	10	Slash pine.
							Longleaf pine-------	70	6	
							Loblolly pine-------	80	8	
24---------- Holopaw	6W	Slight	Severe	Severe	Slight	Severe	Baldcypress---------	100	6	**
							Cabbage palm--------	---	---	
							Laurel oak----------	---	---	
							Red maple----------	---	---	
							Sweetgum----------	---	---	
							Water oak----------	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index ***	Productivity class*	
25---------- Narcoossee	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	80	10	Slash pine, longleaf pine.
							Longleaf pine-------	70	6	
							Loblolly pine-------	70	7	
26---------- Terra Ceia	6W	Slight	Severe	Severe	Severe	Severe	Baldcypress---------	100	6	**
							Cabbage palm--------	---	---	
							Red maple-----------	---	---	
							Sweetgum------------	---	---	
							Water oak-----------	---	---	
							Pond pine-----------	---	---	
27---------- Samsula	2W	Slight	Severe	Severe	Severe	Severe	Pondcypress---------	75	---	**
							Loblollybay---------	---	---	
							Sweetbay------------	---	---	
							Blackgum------------	---	---	
							Carolina ash--------	---	---	
							Red maple-----------	---	---	
							Pond pine-----------	---	---	
28---------- Centenary	11S	Slight	Moderate	Moderate	Slight	Slight	Slash pine----------	85	11	Slash pine, longleaf pine.
							Loblolly pine-------	85	8	
							Longleaf pine-------	72	6	
29---------- Riviera	6W	Slight	Moderate	Moderate	Moderate	Severe	Baldcypress---------	100	6	**
							Cabbage palm--------	---	---	
							Laurel oak----------	---	---	
							Red maple-----------	---	---	
							Sweetgum------------	---	---	
							Water oak-----------	---	---	
30---------- Hontoon	6W	Slight	Severe	Severe	Severe	Severe	Baldcypress---------	100	6	**
							Blackgum------------	---	---	
							White ash-----------	---	---	
							Loblollybay gordonia	---	---	
							Red maple-----------	---	---	
							Sweetbay------------	---	---	
							Pondcypress---------	---	---	
							Pond pine-----------	---	---	
31---------- Myakka	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress---------	75	2	**
							Baldcypress---------	---	---	
							Blackgum------------	---	---	
							Sweetbay------------	---	---	
							Loblollybay gordonia	---	---	
							Red maple-----------	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index ***	Productivity class*	
32---------- Sparr	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	80	10	Slash pine, loblolly pine, longleaf pine.
							Loblolly pine-------	80	8	
							Longleaf pine-------	70	6	
							Laurel oak----------	---	---	
							Water oak-----------	---	---	
							Live oak------------	---	---	
33---------- Winder	11W	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine----------	90	11	Slash pine, loblolly pine.
							Loblolly pine-------	90	10	
							Longleaf pine-------	70	6	
							Live oak------------	---	---	
							Water oak-----------	---	---	
34---------- Riviera	10W	Slight	Moderate	Moderate	Moderate	Moderate	Slash pine----------	80	10	Slash pine, loblolly pine.
							Longleaf pine-------	70	6	
							Loblolly pine-------	80	8	
							Live oak------------	---	---	
							Water oak-----------	---	---	
35---------- Malabar	10W	Slight	Moderate	Severe	Slight	Moderate	Slash pine----------	80	10	Slash pine.
							Longleaf pine-------	70	6	
							Loblolly pine-------	80	8	
							Live oak------------	---	---	
							Water oak-----------	---	---	
36---------- Shenks	6W	Slight	Severe	Severe	Severe	Severe	Baldcypress---------	100	6	**
							Sweetgum------------	---	---	
							Red maple-----------	---	---	
							Cabbage palm--------	---	---	
							Laurel oak----------	---	---	
							Water oak-----------	---	---	
							Pondcypress---------	---	---	
							Pond pine-----------	---	---	
37---------- Ona	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	80	10	Slash pine, longleaf pine.
							Longleaf pine-------	70	6	
							Loblolly pine-------	70	7	
38---------- Holopaw	10W	Slight	Moderate	Severe	Slight	Moderate	Slash pine----------	80	10	Slash pine, longleaf pine.
							Longleaf pine-------	70	6	
							Loblolly pine-------	80	8	
							Live oak------------	---	---	
							Cabbage palm--------	---	---	
							Water oak-----------	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index ***	Productivity class*	
39---------- Holopaw	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress--------- Baldcypress--------- Blackgum---------- Cabbage palm-------- White ash---------- Loblollybay gordonia Pond pine---------- Red maple---------- Sweetbay----------	75 --- --- --- --- --- --- --- ---	2 --- --- --- --- --- --- --- ---	**
40---------- Paola	2S	Slight	Moderate	Severe	Slight	Slight	Sand pine---------- Sand live oak-------	50 ---	2 ---	Sand pine.
41---------- Millhopper	10S	Slight	Moderate	Moderate	Slight	Moderate	Slash pine---------- Loblolly pine------- Longleaf pine------- Turkey oak---------- Live oak----------	80 80 65 --- ---	10 8 5 --- ---	Slash pine.
42---------- Riviera	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress--------- Baldcypress--------- Blackgum---------- Cabbage palm-------- Pond pine---------- Loblollybay gordonia Red maple---------- Sweetbay----------	75 --- --- --- --- --- --- ---	2 --- --- --- --- --- --- ---	**
43: Placid----------	6W	Slight	Severe	Severe	Moderate	Moderate	Baldcypress--------- Sweetgum---------- Water oak---------- Laurel oak---------- Red maple---------- Pondcypress--------- Pond pine----------	100 --- --- --- --- --- ---	6 --- --- --- --- --- ---	**
Pompano----------	6W	Slight	Severe	Severe	Slight	Moderate	Baldcypress--------- Sweetgum---------- Water oak---------- Cabbage palm-------- Laurel oak----------	100 --- --- --- ---	6 --- --- --- ---	**
44---------- Candler	8S	Moderate	Moderate	Moderate	Slight	Moderate	Slash pine---------- Longleaf pine------- Sand pine---------- Turkey oak----------	70 60 75 ---	8 4 4 ---	Sand pine, slash pine, longleaf pine.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index ***	Productivity class*	
45, 46--Astatula	3S	Slight	Severe	Moderate	Slight	Slight	Sand pine	60	3	Sand pine, longleaf pine.
							Slash pine	65	3	
							Longleaf pine	60	3	
							Turkey oak	---	---	
							Bluejack oak	---	---	
							Blackjack oak	---	---	
48--Florahome	10S	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine.
							Longleaf pine	65	5	
							Loblolly pine	80	8	
							Laurel oak	---	---	
							Live oak	---	---	
							Turkey oak	---	---	
							Hickory	---	---	
49--Bonneau	9S	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine, loblolly pine, longleaf pine.
							Loblolly pine	86	9	
							Longleaf pine	75	6	
							Live oak	---	---	
							Turkey oak	---	---	
50--Wabasso	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine	80	10	Slash pine, loblolly pine, longleaf pine.
							Longleaf pine	70	6	
							Loblolly pine	80	8	
51--Surrency	2W	Slight	Severe	Severe	Slight	Severe	Pondcypress	75	2	**
							Baldcypress	---	---	
							Blackgum	---	---	
							Cabbage palm	---	---	
							White ash	---	---	
							Loblollybay	---	---	
							Red maple	---	---	
							Sweetbay	---	---	
52--Orsino	8S	Slight	Moderate	Severe	Slight	Moderate	Slash pine	70	8	Slash pine, longleaf pine.
							Longleaf pine	60	4	
							Sand pine	70	4	
							Sand live oak	---	---	
							Turkey oak	---	---	
56--Mulat	11W	Slight	Severe	Severe	Slight	Moderate	Slash pine	90	11	Slash pine, loblolly pine, longleaf pine.
							Longleaf pine	75	6	
							Loblolly pine	80	8	
							Live oak	---	---	
							Water oak	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index ***	Productivity class*	
57---------- Deland	5S	Slight	Moderate	Moderate	Slight	Moderate	Sand pine----------	80	5	Sand pine, slash pine, longleaf pine.
							Slash pine----------	70	8	
							Longleaf pine-------	70	6	
							Live oak----------	---	---	
							Water oak----------	---	---	
58---------- Wauchula	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	80	10	Slash pine, loblolly pine, longleaf pine.
							Longleaf pine-------	65	5	
59---------- Floridana	11W	Slight	Severe	Severe	Slight	Moderate	Slash pine----------	90	11	Slash pine, loblolly pine.****
							Longleaf pine-------	75	6	
							Loblolly pine-------	90	10	
							Cabbage palm--------	---	---	
							Live oak----------	---	---	
							Water oak----------	---	---	
60---------- Astor	6W	Slight	Severe	Severe	Moderate	Severe	Baldcypress---------	100	6	**
							Sweetgum----------	---	---	
							Water oak----------	---	---	
							Cabbage palm--------	---	---	
							Blackgum----------	---	---	
							Laurel oak---------	---	---	
							Red maple----------	---	---	
							Pond pine----------	---	---	
61---------- Newnan	10W	Slight	Moderate	Moderate	Slight	Moderate	Slash pine----------	80	10	Slash pine, longleaf pine.
							Longleaf pine-------	65	5	
							Loblolly pine-------	80	8	
							Live oak----------	---	---	
							Water oak----------	---	---	
62---------- Monteocha	2W	Slight	Severe	Severe	Moderate	Severe	Pondcypress---------	75	2	**
							Blackgum----------	---	---	
							Pond pine----------	---	---	
							Cabbage palm--------	---	---	
							White ash----------	---	---	
							Loblollybay gordonia	---	---	
							Red maple----------	---	---	
							Sweetbay----------	---	---	
							Baldcypress---------	---	---	
64---------- Paisley	13W	Slight	Severe	Severe	Severe	Severe	Slash pine----------	100	13	Slash pine, loblolly pine.
							Loblolly pine-------	100	9	
							Longleaf pine-------	75	6	
							Live oak----------	---	---	
							Water oak----------	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index ***	Productivity class*	
65---------- Hobe	2S	Slight	Moderate	Severe	Slight	Slight	Sand pine---------- Sand live oak--------	45 ---	2 ---	Sand pine, slash pine, longleaf pine, loblolly pine.

*Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

**Trees to plant are not given for this soil because of equipment limitations and other management concerns. Natural vegetation is preferred.

***Site index for pondcypress is estimated.

****Adequate surface drainage and/or bedding is recommended before planting pine trees.

TABLE 8.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "moderate" and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1---------- Candler	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
2---------- Candler	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
3---------- Myakka	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
4---------- Zolfo	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
5---------- Placid	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: ponding.
6---------- Tavares	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
7---------- Immokalee	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
8. Arents					
9---------- Pomona	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
10---------- Pompano	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
11. Udorthents					
12---------- Electra	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
13---------- St. Johns	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
14---------- Cassia	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: wetness, droughty.
15---------- Apopka	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
16---------- Adamsville	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
17--- Millhopper	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
18--- Lochloosa	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: too sandy.
19--- Pomona	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
20--- Bluff	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
21--- Apopka	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
22--- Tomoka	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
23--- Palmetto	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
24--- Holopaw	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.
25--- Narcoossee	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
26--- Terra Ceia	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness, flooding.	Severe: ponding, excess humus, wetness.	Severe: wetness, excess humus, flooding.
27--- Samsula	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
28--- Centenary	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
29--- Riviera	Severe: flooding, wetness, percs slowly.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.
30--- Hontoon	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
31--- Myakka	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
32--- Sparr	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: wetness, too sandy, droughty.
33--- Winder	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness.
34--- Riviera	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
35--- Malabar	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
36--- Shenks	Severe: flooding, wetness, percs slowly.	Severe: wetness, excess humus, percs slowly.	Severe: excess humus, wetness, flooding.	Severe: wetness, excess humus.	Severe: wetness, flooding, excess humus.
37--- Ona	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
38--- Holopaw	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
39--- Holopaw	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding, droughty.
40--- Paola	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
41--- Millhopper	Severe: too sandy.	Severe: too sandy.	Severe: too sandy, slope.	Severe: too sandy.	Moderate: droughty, too sandy.
42--- Riviera	Severe: ponding, percs slowly, too sandy.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding, percs slowly.	Severe: ponding, too sandy.	Severe: ponding.
43: Placid---	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.
Pompano---	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, droughty, flooding.
44--- Candler	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty, slope.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
45--- Astatula	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
46--- Astatula	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
47: Myakka---	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
Urban land.					
48--- Florahome	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
49--- Bonneau	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
50--- Wabasso	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness.
51--- Surrency	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
52--- Orsino	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
53: Zolfo---	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
Urban land.					
54: Candler---	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Urban land.					
55: Centenary---	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Urban land.					
56--- Mulat	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness.
57--- Deland	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
58--- Wauchula	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: wetness.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
59--- Floridana	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, percs slowly.	Severe: wetness, too sandy.	Severe: wetness.
60--- Astor	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.
61--- Newnan	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: wetness, droughty, too sandy,
62--- Monteocha	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
63--- Okeechobee	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
64--- Paisley	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
65--- Hobe	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.

TABLE 9.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1, 2---------- Candler	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
3---------- Myakka	Poor	Fair	Fair	Poor	Poor	Fair	Poor	Fair	Poor	Poor.
4---------- Zolfo	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
5---------- Placid	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
6---------- Tavares	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
7---------- Immokalee	Poor	Poor	Fair	Poor	Poor	Fair	Poor	Poor	Poor	Poor.
8. Arents										
9---------- Pomona	Poor	Fair	Fair	Poor	Poor	Fair	Fair	Fair	Poor	Fair.
10---------- Pompano	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
11. Udorthents										
12---------- Electra	Poor	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor.
13---------- St. Johns	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Good	Very poor.	Very poor.	Good.
14---------- Cassia	Very poor.	Poor	Poor	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
15---------- Apopka	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.
16---------- Adamsville	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
17---------- Millhopper	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
18---------- Lochloosa	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
19---------- Pomona	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
20---------- Bluff	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.

TABLE 9.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
21--Apopka	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.
22--Tomoka	Very poor.	Poor	Poor	Fair	Poor	Good	Good	Poor	Poor	Good.
23--Palmetto	Poor	Poor	Fair	Poor	Poor	Good	Fair	Poor	Poor	Fair.
24--Holopaw	Very poor.	Very poor.	Poor	Fair	Poor	Good	Fair	Very poor.	Fair	Fair.
25--Narcoossee	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
26--Terra Ceia	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
27--Samsula	Very poor.	Very poor.	Poor	Fair	Very poor.	Good	Good	Very poor.	Poor	Good.
28--Centenary	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
29--Riviera	Poor	Fair	Fair	Fair	Fair	Poor	Fair	Fair	Fair	Fair.
30--Hontoon	Very poor.	Very poor.	Poor	Poor	Very poor.	Good	Good	Very poor.	Poor	Good.
31--Myakka	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Good	Very poor.	Very poor.	Good.
32--Sparr	Poor	Fair	Good	Fair	Fair	Poor	Fair	Fair	Fair	Poor.
33--Winder	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
34--Riviera	Poor	Fair	Fair	Fair	Fair	Poor	Fair	Fair	Fair	Fair.
35--Malabar	Poor	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair.
36--Shenks	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
37--Ona	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair.
38--Holopaw	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair.
39--Holopaw	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
40--Paola	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.

TABLE 9.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
41--Millhopper	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
42--Riviera	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
43:										
Placid	Very poor.	Very poor.	Poor	Fair	Poor	Good	Fair	Very poor.	Poor	Good.
Pompano	Very poor.	Very poor.	Poor	Fair	Poor	Fair	Fair	Very poor.	Poor	Fair.
44--Candler	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
45, 46--Astatula	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
47:										
Myakka	Poor	Fair	Fair	Poor	Poor	Fair	Poor	Fair	Poor	Poor.
Urban land.										
48--Florahome	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
49--Bonneau	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
50--Wabasso	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair	Poor.
51--Surrency	Poor	Poor	Poor	Poor	Poor	Fair	Good	Poor	Poor	Fair.
52--Orsino	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
53:										
Zolfo	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
Urban land.										
54:										
Candler	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Urban land.										
55:										
Centenary	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Urban land.										
56--Mulat	Poor	Fair	Fair	Poor	Poor	Fair	Fair	Fair	Poor	Fair.
57--Deland	Poor	Poor	Poor	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.

TABLE 9.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
58---------- Wauchula	Poor	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor.
59---------- Floridana	Poor	Poor	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
60---------- Astor	Very poor.	Very poor.	Poor	Fair	Poor	Good	Good	Very poor.	Fair	Good.
61---------- Newnan	Poor	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
62---------- Monteocha	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
63---------- Okeechobee	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
64---------- Paisley	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
65---------- Hobe	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.

TABLE 10.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1---------- Candler	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: droughty.
2---------- Candler	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
3---------- Myakka	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
4---------- Zolfo	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
5---------- Placid	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
6---------- Tavares	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Severe: droughty.
7---------- Immokalee	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
8. Arents						
9---------- Pomona	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
10---------- Pompano	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
11. Udorthents						
12---------- Electra	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
13---------- St. Johns	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
14---------- Cassia	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
15---------- Apopka	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: droughty.
16---------- Adamsville	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
32--Sparr	Severe: cutbanks cave.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, too sandy, droughty.
33--Winder	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
34--Riviera	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
35--Malabar	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
36--Shenks	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding, excess humus.
37--Ona	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
38--Holopaw	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
39--Holopaw	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, droughty.
40--Paola	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Severe: droughty.
41--Millhopper	Severe: cutbanks cave.	Slight	Moderate: wetness.	Moderate: slope.	Slight	Moderate: droughty, too sandy.
42--Riviera	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
43:						
Placid	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Pompano	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, droughty, flooding.
44--Candler	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
45--Astatula	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Severe: droughty.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
17--- Millhopper	Severe: cutbanks cave.	Slight---	Moderate: wetness.	Slight---	Slight---	Moderate: droughty, too sandy.
18--- Lochloosa	Severe: cutbanks cave.	Slight---	Moderate: wetness.	Slight---	Slight---	Moderate: too sandy.
19--- Pomona	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
20--- Bluff	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
21--- Apopka	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
22--- Tomoka	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, excess humus.
23--- Palmetto	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
24--- Holopaw	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.
25--- Narcoossee	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
26--- Terra Ceia	Severe: excess humus, wetness.	Severe: wetness, low strength, flooding.	Severe: wetness, low strength, flooding.	Severe: wetness, low strength, flooding.	Severe: wetness, low strength, flooding.	Severe: wetness, excess humus, flooding.
27--- Samsula	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, excess humus.
28--- Centenary	Severe: cutbanks cave.	Slight---	Moderate: wetness.	Slight---	Slight---	Severe: droughty.
29--- Riviera	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
30--- Hontoon	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: low strength, subsides, ponding.	Severe: ponding, excess humus.
31--- Myakka	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
46--- Astatula	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
47: Myakka	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Urban land.						
48--- Florahome	Severe: cutbanks cave.	Slight---	Moderate: wetness.	Slight---	Slight---	Moderate: droughty.
49--- Bonneau	Severe: cutbanks cave.	Slight---	Moderate: wetness.	Slight---	Slight---	Moderate: droughty, too sandy.
50--- Wabasso	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
51--- Surrency	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
52--- Orsino	Severe: cutbanks cave.	Slight---	Moderate: wetness.	Moderate: slope.	Slight---	Severe: droughty.
53: Zolfo	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
Urban land.						
54: Candler	Severe: cutbanks cave.	Slight---	Slight---	Moderate: slope.	Slight---	Severe: droughty.
Urban land.						
55: Centenary	Severe: cutbanks cave.	Slight---	Moderate: wetness.	Slight---	Slight---	Severe: droughty.
Urban land.						
56--- Mulat	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
57--- Deland	Severe: cutbanks cave.	Slight---	Slight---	Moderate: slope.	Slight---	Severe: droughty.
58--- Wauchula	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
59--- Floridana	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
60---------- Astor	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
61---------- Newnan	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty, too sandy.
62---------- Monteocha	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
63---------- Okeechobee	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, excess humus.
64---------- Paisley	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: wetness.
65---------- Hobe	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Severe: droughty.

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1---------- Candler	Slight*----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
2---------- Candler	Moderate*: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
3---------- Myakka	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
4---------- Zolfo	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
5---------- Placid	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
6---------- Tavares	Moderate*: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
7---------- Immokalee	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
8. Arents					
9---------- Pomona	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
10---------- Pompano	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
11. Udorthents					
12---------- Electra	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
13--St. Johns	Severe: ponding.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
14--Cassia	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
15--Apopka	Slight	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
16--Adamsville	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
17--Millhopper	Moderate: wetness.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
18--Lochloosa	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Fair: wetness.
19--Pomona	Severe: ponding, percs slowly, poor filter.	Severe: seepage, ponding.	Severe: ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
20--Bluff	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
21--Apopka	Moderate: slope.	Severe: seepage, slope.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
22--Tomoka	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: ponding.
23--Palmetto	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
24--Holopaw	Severe: flooding, wetness, poor filter.	Severe: seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
25--Narcoossee	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
26--- Terra Ceia	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, excess humus.	Severe: flooding, wetness, excess humus.	Severe: flooding, seepage, wetness.	Poor: wetness, excess humus.
27--- Samsula	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
28--- Centenary	Moderate*: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
29--- Riviera	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
30--- Hontoon	Severe: ponding, poor filter.	Severe: excess humus, seepage, ponding.	Severe: excess humus, seepage, ponding.	Severe: seepage, ponding.	Poor: excess humus, ponding.
31--- Myakka	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
32--- Sparr	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
33--- Winder	Severe: percs slowly, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness, thin layer.
34--- Riviera	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
35--- Malabar	Severe: wetness, poor filter, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
36--- Shenks	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: too clayey, hard to pack, wetness.
37--- Ona	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
38--Holopaw	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
39--Holopaw	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
40--Paola	Slight*	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
41--Millhopper	Moderate: wetness.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
42--Riviera	Severe: ponding, percs slowly, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
43: Placid	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
Pompano	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
44--Candler	Severe*: slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
45--Astatula	Slight*	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
46--Astatula	Moderate*: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
47: Myakka	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Urban land.					
48--Florahome	Moderate*: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
49--- Bonneau	Severe: wetness.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Good.
50--- Wabasso	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
51--- Surrency	Severe: ponding.	Severe: ponding, seepage.	Severe: ponding, too sandy.	Severe: seepage, ponding.	Poor: too sandy, ponding.
52--- Orsino	Moderate*: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
53: Zolfo---	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
Urban land.					
54: Candler---	Slight*---	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land.					
55: Centenary---	Moderate*: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land.					
56--- Mulat	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness, thin layer.
57--- Deland	Slight*---	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
58--- Wauchula	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
59--- Floridana	Severe: wetness, percs slowly, poor filter.	Severe: wetness, seepage.	Severe: wetness.	Severe: wetness, seepage.	Poor: wetness.
60--- Astor	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
61---------- Newman	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
62---------- Monteocha	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
63---------- Okeechobee	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
64---------- Paisley	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
65---------- Hobe	Moderate: wetness.	Severe: seepage.	Severe: wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

*Because of the poor filtering capacity of the soil, a hazard of ground water contamination is possible in areas where septic tank absorption fields are concentrated.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
1, 2---- Candler	Good	Probable	Improbable: too sandy.	Poor: too sandy.
3---- Myakka	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
4---- Zolfo	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
5---- Placid	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
6---- Tavares	Good	Probable	Improbable: too sandy.	Poor: too sandy.
7---- Immokalee	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
8. Arents				
9---- Pomona	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
10---- Pompano	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
11. Udorthents				
12---- Electra	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
13---- St. Johns	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
14---- Cassia	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
15---- Apopka	Good	Probable	Improbable: too sandy.	Poor: too sandy.
16---- Adamsville	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
17---- Millhopper	Good	Probable	Improbable: too sandy.	Poor: too sandy.
18---- Lochloosa	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
19--Pomona	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
20--Bluff	Poor: wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
21--Apopka	Good	Probable	Improbable: too sandy.	Poor: too sandy.
22--Tomoka	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
23--Palmetto	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
24--Holopaw	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
25--Narcoossee	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
26--Terra Ceia	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
27--Samsula	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
28--Centenary	Good	Probable	Improbable: too sandy.	Poor: too sandy.
29--Riviera	Poor: wetness.	Probable	Improbable: excess fines.	Poor: too sandy, wetness.
30--Hontoon	Poor: wetness, low strength.	Improbable: excess humus.	Improbable: excess humus.	Poor: wetness, excess humus.
31--Myakka	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
32--Sparr	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
33--Winder	Poor: wetness.	Probable	Probable	Poor: too sandy, wetness.
34--Riviera	Poor: wetness.	Probable	Improbable: excess fines.	Poor: too sandy, wetness.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
35--Malabar	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
36--Shenks	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
37--Ona	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
38--Holopaw	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
39--Holopaw	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
40--Paola	Good	Probable	Improbable: too sandy.	Poor: too sandy.
41--Millhopper	Good	Probable	Improbable: too sandy.	Poor: too sandy.
42--Riviera	Poor: wetness.	Probable	Improbable: excess fines.	Poor: too sandy, wetness.
43:				
Placid	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness, too sandy.
Pompano	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
44--Candler	Fair: slope.	Probable	Improbable: too sandy.	Poor: too sandy, slope.
45, 46--Astatula	Good	Probable	Improbable: too sandy.	Poor: too sandy.
47:				
Myakka	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Urban land.				
48--Florahome	Good	Probable	Improbable: too sandy.	Poor: too sandy.
49--Bonneau	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
50--Wabasso	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
51--Surrency	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
52--Orsino	Good	Probable	Improbable: too sandy.	Poor: too sandy.
53: Zolfo	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
Urban land.				
54: Candler	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Urban land.				
55: Centeneary	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Urban land.				
56--Mulat	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
57--Deland	Good	Probable	Improbable: too sandy.	Poor: too sandy.
58--Wauchula	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
59--Floridana	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
60--Astor	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
61--Newnan	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
62--Monteocha	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
63--Okeechobee	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
64--Paisley	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
65--Hobe	Good	Probable	Improbable: too sandy.	Poor: too sandy.

TABLE 13.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1---------- Candler	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
2---------- Candler	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
3---------- Myakka	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
4---------- Zolfo	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
5---------- Placid	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, fast intake, soil blowing.	Ponding, too sandy, soil blowing.	Wetness.
6---------- Tavares	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
7---------- Immokalee	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
8. Arents							
9---------- Pomona	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
10---------- Pompano	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
11. Udorthents							
12---------- Electra	Severe: seepage.	Severe: seepage, piping.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
13---------- St. Johns	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy.	Wetness, droughty.
14---------- Cassia	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
15---------- Apopka	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
16---------- Adamsville	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
17---------- Millhopper	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
18---------- Lochloosa	Severe: seepage.	Moderate: wetness.	Severe: cutbanks cave.	Favorable------	Wetness, fast intake, soil blowing.	Wetness, soil blowing.	Favorable.
19---------- Pomona	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.
20---------- Bluff	Slight---------	Severe: wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
21---------- Apopka	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing, slope.	Droughty, slope.
22---------- Tomoka	Severe: seepage.	Severe: piping, ponding.	Severe: cutbanks cave.	Ponding, subsides.	Ponding--------	Ponding--------	Wetness.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
23--Palmetto	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
24--Holopaw	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
25--Narcoossee	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
26--Terra Ceia	Severe: seepage.	Severe: excess humus, wetness.	Slight	Flooding, subsides.	Wetness, soil blowing, flooding.	Wetness, soil blowing.	Wetness.
27--Samsula	Severe: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave.	Ponding, subsides.	Ponding, soil blowing.	Ponding, soil blowing.	Wetness.
28--Centenary	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
29--Riviera	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Wetness, percs slowly, flooding.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty, percs slowly.
30--Hontoon	Severe: seepage.	Severe: excess humus, ponding.	Slight	Subsides, ponding.	Ponding, soil blowing.	Ponding, soil blowing.	Wetness.
31--Myakka	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.
32--Sparr	Severe: seepage, wetness.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
33--Winder	Moderate: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly---	Wetness, droughty, fast intake.	Wetness, soil blowing, percs slowly.	Wetness, droughty, percs slowly.
34--Riviera	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Wetness, percs slowly.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty, percs slowly.
35--Malabar	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
36--Shenks	Slight---	Severe: hard to pack, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, flooding, subsides.	Wetness, percs slowly, soil blowing.	Wetness, soil blowing, percs slowly.	Wetness, percs slowly.
37--Ona	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy.	Wetness, droughty.
38--Holopaw	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
39--Holopaw	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.
40--Paola	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
41--Millhopper	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
42--Riviera	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, percs slowly, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty, percs slowly.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
43: Placid	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Pompano	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
44--- Candler	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
45--- Astatula	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
46--- Astatula	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
47--- Myakka	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Urban land.							
48--- Florahome	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
49--- Bonneau	Severe: seepage.	Severe: thin layer.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Soil blowing---	Droughty.
50--- Wabasso	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave, slow refill.	Percs slowly, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
51--- Surrency	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Droughty, fast intake.	Ponding, too sandy.	Wetness, droughty.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
52---------- Orsino	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
53: Zolfo----------	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
Urban land.							
54: Candler----------	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
Urban land.							
55: Centenary--------	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
Urban land.							
56---------- Mulat	Severe: seepage.	Severe: thin layer, wetness.	Severe: cutbanks cave.	Favorable------	Wetness, fast intake, soil blowing.	Wetness, soil blowing, percs slowly.	Wetness, percs slowly.
57---------- Deland	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
58---------- Wauchula	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Percs slowly---	Wetness, fast intake, soil blowing.	Wetness, erodes easily, soil blowing.	Wetness, erodes easily, percs slowly.
59---------- Floridana	Severe: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly---	Wetness, fast intake.	Wetness, soil blowing, percs slowly.	Wetness, percs slowly.
60---------- Astor	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave, wetness.	Wetness, fast intake, soil blowing, flooding.	Wetness, too sandy, soil blowing.	Wetness.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
61---------- Newnan	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave--	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
62---------- Monteocha	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, fast intake, soil blowing.	Ponding, too sandy, soil blowing.	Wetness.
63---------- Okeechobee	Severe: seepage.	Severe: excess humus, ponding.	Slight---------	Ponding, subsides.	Ponding, soil blowing.	Ponding, soil blowing.	Wetness.
64---------- Paisley	Slight---------	Severe: wetness.	Severe: slow refill.	Percs slowly---	Wetness, fast intake, soil blowing.	Wetness, soil blowing, percs slowly.	Wetness, percs slowly.
65---------- Hobe	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.

TABLE 14.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. Some soils may have Unified classifications and USDA textures in addition to those shown. In general, the dominant classifications and textures are shown]

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1---------- Candler	0-4	Fine sand--------	SP, SP-SM	A-3	0	100	95-100	75-100	2-8	---	NP
	4-62	Sand, fine sand	SP, SP-SM	A-3	0	100	95-100	75-100	2-8	---	NP
	62-80	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	95-100	75-100	5-12	---	NP
2---------- Candler	0-4	Fine sand--------	SP, SP-SM	A-3	0	100	95-100	75-100	2-8	---	NP
	4-65	Sand, fine sand	SP, SP-SM	A-3	0	100	95-100	75-100	2-8	---	NP
	65-80	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	95-100	75-100	5-12	---	NP
3---------- Myakka	0-21	Fine sand, sand	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	21-38	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	38-42	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	2-8	---	NP
	42-60	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	60-80	Sand, fine sand	SP-SP-SM	A-3	0	100	100	85-100	2-8	---	NP
4---------- Zolfo	0-6	Fine sand--------	SP-SM	A-3, A-2-4	0	100	100	90-100	5-12	---	NP
	6-53	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	90-100	5-18	---	NP
	53-80	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	90-100	5-18	---	NP
5---------- Placid	0-14	Fine sand--------	SP, SP-SM, SM	A-3, A-2-4	0	100	100	90-100	1-20	---	NP
	14-80	Sand, fine sand, loamy fine sand.	SP, SP-SM, SM	A-3, A-2-4	0	100	100	90-100	1-20	---	NP
6---------- Tavares	0-5	Fine sand--------	SP, SP-SM	A-3	0	100	95-100	85-100	2-10	---	NP
	5-80	Sand, fine sand	SP, SP-SM	A-3	0	100	95-100	85-100	2-10	---	NP
7---------- Immokalee	0-7	Fine sand--------	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
	7-35	Fine sand, sand	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
	35-48	Fine sand, sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	70-100	5-21	---	NP
	48-80	Fine sand, sand	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
8. Arents											
9---------- Pomona	0-6	Fine sand--------	SP, SP-SM, SM	A-3, A-2-4	0	100	100	85-100	2-20	---	NP
	6-20	Sand, fine sand	SP, SP-SM, SM	A-3, A-2-4	0	100	100	85-100	2-20	---	NP
	20-35	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-25	---	NP
	35-42	Sand, fine sand	SP, SP-SM, SM	A-3, A-2-4	0	100	100	85-100	2-20	---	NP
	42-80	Sandy clay loam, sandy loam, fine sandy loam.	SC, SM-SC, SM	A-2, A-4, A-6	0	100	95-100	85-100	25-50	<40	NP-16
10---------- Pompano	0-80	Fine sand, sand	SP, SP-SM	A-3, A-2-4	0	100	100	75-100	1-12	---	NP

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
11. Udorthents											
12---------- Electra	0-8	Fine sand--------	SP, SP-SM	A-3	0	100	95-100	75-99	3-10	---	NP
	8-48	Sand, fine sand	SP, SP-SM	A-3	0	100	95-100	75-99	3-10	---	NP
	48-64	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80-99	8-15	---	NP
	64-80	Sandy clay loam, sandy clay, fine sandy loam.	SC, SM-SC	A-2, A-4, A-6	0	100	100	80-99	20-45	20-40	4-20
13---------- St. Johns	0-12	Fine sand--------	SP, SP-SM	A-3	0	100	100	75-95	3-10	---	NP
	12-28	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-95	3-10	---	NP
	28-50	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-3, A-2-4	0	100	100	85-95	5-20	---	NP
	50-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-90	2-10	---	NP
14---------- Cassia	0-28	Fine sand, sand	SP, SP-SM	A-3	0	100	100	90-100	2-7	---	NP
	28-46	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	90-100	5-20	---	NP
	46-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	90-100	2-10	---	NP
15---------- Apopka	0-43	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	3-10	---	NP
	43-80	Sandy loam, sandy clay loam, sandy clay.	SM-SC, SC, SM	A-2-4, A-2-6, A-4, A-6	0	98-100	95-100	60-95	20-40	<40	NP-20
16---------- Adamsville	0-6	Sand----------	SP-SM	A-3, A-2-4	0	100	100	90-100	5-12	---	NP
	6-80	Fine sand, sand	SP-SM, SP	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
17---------- Millhopper	0-66	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	97-100	75-95	5-20	---	NP
	66-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-4	0	100	97-100	75-97	18-40	<28	NP-10
18---------- Lochloosa	0-27	Fine sand, sand	SP-SM, SM	A-2-4, A-3	0	95-100	95-100	90-98	8-20	---	NP
	27-32	Fine sandy loam, sandy loam, loamy sand.	SM, SM-SC	A-2-4	0	95-100	95-100	90-98	18-30	<28	NP-6
	32-62	Sandy clay loam, sandy loam.	SC, SM-SC	A-2, A-4, A-6	0	95-100	95-100	90-98	25-40	25-40	5-18
	62-80	Sandy clay loam, sandy loam.	SC, SM-SC	A-2, A-4, A-6	0	95-100	95-100	90-98	25-40	25-40	5-18
19---------- Pomona	0-6	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-20	---	NP
	6-20	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-20	---	NP
	20-28	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-25	---	NP
	28-55	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-20	---	NP
	55-80	Sandy clay loam, sandy loam, fine sandy loam.	SC, SM-SC, SM	A-2, A-4, A-6	0	100	95-100	85-100	25-50	<40	NP-16

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
20----------	0-19	Sandy clay loam	SC	A-6, A-7	0	100	95-100	85-95	36-50	35-50	20-35
Bluff	19-39	Sandy clay loam, sandy clay.	SC, CL, CH	A-6, A-7	0	100	95-100	85-95	36-55	35-55	20-40
	39-60	Sandy clay loam, sandy clay, loam.	SC	A-6, A-7	0	95-100	90-100	80-95	36-50	35-50	20-35
	60-80	Sandy clay loam, sandy clay, loam.	SC	A-6, A-7	0	95-100	90-100	80-95	36-50	35-50	20-35
21----------	0-55	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	3-10	---	NP
Apopka	55-80	Sandy loam, sandy clay loam, sandy clay.	SM-SC, SC, SM	A-2-4, A-2-6, A-4, A-6	0	98-100	95-100	60-95	20-40	<40	NP-20
22----------	0-24	Muck----------	PT	---	0	---	---	---	---	---	NP
Tomoka	24-31	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80-95	5-15	---	NP
	31-80	Sandy clay loam, sandy loam, fine sandy loam.	SM, SM-SC, SC	A-2, A-4, A-6	0	100	100	80-95	25-40	<35	NP-15
23----------	0-21	Fine sand, sand	SP, SP-SM	A-3, A-2-4	0	100	100	70-95	2-12	---	NP
Palmetto	21-52	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	70-95	5-12	---	NP
	52-75	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	70-95	15-35	<37	NP-20
	75-80	Sand, loamy sand, loamy fine sand.	SM, SP-SM	A-3, A-2-4	0	90-100	80-100	60-85	5-25	---	NP
24----------	0-54	Fine sand, sand	SP, SP-SM, SM	A-3, A-2-4	0	100	95-100	75-90	2-14	---	NP
Holopaw	54-80	Fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	95-100	65-90	15-34	<30	NP-12
25----------	0-4	Fine sand---------	SP-SM	A-3	0	100	100	95-100	5-10	---	NP
Narcoossee	4-22	Sand, fine sand	SP, SP-SM	A-3	0	100	100	95-100	2-8	---	NP
	22-29	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	95-100	5-12	---	NP
	29-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	95-100	2-8	---	NP
26----------	0-80	Muck----------	PT	A-8	---	---	---	---	---	---	---
Terra Ceia											
27----------	0-29	Muck----------	PT	---	---	---	---	---	---	---	---
Samsula	29-80	Sand, fine sand	SP-SM, SM, SP	A-3, A-2-4	0	100	100	80-100	2-20	---	NP
28----------	0-8	Fine sand---------	SP, SP-SM	A-3	0	100	100	60-100	4-10	---	NP
Centenary	8-65	Sand, fine sand, loamy sand.	SP-SM, SP, SM	A-3, A-2-4	0	100	100	65-100	4-20	---	NP
	65-80	Sand, fine sand, loamy sand.	SP, SP-SM, SM	A-3, A-2-4	0	100	100	60-100	3-20	---	NP

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
29---------- Riviera	0-21	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	4-12	---	NP
	21-47	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	0	100	100	80-100	15-35	<35	NP-15
	47-55	Sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	80-100	20-35	20-40	4-20
	55-80	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-1, A-2-4	0	60-80	50-75	40-70	3-10	---	NP
30---------- Hontoon	0-80	Muck----------	PT	A-8	0	---	---	---	---	---	---
31---------- Myakka	0-28	Fine sand, sand	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	28-34	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	34-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	2-8	---	NP
32---------- Sparr	0-9	Sand----------	SP-SM, SM	A-3, A-2-4	0	100	100	75-99	5-17	---	NP
	9-70	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	75-99	5-17	---	NP
	70-80	Sandy loam, sandy clay loam, fine sandy loam.	SM-SC, SC, SM	A-2-4	0	100	100	75-99	24-35	<30	NP-10
33---------- Winder	0-17	Fine sand, sand, loamy sand.	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	17-27	Loamy sand, fine sandy loam, sandy clay loam.	SM	A-2-4	0	100	100	80-100	15-25	<35	NP-10
	27-39	Sandy clay loam, fine sandy loam.	SC	A-2-4, A-2-6	0	100	100	80-100	18-35	20-40	9-26
	39-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	0	60-80	50-75	40-70	15-35	<35	NP-20
34---------- Riviera	0-25	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	4-12	---	NP
	25-31	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	0	100	100	80-100	15-35	<35	NP-15
	31-50	Sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	80-100	20-35	20-40	4-20
	50-80	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-1, A-2-4	0	60-80	50-75	40-70	3-10	---	NP
35---------- Malabar	0-20	Fine sand, sand	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
	20-31	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	3-12	---	NP
	31-60	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
	60-80	Sandy clay loam, fine sandy loam, sandy loam.	SC, SM-SC	A-2, A-4, A-6	0	100	100	80-100	20-40	20-40	NP-12
36---------- Shenks	0-18	Muck----------	PT	---	---	---	---	---	---	---	---
	18-60	Sandy clay, clay	CH	A-7	0	100	100	90-98	56-85	52-80	32-60
	60-80	Sand, loamy sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-95	5-15	---	NP

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
37---------- Ona	0-11	Fine sand, sand	SP-SM, SP	A-3	0	100	100	85-95	3-10	---	NP
	11-26	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-20	---	NP
	26-55	Fine sand, sand	SP-SM, SP	A-3	0	100	100	85-95	3-10	---	NP
	55-80	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-20	---	NP
38---------- Holopaw	0-55	Fine sand, sand	SP, SP-SM, SM	A-3, A-2-4	0	100	95-100	70-95	2-14	---	NP
	55-80	Sandy loam, sandy clay loam, fine sandy loam.	SM, SM-SC	A-2-4	0	100	95-100	70-99	15-30	<25	NP-7
39---------- Holopaw	0-47	Fine sand, sand	SP, SP-SM, SM	A-3, A-2-4	0	100	95-100	70-95	2-14	---	NP
	47-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC	A-2-4	0	100	95-100	70-95	15-30	<25	NP-7
40---------- Paola	0-27	Fine sand, sand	SP	A-3	0	100	100	85-100	1-3	---	NP
	27-80	Sand, fine sand	SP	A-3	0	100	100	85-100	1-4	---	NP
41---------- Millhopper	0-66	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	97-100	75-95	5-20	---	NP
	66-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-4	0	100	97-100	75-97	18-40	<28	NP-10
42---------- Riviera	0-25	Fine sand, sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	4-12	---	NP
	25-45	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	80-100	15-35	<35	NP-15
	45-49	Sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	80-100	20-35	20-40	4-20
	49-80	Sand, fine sand, loamy sand.	SP, SP-SM	A-3, A-1, A-2-4	0	60-100	50-95	40-90	3-10	---	NP
43:											
Placid----------	0-11	Sand----------	SP, SP-SM, SM	A-3, A-2-4	0	100	100	90-100	1-20	---	NP
	11-80	Fine sand, sand, loamy fine sand.	SP, SP-SM, SM	A-3, A-2-4	0	100	100	90-100	1-20	---	NP
Pompano---------	0-6	Sand----------	SP, SP-SM	A-3, A-2-4	0	100	100	75-100	1-12	---	NP
	6-80	Fine sand, sand	SP, SP-SM	A-3, A-2-4	0	100	100	75-100	1-12	---	NP
44---------- Candler	0-5	Sand----------	SP, SP-SM	A-3	0	100	95-100	75-100	2-8	---	NP
	5-67	Sand, fine sand	SP, SP-SM	A-3	0	100	95-100	75-100	2-8	---	NP
	67-80	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	95-100	75-100	5-12	---	NP
45---------- Astatula	0-4	Fine sand--------	SP, SP-SM	A-3	0	100	100	75-99	1-7	---	NP
	4-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	75-99	1-7	---	NP

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
46----------	0-7	Fine sand--------	SP, SP-SM	A-3	0	100	100	75-99	1-7	---	NP
Astatula	7-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	75-99	1-7	---	NP
47:											
Myakka----------	0-22	Fine sand--------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	22-37	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	37-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	2-8	---	NP
Urban land.											
48----------	0-36	Sand----------	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	1-12	---	NP
Florahome											
	36-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	1-12	---	NP
49----------	0-25	Sand, fine sand	SM, SP-SM	A-2, A-3	0	100	100	60-95	8-20	---	NP
Bonneau	25-80	Sandy loam, sandy clay loam, fine sandy loam.	SC, SM-SC	A-2, A-6, A-4	0	100	100	60-100	30-50	21-40	4-21
50----------	0-21	Fine sand, sand	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
Wabasso	21-28	Sand, fine sand	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
	28-31	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	95-100	5-20	---	NP
	31-57	Sand, fine sand	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
	57-80	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC	A-2-4, A-2-6	0	100	100	95-100	20-35	20-30	5-13
51----------	0-25	Fine sand, loamy fine sand.	SM	A-2	0	100	95-100	50-75	10-26	---	NP
Surrency											
	25-40	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2	0	100	95-100	75-93	22-35	<30	NP-10
	40-80	Sandy clay loam, sandy loam, fine sandy loam.	SM, SC, SM-SC	A-2, A-4, A-6	0	100	95-100	80-98	30-44	<35	NP-15
52----------	0-24	Fine sand, sand	SP	A-3	0	100	100	85-95	1-3	---	NP
Orsino	24-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
53:											
Zolfo----------	0-9	Fine sand--------	SP-SM	A-3, A-2-4	0	100	100	90-100	5-12	---	NP
	9-53	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	90-100	5-18	---	NP
	53-80	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	90-100	5-18	---	NP
Urban land.											
54:											
Candler----------	0-4	Fine sand--------	SP, SP-SM	A-3	0	100	95-100	75-100	2-8	---	NP
	4-62	Sand, fine sand	SP, SP-SM	A-3	0	100	95-100	75-100	2-8	---	NP
	62-80	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	95-100	75-100	5-12	---	NP
Urban land.											

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
55:											
Centenary-------	0-4	Fine sand--------	SP, SP-SM	A-3	0	100	100	60-100	4-10	---	NP
	4-65	Sand, fine sand, loamy sand.	SP-SM, SP, SM	A-3, A-2-4	0	100	100	65-100	4-20	---	NP
	65-80	Sand, fine sand, loamy sand.	SP, SP-SM, SM	A-3, A-2-4	0	100	100	60-100	3-20	---	NP
Urban land.											
56----------	0-5	Fine sand--------	SP-SM	A-3, A-2-4	0	100	100	80-99	5-12	---	NP
Mulat	5-33	Loamy fine sand, loamy sand, fine sand.	SM, SP-SM	A-3, A-2-4	0	100	100	80-99	8-20	---	NP
	33-58	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC, SM	A-2-4	0	100	100	80-99	20-35	20-30	NP-10
	58-80	Fine sand, sand, loamy sand.	SP, SP-SM, SM	A-3, A-2-4	0	100	100	75-95	4-20	---	NP
57----------	0-6	Fine sand--------	SP, SP-SM	A-3	0	100	100	80-100	2-7	---	NP
Deland	6-55	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-100	2-7	---	NP
	55-61	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-100	5-15	---	NP
	61-80	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-99	5-20	---	NP
58----------	0-6	Fine sand--------	SP-SM	A-3, A-2-4	0	100	100	90-100	5-12	---	NP
Wauchula	6-12	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	90-100	5-12	---	NP
	12-22	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	90-100	8-25	---	NP
	22-34	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	90-100	5-20	---	NP
	34-44	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6, A-4, A-6	0	100	92-100	90-100	25-50	<40	NP-20
	44-80	Loamy fine sand, sand, fine sand.	SM, SP-SM	A-2-4, A-3	0	100	95-100	85-100	8-25	---	NP
59----------	0-10	Fine sand--------	SP-SM, SM	A-3, A-2-4	0	100	100	80-90	5-25	---	NP
Floridana	10-24	Fine sand, sand	SP, SP-SM	A-3	0	100	100	80-90	2-10	---	NP
	24-35	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC	A-2-4, A-2-6	0	100	100	80-95	20-35	20-45	4-28
	35-80	Variable---------	---	---	---	---	---	---	---	---	---
60----------	0-13	Mucky fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
Astor	13-55	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	55-80	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
61---------- Newnan	0-22	Fine sand, sand	SP, SP-SM	A-3, A-2-4	0	100	98-100	80-100	3-12	---	NP
	22-30	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	98-100	80-100	6-15	---	NP
	30-58	Sand, fine sand	SP, SP-SM, SM	A-3, A-2-4	0	100	98-100	80-100	3-18	---	NP
	58-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-4, A-6, A-2-6	0	100	98-100	85-100	18-40	<35	NP-20
62---------- Monteocha	0-12	Fine sand--------	SP-SM, SM	A-3, A-2-4	0	100	100	80-95	5-23	---	NP
	12-50	Sand, fine sand	SP, SP-SM, SM	A-3, A-2-4	0	100	100	80-90	3-15	---	NP
	50-80	Fine sandy loam, sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	75-100	16-35	<35	NP-12
63---------- Okeechobee	0-25	Muck----------	PT	A-8	---	---	---	---	---	---	---
	25-46	Hemic material, mucky-peat.	PT	A-8	---	---	---	---	---	---	---
	46-80	Sapric material, mucky-peat.	PT	A-8	---	---	---	---	---	---	---
64---------- Paisley	0-9	Loamy fine sand, loamy sand.	SM	A-2-4	0	100	100	80-99	13-25	---	NP
	9-80	Sandy clay, clay	CH, CL	A-7	0	95-100	90-100	75-95	51-70	41-51	25-35
65---------- Hobe	0-3	Fine sand--------	SP, SP-SM	A-3	0	100	100	85-100	1-7	---	NP
	3-42	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	1-7	---	NP
	42-50	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	6-15	---	NP
	50-62	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
	62-80	Sandy clay loam, sandy loam, fine sandy loam.	SM-SC, SC, SM	A-2-4, A-2-6	0	100	100	85-100	15-35	<40	NP-15

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	G/cc	In/hr	In/in	pH					Pct
1----------	0-4	<3	1.30-1.55	6.0-20	0.04-0.08	4.5-6.0	Low-------	0.10	5	2	.5-2
Candler	4-62	<3	1.46-1.65	6.0-20	0.02-0.06	4.5-6.0	Low-------	0.10			
	62-80	3-8	1.50-1.65	6.0-20	0.05-0.08	4.5-6.0	Low-------	0.10			
2----------	0-4	<3	1.30-1.55	6.0-20	0.04-0.08	4.5-6.0	Low-------	0.10	5	2	.5-2
Candler	4-65	<3	1.46-1.65	6.0-20	0.02-0.06	4.5-6.0	Low-------	0.10			
	65-80	3-8	1.50-1.65	6.0-20	0.05-0.08	4.5-6.0	Low-------	0.10			
3----------	0-21	<2	1.35-1.55	6.0-20	0.02-0.05	3.6-6.5	Low-------	0.10	5	2	<2
Myakka	21-38	1-8	1.45-1.60	0.6-6.0	0.10-0.20	3.6-6.5	Low-------	0.15			
	38-42	<2	1.48-1.70	6.0-20	0.02-0.10	3.6-6.5	Low-------	0.10			
	42-60	1-8	1.45-1.60	0.6-6.0	0.10-0.20	3.6-6.5	Low-------	0.15			
	60-80	<2	1.48-1.70	6.0-2.0	0.02-0.10	3.6-6.5	Low-------	0.10			
4----------	0-6	1-5	1.40-1.55	6.0-20	0.10-0.15	4.5-7.3	Low-------	0.10	5	2	.5-1
Zolfo	6-53	1-5	1.50-1.60	6.0-20	0.03-0.10	4.5-7.3	Low-------	0.10			
	53-80	1-5	1.50-1.70	0.6-2.0	0.10-0.25	3.6-6.5	Low-------	0.15			
5----------	0-14	<10	1.20-1.40	6.0-20	0.15-0.20	3.6-5.5	Low-------	0.10	5	2	2-10
Placid	14-80	<10	1.30-1.60	6.0-20	0.05-0.08	3.6-5.5	Low-------	0.10			
6----------	0-5	0-4	1.25-1.60	>6.0	0.05-0.10	3.6-6.0	Low-------	0.10	5	2	.5-2
Tavares	5-80	0-4	1.40-1.70	>6.0	0.02-0.05	3.6-6.0	Low-------	0.10			
7----------	0-7	1-5	1.20-1.50	6.0-20	0.05-0.10	3.6-6.0	Low-------	0.10	5	2	1-2
Immokalee	7-35	1-5	1.45-1.70	6.0-20	0.02-0.05	3.6-6.0	Low-------	0.10			
	35-48	2-7	1.30-1.60	0.6-2.0	0.10-0.25	3.6-6.0	Low-------	0.15			
	48-80	1-5	1.40-1.60	6.0-20	0.02-0.05	3.6-6.0	Low-------	0.10			
8. Arents											
9----------	0-6	1-6	1.15-1.50	6.0->20	0.05-0.10	3.6-5.5	Low-------	0.10	5	2	1-2
Pomona	6-20	<6	1.45-1.70	6.0-20	0.03-0.08	3.6-5.5	Low-------	0.10			
	20-35	2-7	1.30-1.60	0.6-20	0.10-0.20	3.6-5.5	Low-------	0.15			
	35-42	1-6	1.40-1.65	2.0-20	0.03-0.15	3.6-6.0	Low-------	0.10			
	42-80	13-36	1.50-1.80	0.2-2.0	0.10-0.17	3.6-5.5	Low-------	0.20			
10----------	0-80	0-5	1.30-1.65	6.0-20	0.02-0.05	4.5-7.8	Low-------	0.10	5	2	1-5
Pompano											
11. Udorthents											
12----------	0-8	1-6	1.40-1.55	6.0-20	0.05-0.10	3.6-6.5	Low-------	0.10	5	1	1-2
Electra	8-48	1-6	1.45-1.70	6.0-20	0.02-0.07	3.6-6.5	Low-------	0.10			
	48-64	1-6	1.50-1.70	0.6-2.0	0.10-0.15	3.6-5.5	Low-------	0.15			
	64-80	18-38	1.60-1.75	<0.2	0.10-0.15	3.6-5.5	Low-------	0.32			
13----------	0-12	<4	1.30-1.50	6.0-20	0.10-0.15	3.6-5.5	Low-------	0.10	5	2	2-4
St. Johns	12-28	1-3	1.50-1.70	6.0-20	0.03-0.08	3.6-5.5	Low-------	0.10			
	28-50	2-6	1.50-1.58	0.2-2.0	0.10-0.30	3.6-5.5	Low-------	0.15			
	50-80	1-4	1.50-1.65	6.0-20	0.03-0.08	3.6-5.5	Low-------	0.10			
14----------	0-28	1-4	1.30-1.55	6.0-20	0.03-0.07	3.6-6.0	Low-------	0.10	5	2	<1
Cassia	28-46	1-10	1.30-1.55	0.6-6.0	0.10-0.20	3.6-6.0	Low-------	0.15			
	46-80	1-5	1.40-1.60	6.0-20	0.03-0.07	4.5-6.0	Low-------	0.10			

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	G/cc	In/hr	In/in	pH					Pct
15----------	0-43	<3	1.35-1.60	6.0-20	0.03-0.05	4.5-6.0	Low-------	0.10	5	2	<2
Apopka	43-80	18-37	1.55-1.75	0.6-2.0	0.12-0.17	4.5-6.0	Low-------	0.24			
16----------	0-6	1-8	1.35-1.65	6.0-20	0.05-0.10	4.5-7.8	Low-------	0.10	5	2	<2
Adamsville	6-80	1-7	1.35-1.65	6.0-20	0.03-0.08	4.5-7.8	Low-------	0.10			
17----------	0-66	1-8	1.50-1.67	6.0-20	0.05-0.10	4.5-6.5	Low-------	0.10	5	2	.5-2
Millhopper	66-80	12-28	1.80-1.90	0.06-2.0	0.08-0.15	4.5-6.0	Low-------	0.28			
18----------	0-27	2-12	1.35-1.65	2.0-20	0.05-0.20	4.5-5.5	Low-------	0.10	5	2	1-4
Lochloosa	27-32	7-20	1.55-1.70	0.6-6.0	0.10-0.15	4.5-5.5	Low-------	0.24			
	32-62	15-35	1.55-1.75	0.6-0.2	0.12-0.15	4.5-5.5	Low-------	0.28			
	62-80	15-35	1.55-1.70	0.06-0.2	0.10-0.15	4.5-5.5	Low-------	0.28			
19----------	0-6	1-6	1.20-1.50	6.0-20	0.05-0.10	3.6-5.5	Low-------	0.10	5	2	1-2
Pomona	6-20	0-6	1.43-1.70	6.0-20	0.03-0.08	3.6-5.5	Low-------	0.10			
	20-28	2-7	1.30-1.60	0.6-20	0.10-0.20	3.6-5.5	Low-------	0.15			
	28-55	1-6	1.40-1.65	2.0-20	0.03-0.15	3.6-5.5	Low-------	0.10			
	55-80	13-36	1.50-1.80	0.2-2.0	0.10-0.17	3.6-5.5	Low-------	0.20			
20----------	0-19	20-40	0.65-1.55	0.2-0.6	0.18-0.20	5.6-7.3	Moderate--	0.28	5	6	5-11
Bluff	19-39	20-40	1.30-1.70	0.06-0.2	0.12-0.17	6.1-8.4	High------	0.28			
	39-60	20-40	1.30-1.70	0.06-0.2	0.12-0.17	6.1-8.4	High------	0.28			
	60-80	20-40	1.30-1.70	0.06-0.2	0.12-0.17	7.4-8.4	High------	0.28			
21----------	0-55	<3	1.45-1.60	6.0-20	0.03-0.05	4.5-6.0	Low-------	0.10	5	2	<2
Apopka	55-80	18-37	1.55-1.75	0.6-2.0	0.12-0.17	4.5-6.0	Low-------	0.24			
22----------	0-24	---	0.25-0.30	6.0-20	0.30-0.50	3.6-4.4	Low-------	----	---	---	30-90
Tomoka	24-31	1-9	1.35-1.60	6.0-20	0.05-0.10	3.6-4.4	Low-------	0.17			
	31-80	15-30	1.60-1.70	0.6-6.0	0.10-0.15	3.6-4.4	Low-------	0.28			
23----------	0-21	1-7	1.40-1.60	6.0-20	0.05-0.10	3.6-5.5	Low-------	0.10	5	2	1-3
Palmetto	21-52	3-8	1.50-1.60	6.0-20	0.05-0.10	3.6-5.5	Low-------	0.10			
	52-75	13-30	1.60-1.70	0.2-0.6	0.10-0.15	4.5-5.5	Low-------	0.24			
	75-80	5-13	1.50-1.65	2.0-6.0	0.08-0.12	4.5-5.5	Low-------	0.20			
24----------	0-54	2-5	1.20-1.60	6.0-20	0.03-0.07	3.6-7.3	Low-------	0.10	5	2	1-4
Holopaw	54-80	16-24	1.50-1.70	0.6-2.0	0.10-0.15	5.1-8.4	Low-------	0.24			
25----------	0-4	2-6	1.35-1.45	6.0-20	0.03-0.08	3.6-6.0	Low-------	0.10	5	2	1-2
Narcoossee	4-22	1-4	1.40-1.65	6.0-20	0.02-0.05	3.6-6.0	Low-------	0.10			
	22-29	2-6	1.25-1.60	2.0-6.0	0.05-0.13	3.6-6.0	Low-------	0.10			
	29-80	1-4	1.45-1.65	6.0-20	0.02-0.05	3.6-6.0	Low-------	0.10			
26----------	0-80	---	0.15-0.35	6.0-20	0.30-0.50	4.5-8.4	Low-------	----	2	2	>60
Terra Ceia											
27----------	0-29	---	0.25-0.50	6.0-20	0.20-0.25	4.5-5.5	Low-------	----	2	2	>20
Samsula	29-80	1-14	1.35-1.55	6.0-20	0.02-0.05	3.6-5.5	Low-------	0.17			
28----------	0-8	1-8	1.40-1.60	6.0-20	0.03-0.08	4.5-6.5	Low-------	0.10	5	1	<1
Centenary	8-65	1-8	1.40-1.60	6.0-20	0.03-0.05	4.5-6.0	Low-------	0.10			
	65-80	2-10	1.50-1.70	2.0-6.0	0.03-0.10	4.5-6.0	Low-------	0.10			
29----------	0-21	1-6	1.40-1.65	6.0-20	0.05-0.08	4.5-7.3	Low-------	0.10	4	2	.1-2
Riviera	21-47	12-25	1.50-1.70	<0.2	0.10-0.14	6.1-8.4	Low-------	0.24			
	47-55	15-25	1.50-1.70	<0.2	0.12-0.15	6.1-8.4	Low-------	0.24			
	55-80	1-8	1.40-1.65	0.6-6.0	0.05-0.08	7.9-8.4	Low-------	0.15			
30----------	0-80	---	0.20-0.40	6.0-20	0.30-0.50	4.5-5.5	Low-------	----	---	2	75-85
Hontoon											

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	G/cc	In/hr	In/in	pH					Pct
31----------	0-28	1-3	1.25-1.45	6.0-20	0.05-0.15	3.6-6.5	Low-------	0.10	5	2	2-7
Myakka	28-34	2-8	1.45-1.60	0.6-6.0	0.10-0.20	3.6-6.5	Low-------	0.15			
	34-80	0-2	1.45-1.60	6.0-20	0.02-0.10	3.6-6.5	Low-------	0.10			
32----------	0-9	1-5	1.20-1.50	6.0-20	0.08-0.12	3.6-6.5	Low-------	0.10	5	2	<3
Sparr	9-70	1-5	1.45-1.70	6.0-20	0.05-0.08	3.6-6.5	Low-------	0.10			
	70-80	15-32	1.55-1.80	0.6-2.0	0.10-0.15	3.6-6.5	Low-------	0.20			
33----------	0-17	1-6	1.20-1.65	6.0-20	0.03-0.08	5.1-7.8	Low-------	0.10	5	2	.1-2
Winder	17-27	10-22	1.45-1.65	0.2-0.6	0.06-0.10	6.1-7.8	Low-------	0.20			
	27-39	20-30	1.60-1.70	<0.2	0.10-0.15	6.6-8.4	Low-------	0.24			
	39-80	15-30	1.50-1.70	<0.2	0.06-0.12	7.4-8.4	Low-------	0.24			
34----------	0-25	1-6	1.40-1.65	6.0-20	0.05-0.08	4.5-7.3	Low-------	0.10	4	2	.1-2
Riviera	25-31	12-25	1.50-1.70	<0.2	0.10-0.14	6.1-8.4	Low-------	0.24			
	31-50	15-25	1.50-1.70	<0.2	0.12-0.15	6.1-8.4	Low-------	0.24			
	50-80	1-8	1.40-1.65	0.6-6.0	0.05-0.08	7.9-8.4	Low-------	0.15			
35----------	0-20	0-4	1.35-1.55	6.0-20	0.03-0.08	5.1-8.4	Low-------	0.10	5	2	1-2
Malabar	20-31	1-5	1.35-1.70	6.0-20	0.05-0.10	5.1-8.4	Low-------	0.10			
	31-60	1-5	1.40-1.70	6.0-20	0.02-0.05	5.1-8.4	Low-------	0.10			
	60-80	12-25	1.55-1.75	<0.2	0.10-0.15	5.1-8.4	Low-------	0.24			
36----------	0-18	---	0.10-0.40	>6.0	0.25-0.40	3.6-4.4	Low-------	----	---	2	20-60
Shenks	18-60	38-65	1.10-1.35	<0.06	0.10-0.20	5.6-6.5	High------	0.32			
	60-80	2-13	1.50-1.65	6.0-20.0	0.10-0.15	5.6-6.5	Low-------	0.10			
37----------	0-11	1-7	1.40-1.55	6.0-20	0.10-0.15	3.6-6.0	Low-------	0.10	5	2	1-5
Ona	11-26	3-8	1.50-1.65	0.6-2.0	0.10-0.15	3.6-6.0	Low-------	0.15			
	26-55	1-4	1.50-1.65	6.0-20	0.03-0.08	3.6-6.0	Low-------	0.10			
	55-80	3-8	1.50-1.65	0.6-2.0	0.10-0.15	3.6-6.0	Low-------	0.15			
38----------	0-55	1-7	1.20-1.60	6.0-20	0.07-0.10	3.6-7.3	Low-------	0.10	5	2	1-4
Holopaw	55-80	13-28	1.50-1.70	0.2-2.0	0.15-0.20	5.1-8.4	Low-------	0.20			
39----------	0-47	1-7	1.35-1.60	6.0-20	0.03-0.10	3.6-7.3	Low-------	0.10	5	2	1-4
Holopaw	47-80	13-28	1.50-1.70	0.2-2.0	0.10-0.20	5.1-8.4	Low-------	0.20			
40----------	0-27	0-2	1.20-1.60	>20	0.02-0.05	3.5-7.3	Low-------	0.10	5	1	<.5
Paola	27-80	0-2	1.35-1.60	>20	0.02-0.05	3.6-7.3	Low-------	0.10			
41----------	0-66	1-8	1.50-1.67	6.0-20	0.05-0.10	4.5-6.5	Low-------	0.10	5	2	.5-2
Millhopper	66-80	12-28	1.80-1.90	0.06-2.0	0.08-0.15	4.5-6.0	Low-------	0.28			
42----------	0-25	1-6	1.40-1.65	6.0-20	0.05-0.08	4.5-7.3	Low-------	0.10	4	2	.1-2
Riviera	25-45	12-25	1.50-1.70	<0.2	0.10-0.14	6.1-8.4	Low-------	0.24			
	45-49	15-25	1.50-1.70	<0.2	0.12-0.15	6.1-8.4	Low-------	0.24			
	49-80	1-8	1.40-1.65	0.6-6.0	0.05-0.08	7.9-8.4	Low-------	0.15			
43:											
Placid----------	0-11	0-10	1.20-1.40	6.0-20	0.15-0.20	3.6-5.5	Low-------	0.10	5	2	2-10
	11-80	0-10	1.30-1.60	6.0-20	0.05-0.08	3.6-5.5	Low-------	0.10			
Pompano---------	0-6	0-8	1.20-1.50	6.0-20	0.02-0.05	4.5-7.8	Low-------	0.10	5	2	1-4
	6-80	0-8	1.45-1.65	6.0-20	0.02-0.05	4.5-7.8	Low-------	0.10			
44----------	0-4	<3	1.30-1.55	6.0-20	0.04-0.08	4.5-6.0	Low-------	0.10	5	2	.5-2
Candler	4-70	<3	1.45-1.65	6.0-20	0.02-0.06	4.5-6.0	Low-------	0.10			
	70-80	3-8	1.40-1.65	6.0-20	0.05-0.08	4.5-6.0	Low-------	0.10			
45----------	0-4	<3	1.25-1.50	>20	0.04-0.10	4.5-6.5	Low-------	0.10	5	2	.5-2
Astatula	4-80	<3	1.45-1.60	>20	0.02-0.05	4.5-6.5	Low-------	0.10			

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	G/cc	In/hr	In/in	pH					Pct
46----------	0-7	<3	1.25-1.50	>20	0.04-0.10	4.5-6.5	Low--------	0.10	5	2	.5-2
Astatula	7-80	<3	1.45-1.60	>20	0.02-0.05	4.5-6.5	Low--------	0.10			
47:											
Myakka----------	0-6	1-3	1.25-1.45	6.0-20	0.05-0.15	3.6-6.5	Low--------	0.10	5	2	2-5
	6-22	0-2	1.45-1.60	6.0-20	0.02-0.05	3.6-6.5	Low--------	0.10			
	22-37	1-8	1.45-1.60	0.6-6.0	0.10-0.20	3.6-6.5	Low--------	0.15			
	37-80	0-2	1.48-1.70	6.0-20	0.02-0.10	3.6-6.5	Low--------	0.10			
Urban land.											
48----------	0-36	1-8	1.30-1.45	6.0-20	0.07-0.12	4.5-6.5	Low--------	0.10	5	2	1-5
Florahome	36-80	1-8	1.35-1.60	6.0-20	0.03-0.10	4.5-6.5	Low--------	0.10			
49----------	0-25	2-8	1.30-1.70	6.0-20	0.04-0.08	4.5-6.0	Low--------	0.15	5	1	.5-2
Bonneau	25-80	18-35	1.40-1.60	0.6-2.0	0.10-0.15	4.5-5.5	Low--------	0.20			
50----------	0-21	1-5	1.25-1.45	6.0-20	0.03-0.08	3.6-6.5	Low--------	0.10	5	2	1-4
Wabasso	21-28	0-5	1.35-1.55	6.0-20	0.02-0.05	3.6-6.5	Low--------	0.10			
	28-31	1-12	1.50-1.75	0.6-2.0	0.10-0.15	4.5-7.3	Low--------	0.15			
	31-57	2-5	1.40-1.55	6.0-20	0.02-0.05	5.1-8.4	Low--------	0.10			
	57-80	12-30	1.60-1.75	<0.2	0.10-0.15	5.1-8.4	Low--------	0.24			
51----------	0-13	<10	1.50-1.70	2.0-20	0.05-0.10	3.6-5.5	Low--------	0.10	5	---	2-9
Surrency	13-25	<10	1.50-1.65	2.0-20	0.05-0.10	3.6-5.0	Low--------	0.10			
	25-40	10-23	1.60-1.85	0.6-6.0	0.06-0.10	3.6-5.5	Low--------	0.15			
	40-80	22-35	1.65-1.85	0.6-2.0	0.10-0.15	3.6-5.5	Low--------	0.15			
52----------	0-24	<1	1.35-1.55	>20	0.02-0.08	3.6-6.0	Low--------	0.10	5	2	<1
Orsino	24-80	<2	1.35-1.55	>20	0.02-0.08	3.6-6.0	Low--------	0.10			
53:											
Zolfo----------	0-9	1-5	1.40-1.55	6.0-20	0.10-0.15	4.5-7.3	Low--------	0.10	5	2	.5-1
	9-53	1-5	1.50-1.60	6.0-20	0.03-0.10	4.5-7.3	Low--------	0.10			
	53-80	1-5	1.50-1.70	0.6-2.0	0.10-0.25	3.6-6.5	Low--------	0.15			
Urban land.											
54:											
Candler----------	0-4	<3	1.35-1.55	6.0-20	0.04-0.08	4.5-6.0	Low--------	0.10	5	2	.5-2
	4-62	<3	1.50-1.65	6.0-20	0.02-0.06	4.5-6.0	Low--------	0.10			
	62-80	3-8	1.50-1.65	6.0-20	0.05-0.08	4.5-6.0	Low--------	0.10			
Urban land.											
55:											
Centenary--------	0-4	1-8	1.40-1.60	6.0-20	0.03-0.08	4.5-6.5	Low--------	0.10	5	1	<1
	4-65	1-8	1.40-1.60	6.0-20	0.03-0.05	4.5-6.0	Low--------	0.10			
	65-80	2-10	1.50-1.70	2.0-6.0	0.03-0.10	4.5-6.0	Low--------	0.10			
Urban land.											
56----------	0-5	2-5	1.25-1.55	2.0-20	0.10-0.15	3.6-6.0	Low--------	0.10	5	2	1-4
Mulat	5-33	2-8	1.40-1.70	2.0-20	0.05-0.20	3.6-6.0	Low--------	0.17			
	33-58	14-25	1.55-1.70	0.06-0.6	0.10-0.15	3.6-6.0	Low--------	0.24			
	58-80	3-7	1.55-1.70	2.0-20	0.05-0.10	3.6-6.0	Low--------	0.17			
57----------	0-6	1-5	1.40-1.50	>6.0	0.02-0.05	4.5-6.5	Low--------	0.10	5	2	.5-1
Deland	6-55	1-5	1.50-1.60	>6.0	0.02-0.05	4.5-6.5	Low--------	0.10			
	55-61	1-5	1.30-1.40	2.0-6.0	0.10-0.15	4.5-6.0	Low--------	0.15			
	61-80	1-5	1.55-1.65	0.6-2.0	0.10-0.15	3.6-5.5	Low--------	0.20			

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	G/cc	In/hr	In/in	pH					Pct
58----------	0-6	<2	1.25-1.45	2.0-20	0.08-0.15	3.6-5.5	Low-------	0.10	5	2	1-3
Wauchula	6-12	<2	1.45-1.60	6.0-20	0.02-0.10	3.6-5.5	Low-------	0.10			
	12-22	2-8	1.45-1.60	0.2-6.0	0.15-0.25	3.6-5.5	Low-------	0.15			
	22-34	<2	1.45-1.65	2.0-6.0	0.08-0.15	4.5-5.5	Low-------	0.10			
	34-44	15-30	1.60-1.80	0.06-0.2	0.10-0.17	4.5-5.5	Low-------	0.20			
	44-80	11-20	1.60-1.75	0.06-0.6	0.15-0.20	4.5-5.5	Low-------	0.15			
59----------	0-10	3-10	1.40-1.49	6.0-20	0.10-0.20	4.5-8.4	Low-------	0.10	5	2	2-8
Floridana	10-24	1-7	1.52-1.58	6.0-20	0.05-0.10	4.5-8.4	Low-------	0.10			
	24-35	15-30	1.60-1.69	<0.2	0.10-0.20	4.5-8.4	Low-------	0.24			
	35-80	---	---	---	---	---	----------	----			
60----------	0-13	2-7	1.20-1.55	6.0-20	0.20-0.25	6.1-8.4	Low-------	0.10	5	2	10-20
Astor	13-55	2-7	1.50-1.70	6.0-20	0.15-0.20	6.1-8.4	Low-------	0.10			
	55-80	2-7	1.50-1.70	6.0-20	0.05-0.10	6.1-8.4	Low-------	0.10			
61----------	0-22	0-5	1.45-1.55	6.0-20	0.03-0.10	3.6-6.0	Low-------	0.10	5	2	1-2
Newnan	22-30	2-8	1.40-1.55	2.0-20	0.07-0.15	3.6-6.0	Low-------	0.15			
	30-58	0-5	1.45-1.65	6.0-20	0.05-0.12	3.6-6.0	Low-------	0.10			
	58-80	12-30	1.65-1.80	0.06-0.6	0.07-0.15	3.6-6.0	Low-------	0.24			
62----------	0-12	1-8	0.90-1.25	6.0-20	0.15-0.30	3.6-5.5	Low-------	0.15	5	2	5-10
Monteocha	12-50	0-6	1.40-1.65	2.0-20	0.10-0.15	3.6-5.5	Low-------	0.10			
	50-80	15-30	1.50-1.70	0.2-2.0	0.10-0.15	3.6-5.5	Low-------	0.24			
63----------	0-25	---	0.15-0.30	6.0-20	0.30-0.50	5.6-8.4	Low-------	----	2	2	>60
Okeechobee	25-46	---	0.10-0.30	6.0-20	0.45-0.65	5.6-8.4	Low-------	----			
	46-80	---	0.15-0.30	6.0-20	0.30-0.50	5.6-8.4	Low-------	----			
64----------	0-9	8-12	1.40-1.45	6.0-20	0.06-0.10	4.5-6.5	Low-------	0.15	5	2	1-4
Paisley	9-80	45-65	1.25-1.50	0.06-0.2	0.15-0.18	5.6-8.4	High------	0.28			
65----------	0-3	0-3	1.30-1.55	>20	0.05-0.08	3.6-6.5	Low-------	0.10	5	2	1-2
Hobe	3-42	0-3	1.50-1.70	>20	0.01-0.05	3.6-6.5	Low-------	0.10			
	42-50	2-7	1.40-1.65	0.6-2.0	0.10-0.15	3.6-5.5	Low-------	0.15			
	50-62	2-7	1.40-1.55	2.0-6.0	0.08-0.12	3.6-5.5	Low-------	0.15			
	62-80	15-30	1.60-1.70	0.6-2.0	0.11-0.15	3.6-5.5	Low-------	0.24			

TABLE 16.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "none," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
1, 2---------- Candler	A	None--------	---	---	>6.0	---	---	---	---	Low-------	High.
3---------- Myakka	B/D	None--------	---	---	0-1.0	Apparent	Jun-Feb	---	---	High------	High.
4---------- Zolfo	C	None--------	---	---	2.0-3.5	Apparent	Jun-Nov	---	---	Low-------	Moderate.
5---------- Placid	D	None--------	---	---	+2-1.0	Apparent	Jun-Mar	---	---	High------	High.
6---------- Tavares	A	None--------	---	---	3.5-6.0	Apparent	Jun-Nov	---	---	Low-------	High.
7---------- Immokalee	B/D	None--------	---	---	0-1.0	Apparent	Jun-Nov	---	---	High------	High.
8. Arents											
9---------- Pomona	B/D	None--------	---	---	0-1.0	Apparent	Jun-Nov	---	---	High------	High.
10---------- Pompano	B/D	None--------	---	---	0-1.0	Apparent	Jun-Nov	---	---	High------	Moderate.
11. Udorthents											
12---------- Electra	C	None--------	---	---	2.0-3.5	Apparent	Jun-Nov	---	---	Low-------	High.
13---------- St. Johns	D	None--------	---	---	+2-1.0	Apparent	Jun-Apr	---	---	High------	High.
14---------- Cassia	C	None--------	---	---	1.5-3.5	Apparent	Jun-Nov	---	---	Moderate	High.
15---------- Apopka	A	None--------	---	---	>6.0	---	---	---	---	Moderate	High.
16---------- Adamsville	C	None--------	---	---	2.0-3.5	Apparent	Jun-Nov	---	---	Low-------	Moderate.
17---------- Millhopper	A	None--------	---	---	3.5-6.0	Perched	Aug-Feb	---	---	Low-------	Moderate.
18---------- Lochloosa	C	None--------	---	---	2.5-5.0	Apparent	Jul-Oct	---	---	High------	High.
19---------- Pomona	D	None--------	---	---	+2-1.0	Apparent	Jun-Feb	---	---	High------	High.
20---------- Bluff	D	Frequent----	Long----	Jun-Nov	0-1.0	Apparent	Jun-Feb	---	---	High------	Low.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
21--Apopka	A	None	---	---	>6.0	---	---	---	---	Moderate	High.
22--Tomoka	B/D	None	---	---	+1-0	Apparent	Jun-Apr	---	24	High	High.
23--Palmetto	B/D	None	---	---	0-1.0	Apparent	Jun-Feb	---	---	High	High.
24--Holopaw	D	Frequent	Very long.	Jun-Feb	0-1.0	Apparent	Jun-Feb	---	---	High	High.
25--Narcoossee	C	None	---	---	2.0-3.5	Apparent	Jun-Nov	---	---	Moderate	High.
26--Terra Ceia	D	Frequent	Very long.	Jun-Feb	0-1.0	Apparent	Jan-Dec	16-20	50-60	Moderate	Moderate.
27--Samsula	B/D	None	---	---	+2-1.0	Apparent	Jan-Dec	16-20	30-36	High	High.
28--Centenary	A	None	---	---	3.5-5.0	Apparent	Jun-Nov	---	---	Moderate	High.
29--Riviera	C/D	Frequent	Brief	Jun-Feb	0-1.0	Apparent	Jun-Feb	---	---	High	High.
30--Hontoon	B/D	None	---	---	+2-1.0	Apparent	Jan-Dec	16-24	>52	High	High.
31--Myakka	D	None	---	---	+2-1.0	Apparent	Jun-Feb	---	---	High	High.
32--Sparr	C	None	---	---	1.5-3.5	Apparent	Jul-Nov	---	---	Moderate	High.
33--Winder	B/D	None	---	---	0-1.0	Apparent	Jun-Feb	---	---	High	Low.
34--Riviera	C/D	None	---	---	0-1.0	Apparent	Jun-Feb	---	---	High	High.
35--Malabar	B/D	None	---	---	0-1.0	Apparent	Jun-Feb	---	---	High	Low.
36--Shenks	B/D	Frequent	Very long.	Jun-Feb	0-1.0	Apparent	Jun-Mar	5-10	10-21	High	High.
37--Ona	B/D	None	---	---	0-1.0	Apparent	Jun-Feb	---	---	High	High.
38--Holopaw	B/D	None	---	---	0-1.0	Apparent	Jun-Feb	---	---	High	Moderate.
39--Holopaw	D	None	---	---	+2-1.0	Apparent	Jun-Apr	---	---	High	Moderate.
40--Paola	A	None	---	---	>6.0	---	---	---	---	Low	High.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
41--Millhopper	A	None	---	---	3.5-6.0	Perched	Aug-Feb	---	---	Low	Moderate.
42--Riviera	D	None	---	---	+2-1.0	Apparent	Jun-Apr	---	---	High	High.
43:											
Placid	D	Frequent	Brief	Jun-Nov	0-1.0	Apparent	Jun-Feb	---	---	High	High.
Pompano	D	Frequent	Brief	Jun-Nov	0-1.0	Apparent	Jun-Feb	---	---	High	Moderate.
44--Candler	A	None	---	---	>6.0	---	---	---	---	Low	High.
45, 46--Astatula	A	None	---	---	>6.0	---	---	---	---	Low	High.
47--Myakka	B/D	None	---	---	0-1.0	Apparent	Jun-Feb	---	---	High	High.
Urban land.											
48--Florahome	A	None	---	---	4.0-6.0	Apparent	Jun-Dec	---	---	Low	High.
49--Bonneau	A	None	---	---	3.5-5.0	Apparent	Aug-Feb	---	---	Low	High.
50--Wabasso	B/D	None	---	---	0-1.0	Apparent	Jun-Feb	---	---	Moderate	High.
51--Surrency	D	None	---	---	+1-0.5	Apparent	Jun-Apr	---	---	High	High.
52--Orsino	A	None	---	---	3.5-5.0	Apparent	Jun-Dec	---	---	Low	Moderate.
53:											
Zolfo	C	None	---	---	2.0-3.5	Apparent	Jun-Nov	---	---	Low	Moderate.
Urban land.											
54:											
Candler	A	None	---	---	>6.0	---	---	---	---	Low	High.
Urban land.											
55:											
Centenary	A	None	---	---	3.5-5.0	Apparent	Jun-Nov	---	---	Moderate	High.
Urban land.											
56--Mulat	D	None	---	---	0-1.0	Apparent	Jun-Feb	---	---	High	High.
57--Deland	A	None	---	---	>6.0	---	---	---	---	Low	High.
58--Wauchula	B/D	None	---	---	0-1.0	Apparent	Jun-Feb	---	---	High	High.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
59--Floridana	B/D	None	---	---	0-1.0	Apparent	Jun-Feb	---	---	Moderate	Low.
60--Astor	D	Frequent	Very long.	Jun-Jan	0-1.0	Apparent	Jun-Feb	---	---	High	Low.
61--Newnan	C	None	---	---	1.5-2.5	Apparent	Aug-Feb	---	---	Low	High.
62--Monteocha	D	None	---	---	+2-0	Apparent	Jun-Mar	---	---	Moderate	High.
63--Okeechobee	B/D	None	---	---	+1-1.0	Apparent	Jun-Apr	4-8	50-65	High	Low.
64--Paisley	D	None	---	---	0-1.0	Apparent	Jun-Nov	---	---	High	Moderate.
65--Hobe	A	None	---	---	5.0-6.0	Apparent	Jun-Oct	---	---	Low	High.

TABLE 17.--DEPTH TO WATER TABLE IN SELECTED SOILS

[Monthly readings were based on the average of two readings taken on the 1st and 15th of each month. Absence of an entry indicates that reading was not taken for that month. Measurements are in inches below soil surface. The symbol > means more than]

Soil	Year	Month											
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Centenary	1982	--	--	--	--	--	--	--	--	54	58	67	>80
	1983	78	69	63	56	59	59	62	>80	62	50	60	59
	1984	58	63	53	50	61	58	60	68	55	57	64	67
	1985	68	71	65	67	--	--	--	--	--	--	--	--
Electra	1982	--	--	--	--	--	--	--	--	--	--	--	--
	1983	52	37	41	34	43	37	27	35	41	41	44	43
	1984	38	33	31	28	33	36	35	39	44	35	43	48
	1985	52	53	51	46	--	--	--	--	--	--	--	--
Myakka	1982	--	--	--	--	--	--	--	--	--	--	36	34
	1983	33	8	20	12	23	27	16	28	35	39	38	14
	1984	13	14	4	10	36	31	2	19	19	12	23	30
	1985	36	39	41	45	--	--	--	--	--	--	--	--
Narcoossee	1982	--	--	--	--	--	--	--	31	35	39	50	54
	1983	54	45	43	33	30	40	29	27	20	25	40	34
	1984	37	38	24	26	38	45	35	39	39	33	42	49
	1985	55	56	55	55	--	--	--	--	--	--	--	--
Pomona	1982	--	--	--	--	--	--	--	--	19	6	24	28
	1983	36	10	13	7	15	18	10	4	10	9	10	11
	1984	11	10	2	10	27	3	14	8	12	12	14	29
	1985	42	38	34	34	--	--	--	--	--	--	--	--

TABLE 17.--DEPTH TO WATER TABLE IN SELECTED SOILS--Continued

Soil	Year	Month											
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Riviera	1982	--	--	--	--	--	--	--	--	3	1	2	13
	1983	16	1	3	1	10	8	1	12	16	7	5	8
	1984	6	2	5	8	18	21	0	7	0	6	15	16
	1985	16	17	19	17	--	--	--	--	--	--	--	--
Zolfo	1982	--	--	--	--	--	--	--	--	30	31	47	54
	1983	52	41	34	30	29	39	26	19	13	26	36	30
	1984	34	36	24	24	37	44	43	40	35	33	43	48
	1985	52	53	51	54	--	--	--	--	--	--	--	--

TABLE 18.--PHYSICAL PROPERTIES OF SELECTED SOILS

Soil name and sample number	Depth	Horizon	Particle-size distribution: Sand: Very coarse (2-1 mm)	Sand: Coarse (1-0.5 mm)	Sand: Medium (0.5-0.25 mm)	Sand: Fine (0.25-0.1 mm)	Sand: Very fine (0.1-0.05 mm)	Sand: Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	Hydraulic conductivity	Bulk density (field moisture)	Water content: 1/10 bar	Water content: 1/3 bar	Water content: 15 bar
	Cm		Pct								Cm/hr	G/cm	Pct(wt)		
Adamsville sand:															
S83FL-107-010-1	0-15	A	0.2	7.3	54.7	34.2	1.4	97.8	0.5	1.7	63.1	1.41	6.1	4.1	0.6
-2	15-38	C1	0.2	7.1	51.2	36.7	1.8	97.0	1.6	1.4	59.2	1.58	4.2	3.1	0.5
-3	38-86	C2	0.2	6.0	49.7	39.4	2.0	97.3	0.7	2.0	73.6	1.61	2.5	1.7	0.3
-4	86-107	C3	0.2	6.6	45.9	42.0	2.5	97.2	0.8	2.0	63.8	1.60	3.7	2.9	0.3
-5	107-173	C4	0.4	6.7	43.8	44.5	2.5	97.9	0.8	1.3	46.0	1.59	3.4	2.6	0.2
-6	173-203	C5	0.6	8.1	48.1	39.5	1.7	98.0	0.8	1.2	27.6	1.64	3.3	2.4	0.2
Apopka sand:															
S83FL-107-008-1	0-18	A	0.1	6.4	48.0	39.5	1.5	95.5	1.3	3.2	86.8	1.38	6.1	4.7	1.2
-2	18-41	E1	0.1	5.9	45.0	41.9	1.8	94.7	2.6	2.7	61.8	1.49	5.4	4.2	1.0
-3	41-102	E2	0.1	6.0	46.7	40.7	1.6	95.1	2.3	2.6	65.1	1.49	3.8	3.0	1.3
-4	102-109	EB	0.2	6.1	42.6	39.0	1.6	89.5	3.0	7.5	40.4	1.56	7.8	6.9	4.6
-5	109-173	Bt1	0.0	4.6	34.8	31.4	1.2	72.0	3.8	24.2	4.0	1.67	16.8	15.7	11.8
-6	173-203	Bt2	0.0	3.2	34.4	35.6	1.0	74.2	2.8	23.0	3.8	1.63	14.4	12.7	8.9
Astatula fine sand:															
S83FL-107-016-1	0-10	A	0.0	0.6	14.3	82.1	1.8	98.8	0.8	0.4	61.1	1.30	4.9	3.1	0.8
-2	10-30	C1	0.0	0.5	12.5	83.2	2.1	98.3	0.8	0.9	63.7	1.37	4.4	2.8	0.4
-3	30-66	C2	0.0	0.6	13.7	82.5	1.8	98.6	0.5	0.9	55.2	1.41	3.7	2.1	0.3
-4	66-135	C3	0.0	0.5	12.0	84.0	2.2	98.7	0.5	0.8	60.5	1.43	3.1	1.9	0.3
-5	135-203	C3	0.0	0.5	12.9	84.1	1.5	99.0	0.2	0.8	53.2	1.44	3.2	2.1	0.3
Candler fine sand:															
S82FL-107-003-1	0-10	A	0.0	0.1	6.7	90.2	1.9	99.0	0.0	1.0	46.0	1.30	6.5	4.4	0.9
-2	10-71	E1	0.0	0.2	7.2	88.5	1.7	97.6	0.6	1.8	36.8	1.46	4.8	2.4	0.5
-3	71-114	E2	0.0	0.1	6.7	89.9	1.5	98.2	0.4	1.4	38.1	1.55	3.1	1.5	0.5
-4	114-155	E3	0.0	0.1	6.8	89.6	1.7	98.2	0.4	1.4	39.4	1.50	2.6	1.2	0.3
-5	155-203	E&Bt	0.0	0.3	7.1	85.7	1.8	94.9	2.3	2.8	28.3	1.43	3.8	2.0	0.6
Cassia fine sand:															
S83FL-107-011-1	0-10	A	0.0	0.1	5.4	88.8	3.4	97.7	1.9	0.4	28.3	1.35	8.5	6.7	0.9
-2	10-23	E1	0.0	0.1	6.0	88.4	3.5	98.0	1.4	0.6	35.5	1.50	4.0	3.5	0.2
-3	23-61	E2	0.0	0.1	5.5	88.8	3.5	97.9	1.6	0.5	35.5	1.48	3.6	3.0	0.2
-4	61-71	E3	0.0	0.1	5.6	88.1	3.3	97.1	2.2	0.7	27.6	1.51	4.5	2.9	0.1
-5	71-81	Bh1	0.0	0.1	5.4	85.8	3.3	94.6	4.1	1.3	34.2	1.31	17.5	14.6	2.0
-6	81-96	Bh2	0.0	0.1	5.3	86.7	3.3	95.4	2.6	2.0	23.0	1.41	12.2	9.6	1.3
-7	96-117	Bh3	0.0	0.1	4.9	88.8	3.4	97.2	2.0	0.8	16.4	1.44	10.0	7.4	0.9
-8	117-137	C1	0.0	0.1	5.8	89.0	3.0	97.9	1.1	1.0	22.0	1.53	4.8	3.0	0.2
-9	137-203	C2	0.0	0.1	4.8	90.4	2.8	98.1	1.1	0.8	29.6	1.52	4.1	3.0	0.1
Centenary fine sand:															
S82FL-107-004-1	0-20	A	0.0	0.1	7.6	87.3	2.1	97.2	1.3	1.5	24.6	1.42	6.2	3.9	0.6
-2	20-94	E1	0.0	0.1	7.5	86.3	1.7	95.6	3.0	1.4	28.2	1.52	4.1	2.2	0.4
-3	94-127	E2	0.0	0.1	7.2	87.2	1.7	96.2	2.0	1.8	47.3	1.51	3.6	1.7	0.3
-4	127-165	E3	0.0	0.1	7.1	88.0	1.6	96.8	2.0	1.2	37.4	1.52	3.2	1.5	0.2
-5	165-193	Bh1	0.0	0.1	5.5	85.9	2.2	93.7	5.4	0.9	25.6	1.53	5.7	3.2	0.3
-6	193-203	Bh2	0.0	0.0	5.6	80.5	1.8	87.9	7.7	4.4	7.1	1.62	7.5	5.3	1.4

TABLE 18.--PHYSICAL PROPERTIES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Particle-size distribution								Hydraulic conductivity	Bulk density (field moisture)	Water content		
			Sand						Silt (0.05-0.002 mm)	Clay (<0.002 mm)			1/10 bar	1/3 bar	15 bar
			Very coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.1 mm)	Very fine (0.1-0.05 mm)	Total (2-0.05 mm)							
	Cm		Pct								Cm/hr	G/cm	Pct(wt)		
Deland fine sand:															
S84FL-107-020-1	0-15	A	0.0	0.0	3.9	87.1	3.7	94.7	2.9	2.4	23.7	1.45	8.6	5.2	1.1
-2	15-30	E1	0.0	0.0	3.9	85.5	3.6	93.0	5.0	2.0	23.7	1.47	8.4	5.0	1.0
-3	30-117	E2	0.0	0.0	3.5	86.4	4.1	94.0	3.6	2.4	42.1	1.38	6.0	3.4	0.6
-4	117-140	E3	0.0	0.0	3.4	86.3	4.3	94.0	3.5	2.5	40.1	1.51	5.2	2.9	0.4
-5	140-155	Bh1	0.0	0.0	3.2	86.7	4.0	93.9	4.0	2.1	44.0	1.47	5.6	3.6	0.2
-6	155-188	Bh2	0.0	0.0	2.9	86.9	3.9	93.7	4.4	1.9	46.0	1.43	6.0	3.8	0.5
-7	188-203	Bh3	0.0	0.0	3.3	85.3	3.1	91.7	5.7	2.6	37.5	1.49	6.5	4.6	0.5
Florahome sand:															
S83FL-107-017-1	0-28	A1	0.1	4.2	46.1	41.4	2.8	94.6	2.5	2.9	36.8	1.39	10.5	8.2	1.9
-2	28-91	A2	0.1	3.3	45.3	41.7	2.9	93.3	3.1	3.6	69.7	1.39	8.5	6.9	4.2
-3	91-147	C1	0.2	4.5	44.4	42.4	2.6	94.1	2.9	3.0	75.6	1.47	5.6	4.7	1.9
-4	147-203	C2	0.1	4.3	42.2	44.5	2.5	93.6	2.1	4.3	69.0	1.44	5.9	4.9	1.6
Holopaw fine sand:															
S82FL-107-006-1	0-15	A	0.0	0.0	0.9	75.5	16.1	92.5	6.2	1.3	4.7	1.44	11.7	6.3	1.0
-2	15-43	Eg1	0.0	0.0	0.8	74.9	16.5	92.2	6.4	1.4	6.6	1.42	10.8	5.0	0.7
-3	43-89	Eg2	0.0	0.0	0.8	77.0	15.0	92.8	5.8	1.4	3.2	1.51	10.5	4.8	0.8
-4	89-140	Eg3	0.0	0.2	0.8	71.0	16.8	88.8	7.5	3.7	1.4	1.50	13.4	7.1	1.1
-5	140-175	Btg1	0.0	0.0	0.8	61.2	18.3	80.3	8.4	11.3	0.2	1.55	17.0	11.7	3.6
-6	175-203	Btg2	0.0	0.0	0.4	50.0	16.4	66.8	6.2	27.0	0.2	1.55	22.9	19.7	10.4
Millhopper sand:															
S83FL-107-009-1	0-8	A	0.1	3.8	51.7	35.0	4.7	95.3	4.1	0.6	32.2	1.45	6.4	4.7	0.9
-2	8-20	E1	0.2	3.4	45.5	38.0	6.9	94.0	4.5	1.5	29.5	1.54	5.9	3.8	0.7
-3	20-102	E2	0.1	3.0	45.1	39.7	7.1	95.0	3.4	1.6	48.6	1.55	4.4	3.2	0.5
-4	102-127	E3	0.1	3.3	44.1	41.1	7.0	95.6	3.1	1.3	30.5	1.62	3.5	2.3	0.3
-5	127-150	E4	0.1	3.4	42.1	42.2	7.5	95.3	3.4	1.3	22.7	1.61	4.4	2.9	0.3
-6	150-168	E5	0.2	3.4	41.3	42.0	7.0	93.9	4.4	1.7	13.1	1.69	4.3	2.7	0.4
-7	168-178	Bt	0.1	3.2	35.8	34.3	6.1	79.5	7.7	12.8	1.5	1.79	8.5	7.1	3.0
-8	178-203	Btg	0.1	1.4	25.7	34.5	11.9	73.6	5.6	20.8	0.0	1.74	18.1	16.0	8.5
Mulat fine sand:															
S84FL-107-021-1	0-13	A1	0.0	0.8	6.8	76.4	6.5	90.5	7.0	2.5	65.7	1.39	11.5	7.6	2.0
-2	13-23	A2	0.0	0.9	6.7	77.7	6.9	92.2	5.9	1.9	14.1	1.51	7.8	5.0	0.8
-3	23-48	Eg1	0.0	1.0	7.4	80.3	5.8	94.5	3.9	1.6	21.7	1.54	6.2	4.0	0.6
-4	48-84	Eg2	0.0	0.9	7.3	80.1	6.2	94.5	3.9	1.6	26.3	1.49	8.1	5.2	0.6
-5	84-96	Btg1	0.0	1.0	7.0	65.4	4.1	77.5	4.6	17.9	10.5	1.43	25.2	21.9	6.1
-6	96-147	Btg2	0.2	0.8	6.0	59.9	4.1	71.0	4.3	24.7	11.6	1.35	35.1	32.6	10.2
-7	147-160	Cg1	0.0	0.7	6.4	76.3	4.5	87.9	2.9	9.2	6.0	1.63	20.2	16.1	4.0
-8	160-203	Cg2	0.0	0.7	5.8	82.1	5.5	94.1	2.4	3.5	5.4	1.61	7.5	4.9	1.0

TABLE 18.--PHYSICAL PROPERTIES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Particle-size distribution								Hydraulic conductivity	Bulk density (field moisture)	Water content		
			Sand						Silt (0.05-0.002 mm)	Clay (<0.002 mm)			1/10 bar	1/3 bar	15 bar
			Very coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.1 mm)	Very fine (0.1-0.05 mm)	Total (2-0.05 mm)							
	Cm		Pct								Cm/hr	G/cm	Pct (wt)		
Narcoossee fine sand:															
S82FL-107-002-1	0-10	A	0.0	0.1	4.4	87.6	2.9	95.0	2.6	2.4	117.0	0.83	27.8	20.3	6.6
-2	10-56	E	0.0	0.1	4.0	90.1	3.1	97.3	2.2	0.5	22.3	1.41	4.3	2.3	0.5
-3	56-64	Bh1	0.0	0.1	4.2	87.2	2.9	96.3	1.0	2.7	26.3	1.34	11.6	7.8	1.7
-4	64-74	Bh2	0.0	0.1	3.7	88.4	2.8	95.0	3.2	1.8	50.6	1.29	9.1	6.2	1.3
-5	74-84	BC	0.0	0.1	4.2	88.2	2.7	95.2	3.1	1.7	51.3	1.33	8.6	5.9	1.1
-6	84-102	C1	0.0	0.1	4.0	89.1	2.9	96.1	2.6	1.3	51.9	1.37	5.4	3.1	0.6
-7	102-152	C2	0.0	0.1	3.8	90.5	3.2	97.6	1.8	0.6	42.1	1.46	3.3	1.6	0.2
-8	152-203	C2	0.0	0.1	3.9	90.5	3.3	97.8	1.4	0.8	25.3	1.54	3.6	1.6	0.1
Orsino fine sand:															
S84FL-107-018-1	0-15	A	0.0	0.2	9.2	86.8	2.2	98.4	0.9	0.7	56.5	1.26	6.5	4.2	1.0
-2	15-61	E	0.0	0.2	8.5	87.3	2.1	98.1	1.8	0.1	51.9	1.40	3.9	2.5	0.6
-3	61-91	B/E	0.0	0.2	7.6	86.2	2.2	96.2	2.9	0.9	66.4	1.36	5.4	3.6	1.1
-4	91-114	Bw1	0.0	0.2	7.3	86.5	2.5	96.5	3.0	0.5	51.3	1.45	5.4	3.6	0.8
-5	114-162	Bw2	0.0	0.2	7.5	87.6	2.4	97.7	1.2	1.1	32.9	1.44	6.0	4.1	0.4
-6	162-203	C	0.0	0.2	8.1	87.7	2.2	98.2	0.7	1.1	31.6	1.49	4.1	2.3	0.3
Paola fine sand:															
S83FL-107-015-1	0-8	A	0.0	0.5	12.4	84.1	2.1	99.1	0.8	0.1	61.1	1.23	7.2	5.2	1.9
-2	8-68	E	0.0	0.5	12.8	83.9	2.1	99.3	0.4	0.3	57.8	1.36	3.5	2.4	0.6
-3	68-132	B/E1	0.0	0.5	13.0	83.2	2.0	98.7	0.3	1.0	65.7	1.38	4.1	2.9	0.3
-4	132-203	B/E2	0.0	1.7	17.4	78.0	1.8	98.9	0.3	1.8	69.6	1.38	6.2	5.2	0.5
Pomona fine sand:															
S82FL-107-005-1	0-15	A	0.0	0.0	0.5	63.5	21.4	90.8	6.4	2.8	23.0	1.14	20.8	14.9	4.0
-2	15-25	E1	0.0	0.0	0.5	73.8	17.7	92.0	7.7	0.3	7.0	1.50	9.7	4.5	0.7
-3	25-51	E2	0.0	0.0	0.5	66.1	24.6	91.2	8.4	0.4	7.1	1.49	9.9	4.2	0.6
-4	51-58	Bh1	0.0	0.0	0.5	56.1	27.8	84.4	11.6	4.0	0.7	1.34	24.7	19.1	3.4
-5	58-71	Bh2	0.0	0.0	0.5	58.3	28.0	86.8	9.8	3.4	4.2	1.37	19.7	13.2	2.9
-6	71-89	BE	0.0	0.0	0.4	65.4	22.9	88.7	9.0	2.3	3.3	1.45	18.0	10.5	1.7
-7	89-107	E'	0.0	0.0	0.5	65.9	24.4	90.8	8.5	0.7	9.2	1.53	12.8	4.0	0.4
-8	107-140	Btg1	0.0	0.0	0.4	50.9	25.9	77.2	9.4	13.4	0.3	1.61	20.3	17.3	6.1
-9	140-185	Btg2	0.0	0.0	0.2	50.7	27.1	78.0	8.9	13.1	0.3	1.63	19.7	17.1	6.6
-10	185-203	Cg	0.0	0.0	0.1	56.7	22.1	78.9	2.2	18.9	0.2	1.61	20.5	18.1	8.4
Sparr sand:															
S83FL-107-013-1	0-23	Ap	0.1	5.2	22.0	34.7	30.3	92.3	6.7	1.0	17.8	1.42	10.0	5.6	1.5
-2	23-43	E1	0.1	5.5	23.6	35.5	28.0	92.7	6.0	1.3	13.1	1.56	6.9	3.1	0.8
-3	43-76	E2	0.1	5.1	23.7	35.7	28.4	93.0	5.5	1.5	13.1	1.59	6.5	2.8	0.7
-4	76-112	E3	0.1	5.6	22.2	36.0	29.5	93.4	5.3	1.3	12.5	1.51	6.3	2.7	0.6
-5	112-165	E4	0.1	5.9	21.2	36.8	29.9	93.9	4.8	1.3	10.5	1.56	6.1	2.3	0.3
-6	165-178	BE	0.4	7.2	24.0	32.4	20.4	84.4	6.1	9.5	1.0	1.78	12.3	9.7	3.4
-7	178-203	Bt	0.4	8.2	29.2	36.0	8.0	81.8	3.4	14.8	1.3	1.73	13.2	11.6	5.0

TABLE 18.--PHYSICAL PROPERTIES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Particle-size distribution								Hydraulic conductivity	Bulk density (field moisture)	Water content		
			Sand						Silt (0.05-0.002 mm)	Clay (<0.002 mm)			1/10 bar	1/3 bar	15 bar
			Very coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.1 mm)	Very fine (0.1-0.05 mm)	Total (2-0.05 mm)							
	Cm		Pct								Cm/hr	G/cm	Pct(wt)		
Tavares fine sand:															
S82FL-107-007-1	0-13	A	0.0	0.0	1.8	91.5	3.9	97.2	0.6	2.2	17.7	1.33	8.7	5.7	1.5
-2	13-68	C1	0.0	0.0	2.0	90.5	3.9	96.4	1.9	1.7	25.6	1.48	5.5	3.0	0.8
-3	68-114	C2	0.0	0.0	1.7	91.0	4.1	96.8	2.3	1.0	39.4	1.44	3.9	2.0	0.5
-4	114-170	C3	0.0	0.0	1.5	91.7	4.0	97.2	1.3	1.5	32.2	1.48	3.5	1.8	0.3
-5	170-203	C4	0.0	0.0	1.6	93.2	4.2	99.0	0.6	0.4	28.9	1.44	4.1	2.0	0.4
Wauchula fine sand:															
S84FL-107-022-1	0-15	Ap	0.0	1.5	17.9	74.8	2.5	96.7	1.3	2.0	69.7	1.39	5.4	4.1	1.3
-2	15-30	E	0.0	1.4	16.9	76.0	2.6	96.9	2.2	0.9	64.4	1.50	3.6	2.4	1.0
-3	30-41	Bh1	0.0	1.2	13.5	67.8	2.5	85.0	12.5	2.5	8.9	1.40	29.9	25.7	4.2
-4	41-56	Bh2	0.0	1.4	14.3	73.7	2.7	92.1	3.9	4.0	19.4	1.52	16.6	11.8	2.4
-5	56-86	BE	0.0	1.3	15.2	74.3	2.5	93.3	3.3	3.4	29.3	1.53	11.2	8.1	1.5
-6	86-112	Btg	0.0	1.4	15.0	65.6	1.9	83.9	3.1	13.0	25.1	1.67	17.8	15.2	3.9
-7	112-157	Cg	0.0	0.7	15.8	74.1	1.3	91.9	2.5	5.6	7.9	1.66	14.0	9.3	2.1
-8	157-203	Cg	0.0	0.9	16.6	75.8	0.9	94.2	1.6	4.2	9.7	1.62	11.0	6.4	1.5
Winder fine sand:															
S83FL-107-012-1	0-15	A	0.1	2.9	15.7	64.5	6.2	89.4	6.9	3.7	14.5	1.20	26.0	17.2	3.3
-2	15-28	Eg1	0.2	3.8	17.0	67.1	6.5	94.6	4.2	1.2	15.1	1.53	5.4	3.5	0.3
-3	28-43	Eg2	0.3	4.1	17.3	67.7	6.4	95.8	3.3	0.9	20.7	1.55	4.7	2.7	0.1
-4	43-68	B/E	0.1	2.6	12.2	49.9	5.1	69.9	7.9	22.2	0.3	1.55	23.1	21.4	10.2
-5	68-99	Btg	0.1	3.3	15.4	55.3	4.9	79.0	6.4	14.6	0.0	1.70	18.9	17.2	8.4
-6	99-165	Cg1	0.4	3.7	14.6	53.1	5.8	77.6	7.1	15.3	0.2	1.64	16.5	14.1	6.2
-7	165-203	Cg2	0.4	3.6	14.9	52.6	5.4	76.9	6.8	16.3	0.4	1.59	17.0	14.2	4.7
Zolfo fine sand:															
S82FL-107-001-1	0-15	A	0.0	0.1	4.0	88.0	3.2	95.3	3.4	1.3	26.6	1.35	9.0	6.0	1.4
-2	15-33	E1	0.0	0.1	4.1	87.4	3.3	94.9	3.7	1.4	25.0	1.44	7.0	4.3	0.8
-3	33-81	E2	0.0	0.1	4.1	88.0	3.3	95.5	2.9	1.6	39.1	1.45	5.0	2.8	0.6
-4	81-135	E3	0.0	0.2	4.3	90.3	2.9	97.7	1.7	0.6	31.9	1.49	3.8	1.9	0.3
-5	135-162	EB	0.0	0.1	3.4	88.1	3.4	95.0	3.2	1.8	---	---	---	---	---
-6	162-203	Bh	0.0	0.1	2.9	86.5	3.1	92.6	5.9	1.5	---	---	---	---	---

TABLE 19.--CHEMICAL PROPERTIES OF SELECTED SOILS

Soil name and sample number	Depth	Horizon	Extractable bases					Extractable acidity	Sum of cations	Base saturation	Organic carbon	Electrical conductivity	pH			Pyrophosphate extractable			Citrate dithionite extractable	
			Ca	Mg	Na	K	Sum						H_2O (1:1)	$CaCl_2$ 0.1m (1:2)	KCl in (1:1)	C	Fe	Al	Fe	Al
	Cm		---Milliequivalents/100 grams of soil---							Pct	Pct	Mmhos/cm				Pct	Pct	Pct	Pct	Pct
Adamsville sand:																				
S83FL-107-010-1	0-15	A	0.10	0.06	0.04	0.06	0.26	4.43	4.69	6	0.76	0.02	4.5	4.0	3.7	---	---	---	---	---
-2	15-38	C1	0.02	0.01	0.02	0.01	0.06	2.02	2.08	3	0.27	0.02	4.8	4.7	4.7	---	---	---	---	---
-3	38-86	C2	0.01	0.01	0.01	0.00	0.03	1.58	1.61	2	0.16	0.01	4.9	4.7	4.7	---	---	---	---	---
-4	86-107	C3	0.02	0.01	0.02	0.00	0.05	1.40	1.45	3	0.09	0.01	4.9	4.7	4.8	---	---	---	---	---
-5	107-173	C4	0.02	0.01	0.02	0.00	0.05	1.15	1.20	4	0.07	0.03	4.8	4.8	4.6	---	---	---	---	---
-6	173-203	C5	0.02	0.02	0.02	0.00	0.06	1.22	1.28	5	0.06	0.01	5.1	4.7	4.8	---	---	---	---	---
Apopka sand:																				
S83FL-107-008-1	0-18	A	0.67	0.21	0.03	0.02	0.93	3.68	4.61	20	0.81	0.06	6.9	5.1	4.6	---	---	---	---	---
-2	18-41	E1	0.15	0.12	0.03	0.01	0.31	2.88	3.19	10	0.38	0.02	5.9	4.8	4.5	---	---	---	---	---
-3	41-102	E2	0.04	0.06	0.02	0.00	0.12	1.22	1.34	9	0.15	0.01	5.8	4.8	4.6	---	---	---	---	---
-4	102-109	EB	0.09	0.26	0.03	0.01	0.39	0.73	1.12	35	0.09	0.02	5.5	4.5	4.6	---	---	---	---	---
-5	109-173	Bt1	0.14	0.53	0.05	0.01	0.73	2.13	2.86	26	0.11	0.03	5.1	4.3	4.4	---	---	---	0.09	0.03
-6	173-203	Bt2	0.12	0.37	0.04	0.01	0.54	2.20	2.74	20	0.07	0.02	4.9	4.2	4.3	---	---	---	0.09	0.03
Astatula fine sand:																				
S83FL-107-016-1	0-10	A	0.08	0.03	0.00	0.01	0.12	2.53	2.65	5	0.38	0.00	4.4	3.9	3.9	---	---	---	---	---
-2	10-30	C1	0.03	0.02	0.00	0.00	0.05	3.04	3.09	2	0.27	0.00	4.7	4.6	4.5	---	---	---	---	---
-3	30-66	C2	0.02	0.02	0.00	0.00	0.04	1.92	1.96	2	0.18	0.00	4.8	4.8	4.9	---	---	---	---	---
-4	66-135	C3	0.02	0.02	0.00	0.00	0.04	1.53	1.57	3	0.10	0.00	4.8	4.9	5.0	---	---	---	---	---
-5	135-203	C3	0.01	0.01	0.00	0.00	0.02	1.36	1.38	1	0.04	0.00	4.7	4.9	5.0	---	---	---	---	---
Candler fine sand:																				
S82FL-107-003-1	0-10	A	0.16	0.06	0.03	0.02	0.27	3.99	4.26	6	1.28	0.05	4.5	3.8	3.5	---	---	---	---	---
-2	10-71	E1	0.02	0.01	0.01	0.00	0.04	1.30	1.34	3	0.05	0.03	4.8	4.5	4.4	---	---	---	---	---
-3	71-114	E2	0.02	0.01	0.01	0.00	0.04	0.98	1.02	4	0.09	0.02	4.9	4.5	4.4	---	---	---	---	---
-4	114-155	E3	0.02	0.01	0.01	0.00	0.04	0.90	0.94	4	0.16	0.02	4.9	4.5	4.5	---	---	---	---	---
-5	155-203	E&Bt	0.06	0.04	0.02	0.01	0.13	1.28	1.41	9	0.09	0.02	5.0	4.4	4.3	---	---	---	0.08	0.03
Cassia fine sand:																				
S83FL-107-011-1	0-10	A	0.73	0.10	0.05	0.02	0.90	4.67	5.57	16	0.77	0.04	4.2	3.6	3.4	---	---	---	---	---
-2	10-23	E1	0.09	0.02	0.01	0.00	0.12	1.09	1.21	10	0.08	0.01	5.0	4.4	4.3	---	---	---	---	---
-3	23-61	E2	0.04	0.01	0.02	0.00	0.07	0.65	0.72	10	0.06	0.01	5.2	4.6	4.4	---	---	---	---	---
-4	61-71	E3	0.03	0.02	0.01	0.00	0.06	0.67	0.73	8	0.09	0.01	4.9	4.4	4.2	---	---	---	---	---
-5	71-81	Bh1	0.07	0.03	0.03	0.02	0.15	9.67	9.82	2	1.35	0.03	4.3	3.8	3.8	0.66	0.05	0.06	0.00	0.10
-6	81-96	Bh2	0.06	0.03	0.03	0.01	0.13	6.50	6.63	2	0.75	0.02	4.4	4.2	4.2	0.41	0.06	0.06	0.00	0.07
-7	96-117	Bh3	0.02	0.01	0.02	0.00	0.05	1.94	1.99	3	0.30	0.01	4.6	4.4	4.3	---	---	---	---	---
-8	117-137	C1	0.02	0.01	0.01	0.01	0.05	0.49	0.54	9	0.16	0.01	4.8	4.5	4.4	---	---	---	---	---
-9	137-203	C2	0.02	0.02	0.01	0.00	0.05	2.04	2.09	2	0.07	0.01	5.2	4.7	4.5	---	---	---	---	---

TABLE 19.--CHEMICAL PROPERTIES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Extractable bases					Extractable acidity	Sum of cations	Base saturation	Organic carbon	Electrical conductivity	pH			Pyrophosphate extractable			Citrate dithionite extractable	
			Ca	Mg	Na	K	Sum						H_2O (1:1)	$CaCl_2$ 0.1m (1:2)	KCl in (1:1)	C	Fe	Al	Fe	Al
	Cm		---Milliequivalents/100 grams of soil---							Pct	Pct	Mmhos/cm				Pct	Pct	Pct	Pct	Pct
Centenary fine sand:																				
S82FL-107-004-1	0-20	A	0.23	0.06	0.02	0.03	0.34	3.41	3.75	9	0.88	0.03	5.0	4.1	3.9	---	---	---	---	---
-2	20-94	E1	0.12	0.03	0.02	0.01	0.18	1.12	1.30	14	0.20	0.02	5.5	4.6	4.4	---	---	---	---	---
-3	94-127	E2	0.04	0.03	0.01	0.01	0.09	0.85	0.94	26	0.15	0.15	5.4	4.6	4.5	---	---	---	---	---
-4	127-165	E3	0.02	0.01	0.01	0.00	0.04	0.64	0.68	6	0.11	0.01	5.2	4.7	4.6	---	---	---	---	---
-5	165-193	Bh1	0.07	0.04	0.01	0.00	0.12	1.05	1.17	10	0.34	0.02	5.5	4.7	4.6	0.12	0.00	0.05	0.03	0.03
-6	193-203	Bh2	0.04	0.08	0.02	0.01	0.15	5.21	5.36	3	0.92	0.02	5.0	4.4	4.3	0.43	0.01	0.14	0.04	0.08
Deland fine sand:																				
S84FL-107-020-1	0-15	A	1.99	0.58	0.02	0.05	2.64	5.30	7.94	33	1.27	0.02	5.4	5.2	5.3	---	---	---	---	---
-2	15-30	E1	0.36	0.11	0.01	0.02	0.50	5.66	6.16	8	0.64	0.02	5.2	4.8	4.6	---	---	---	---	---
-3	30-117	E2	0.08	0.05	0.01	0.01	0.15	1.78	1.93	8	0.20	0.02	5.0	4.8	4.8	---	---	---	---	---
-4	117-140	E3	0.07	0.04	0.02	0.01	0.14	1.48	1.62	9	0.15	0.02	4.8	4.8	4.8	---	---	---	---	---
-5	140-155	Bh1	0.10	0.04	0.02	0.00	0.16	2.53	2.69	6	0.26	0.02	4.8	4.8	4.8	0.15	0.03	0.09	0.12	0.08
-6	155-188	Bh2	0.10	0.04	0.02	0.00	0.16	4.36	4.52	4	0.58	0.02	4.9	4.7	4.7	0.43	0.03	0.14	0.04	0.10
-7	188-203	Bh3	0.29	0.07	0.02	0.00	0.11	3.69	3.80	3	0.46	0.02	4.9	4.7	4.7	0.32	0.01	0.11	0.08	0.08
Florahome sand:																				
S83FL-107-017-1	0-28	A1	0.87	0.16	0.01	0.03	1.07	9.74	10.81	10	1.06	0.00	4.9	4.6	4.5	---	---	---	---	---
-2	28-91	A2	1.20	0.11	0.02	0.02	1.35	6.25	7.60	18	0.40	0.00	5.3	5.1	5.1	---	---	---	---	---
-3	91-147	C1	0.59	0.05	0.01	0.01	0.66	5.63	6.29	10	0.25	0.00	5.4	5.1	5.0	---	---	---	---	---
-4	147-203	C2	0.68	0.04	0.02	0.01	0.75	6.10	6.85	11	0.19	0.00	5.5	5.2	5.1	---	---	---	---	---
Holopaw fine sand:																				
S82FL-107-006-1	0-15	A	0.06	0.04	0.03	0.01	0.14	3.64	3.78	4	0.66	0.05	4.2	3.6	3.3	---	---	---	---	---
-2	15-43	Eg1	0.31	0.04	0.02	0.00	0.37	1.34	1.71	22	0.26	0.09	5.4	4.1	4.3	---	---	---	---	---
-3	43-89	Eg2	0.50	0.04	0.01	0.00	0.55	0.83	1.38	40	0.23	0.02	6.0	4.6	4.9	---	---	---	---	---
-4	89-140	Eg3	2.42	0.41	0.06	0.01	2.90	2.12	5.02	58	0.70	0.05	5.6	5.1	5.3	---	---	---	---	---
-5	140-175	Btg1	6.00	1.32	0.11	0.07	7.50	3.94	11.44	66	0.22	0.03	5.7	5.2	5.1	---	---	---	0.05	0.02
-6	175-203	Btg2	11.57	2.80	0.12	0.25	14.74	7.54	22.28	66	0.16	0.03	5.8	5.2	5.0	---	---	---	---	---
Millhopper sand:																				
S83FL-107-009-1	0-8	A	0.23	0.06	0.03	0.03	0.35	4.75	5.10	7	1.05	0.03	4.3	3.6	3.3	---	---	---	---	---
-2	8-20	E1	0.06	0.02	0.04	0.01	0.13	1.94	2.07	6	0.34	0.01	4.8	4.5	4.5	---	---	---	---	---
-3	20-102	E2	0.05	0.02	0.02	0.00	0.09	0.57	0.66	14	0.15	0.01	5.3	4.9	4.8	---	---	---	---	---
-4	102-127	E3	0.05	0.03	0.02	0.00	0.10	0.16	0.26	38	0.06	0.01	5.4	4.9	4.9	---	---	---	---	---
-5	127-150	E4	0.06	0.02	0.02	0.00	0.10	0.08	0.18	56	0.04	0.01	5.4	4.0	4.9	---	---	---	---	---
-6	150-168	E5	0.07	0.02	0.02	0.00	0.11	0.99	1.10	10	0.03	0.01	5.5	4.9	4.8	---	---	---	---	---
-7	168-178	Bt	0.22	0.30	0.04	0.03	0.59	3.89	4.48	13	0.08	0.01	5.1	4.1	4.2	---	---	---	---	---
-8	178-203	Btg	0.12	0.33	0.09	0.07	0.61	8.28	8.89	7	0.08	0.01	4.8	3.9	3.9	---	---	---	0.06	0.04

TABLE 19.--CHEMICAL PROPERTIES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Extractable bases					Extractable acidity	Sum of cations	Base saturation	Organic carbon	Electrical conductivity	pH			Pyrophosphate extractable			Citrate dithionite extractable	
			Ca	Mg	Na	K	Sum						H_2O (1:1)	$CaCl_2$ 0.1m (1:2)	KCl in (1:1)	C	Fe	Al	Fe	Al
	Cm		---Milliequivalents/100 grams of soil---							Pct	Pct	Mmhos/cm				Pct	Pct	Pct	Pct	Pct
Mulat fine sand:																				
S84FL-107-021-1	0-13	A1	3.09	0.53	0.07	0.08	3.77	2.44	6.21	61	1.30	0.02	4.9	4.7	4.9	---	---	---	---	---
-2	13-23	A2	1.50	0.11	0.06	0.05	1.72	2.48	4.20	41	0.80	0.02	5.0	4.4	4.3	---	---	---	---	---
-3	23-48	Eg1	0.22	0.03	0.03	0.01	0.29	1.16	1.45	20	0.43	0.02	4.7	4.2	4.0	---	---	---	---	---
-4	48-84	Eg2	0.30	0.04	0.03	0.01	0.38	1.49	1.87	20	0.42	0.02	4.6	4.2	4.1	---	---	---	---	---
-5	84-96	Btg1	1.41	0.43	0.10	0.04	1.98	9.03	11.01	18	0.40	0.02	4.3	4.0	4.2	---	---	---	1.25	0.26
-6	96-147	Btg2	2.02	0.72	0.17	0.05	2.96	10.53	13.48	22	0.54	0.02	3.8	3.9	4.1	---	---	---	4.55	0.53
-7	147-160	Cg1	2.11	0.84	0.16	0.04	3.15	2.28	5.43	58	0.16	0.02	4.4	4.2	4.4	---	---	---	---	---
-8	160-203	Cg2	0.72	0.37	0.13	0.02	1.24	1.48	2.72	46	0.12	0.02	4.5	4.3	4.5	---	---	---	---	---
Narcoossee fine sand:																				
S82FL-107-002-1	0-10	A	0.45	0.35	0.11	0.08	0.99	14.72	15.71	6	2.45	0.15	3.7	2.9	2.5	---	---	---	---	---
-2	10-56	E	0.05	0.02	0.03	0.01	0.11	1.20	1.31	8	0.19	0.03	4.7	3.6	3.2	---	---	---	---	---
-3	56-64	Bh1	0.16	0.04	0.04	0.01	0.25	11.53	11.78	2	1.17	0.04	4.7	3.9	3.7	0.87	0.00	0.15	0.01	0.12
-4	64-74	Bh2	0.13	0.03	0.03	0.01	0.20	10.68	10.88	2	1.07	0.04	4.8	4.2	4.1	0.46	0.00	0.18	0.01	0.14
-5	74-84	BC	0.11	0.03	0.04	0.01	0.19	7.14	7.33	3	0.97	0.04	5.0	4.4	4.3	0.59	0.00	0.18	0.00	0.13
-6	84-102	C1	0.07	0.02	0.03	0.01	0.13	4.04	4.17	3	0.41	0.03	5.2	4.6	4.5	---	---	---	---	---
-7	102-152	C2	0.03	0.01	0.02	0.01	0.07	1.07	1.14	6	0.16	0.03	5.2	4.6	4.5	---	---	---	---	---
-8	152-203	C2	0.03	0.02	0.01	0.00	0.06	0.78	0.84	7	0.08	0.03	5.2	4.6	4.5	---	---	---	---	---
Orsino fine sand:																				
S84FL-107-018-1	0-15	A	0.05	0.03	0.02	0.01	0.11	0.84	0.95	12	0.43	0.00	4.6	3.9	3.7	---	---	---	---	---
-2	15-61	E	0.01	0.02	0.01	0.01	0.06	0.63	0.69	9	0.12	0.00	4.4	4.0	4.0	---	---	---	---	---
-3	61-91	B/E	0.02	0.02	0.03	0.01	0.08	1.96	2.04	4	0.21	0.01	3.6	4.2	4.5	---	---	---	---	---
-4	91-114	Bw1	0.03	0.02	0.02	0.01	0.08	1.53	1.61	5	0.17	0.00	4.1	4.4	4.6	---	---	---	---	---
-5	114-162	Bw2	0.01	0.02	0.01	0.00	0.04	0.55	0.59	7	0.08	0.00	4.5	4.5	4.7	---	---	---	---	---
-6	162-203	C	0.02	0.01	0.02	0.00	0.05	0.05	0.10	50	0.02	0.00	5.1	4.7	4.9	---	---	---	---	---
Paola fine sand:																				
S83FL-107-015-1	0-8	A	0.15	0.09	0.02	0.02	0.28	2.55	2.83	10	0.98	0.01	4.1	3.4	3.3	---	---	---	---	---
-2	8-68	E	0.02	0.02	0.00	0.01	0.05	1.10	1.05	4	0.10	0.00	4.5	3.9	3.9	---	---	---	---	---
-3	68-132	B/E1	0.02	0.01	0.00	0.00	0.09	0.86	0.95	9	0.13	0.00	4.2	4.6	4.8	---	---	---	---	---
-4	132-203	B/E2	0.01	0.01	0.00	0.00	0.02	2.22	2.24	1	0.11	0.00	4.4	4.8	4.9	---	---	---	---	---
Pomona fine sand:																				
S82FL-107-005-1	0-15	A	1.50	0.41	0.07	0.08	2.06	13.52	15.58	13	3.44	0.08	4.2	3.3	3.1	---	---	---	---	---
-2	15-25	E1	0.28	0.09	0.03	0.01	0.41	2.67	3.08	13	0.64	0.02	4.7	3.4	3.4	---	---	---	---	---
-3	25-51	E2	0.10	0.03	0.03	0.00	0.16	1.27	1.43	11	0.32	0.02	4.7	3.7	3.7	---	---	---	---	---
-4	51-58	Bh1	0.35	0.13	0.06	0.01	0.55	21.64	22.19	2	3.49	0.04	4.5	3.7	3.7	1.98	0.00	0.20	0.02	0.16
-5	58-71	Bh2	0.11	0.04	0.03	0.00	0.18	18.42	18.60	1	1.86	0.03	4.6	4.1	4.0	1.41	0.00	0.29	0.02	0.24
-6	71-89	BE	0.07	0.04	0.04	0.01	0.15	11.11	11.26	1	1.34	0.03	4.7	4.2	4.1	---	---	---	---	---
-7	89-107	E'	0.03	0.02	0.03	0.00	0.08	2.37	2.45	3	0.19	0.05	4.7	4.4	4.4	---	---	---	---	---
-8	107-140	Btg1	0.69	2.06	0.48	0.05	3.28	8.69	11.97	27	0.16	0.24	4.4	3.8	3.6	---	---	---	0.72	0.08
-9	140-185	Btg2	1.05	2.67	0.57	0.07	4.36	7.91	12.27	36	0.64	0.06	4.1	3.7	3.4	---	---	---	0.64	0.06
-10	185-203	Cg	1.97	4.11	0.30	0.15	6.53	8.45	14.98	44	0.13	0.10	4.4	3.7	3.1	---	---	---	---	---

TABLE 19.--CHEMICAL PROPERTIES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Extractable bases					Extractable acidity	Sum of cations	Base saturation	Organic carbon	Electrical conductivity	pH			Pyrophosphate extractable			Citrate dithionite extractable	
			Ca	Mg	Na	K	Sum						H_2O (1:1)	$CaCl_2$ 0.1m (1:2)	KCl in (1:1)	C	Fe	Al	Fe	Al
	Cm		---Milliequivalents/100 grams of soil---							Pct	Pct	Mmhos/cm				Pct	Pct	Pct	Pct	Pct
Sparr sand:																				
S83FL-107-013-1	0-23	Ap	1.20	0.09	0.01	0.02	1.32	2.71	4.03	33	0.42	0.00	5.5	5.0	5.0	---	---	---	---	---
-2	23-43	E1	0.65	0.02	0.00	0.01	0.68	0.76	1.44	47	0.16	0.00	5.8	5.4	5.4	---	---	---	---	---
-3	43-76	E2	0.42	0.01	0.00	0.00	0.43	0.04	0.47	91	0.02	0.00	6.0	5.7	5.8	---	---	---	---	---
-4	76-112	E3	0.29	0.02	0.00	0.02	0.33	0.03	0.36	92	0.03	0.00	6.0	5.7	5.7	---	---	---	---	---
-5	112-165	E4	0.19	0.01	0.00	0.00	0.20	0.65	0.85	24	0.02	0.00	5.9	5.6	5.5	---	---	---	---	---
-6	165-178	BE	0.95	0.08	0.01	0.04	1.08	1.25	2.33	46	0.06	0.00	6.0	5.7	5.7	---	---	---	---	---
-7	178-203	Bt	1.17	0.41	0.01	0.05	1.64	2.95	4.59	36	0.04	0.00	5.4	5.3	5.2	---	---	---	0.06	0.04
Tavares fine sand:																				
S82FL-107-007-1	0-13	A	0.66	0.31	0.02	0.05	1.04	4.01	5.05	21	1.32	0.02	5.5	4.6	4.3	---	---	---	---	---
-2	13-68	C1	0.04	0.04	0.01	0.01	0.10	1.45	1.55	6	0.22	0.02	5.2	4.6	4.4	---	---	---	---	---
-3	68-114	C2	0.02	0.02	0.01	0.01	0.06	0.96	1.02	6	0.10	0.02	5.1	4.5	4.4	---	---	---	---	---
-4	114-170	C3	0.03	0.02	0.01	0.01	0.07	0.84	0.91	8	0.06	0.01	5.1	4.5	4.5	---	---	---	---	---
-5	170-203	C4	0.03	0.01	0.00	0.00	0.04	0.29	0.33	12	0.02	0.01	5.3	4.7	4.7	---	---	---	---	---
Wauchula fine sand:																				
S84FL-107-022-1	0-15	Ap	1.46	0.11	0.03	0.01	1.61	0.55	2.16	75	0.57	0.04	5.0	4.9	5.0	---	---	---	---	---
-2	15-30	E	0.63	0.04	0.02	0.00	0.69	0.00	0.69	100	0.34	0.03	5.2	5.1	5.2	---	---	---	---	---
-3	30-41	Bh1	2.24	0.51	0.06	0.02	2.83	22.98	25.81	11	3.22	0.05	4.4	3.9	3.7	2.53	0.02	0.25	0.03	0.20
-4	41-56	Bh2	0.69	0.24	0.04	0.03	1.00	11.06	12.06	8	1.28	0.04	4.4	3.9	3.7	0.90	0.00	0.17	0.09	0.15
-5	56-86	BE	0.39	0.13	0.03	0.03	0.58	6.66	7.24	8	0.61	0.03	4.5	4.2	4.2	---	---	---	---	---
-6	86-112	Btg	0.80	0.41	0.06	0.22	1.49	5.68	7.17	21	0.28	0.04	4.8	4.1	4.4	---	---	---	0.25	0.14
-7	112-157	Cg	0.43	0.18	0.05	0.09	0.75	1.60	2.35	32	0.12	0.04	4.9	4.1	4.4	---	---	---	---	---
-8	157-203	Cg	0.48	0.17	0.03	0.05	0.73	0.79	1.52	48	0.14	0.04	4.8	4.2	4.4	---	---	---	---	---
Winder fine sand:																				
S83FL-107-012-1	0-15	A	10.85	0.74	0.12	0.10	11.81	7.60	19.41	61	3.80	0.07	5.3	5.1	5.1	---	---	---	---	---
-2	15-28	Eg1	1.62	0.07	0.01	0.00	1.70	0.16	1.86	91	0.34	0.04	6.2	5.9	6.2	---	---	---	---	---
-3	28-43	Eg2	0.51	0.02	0.01	0.00	0.54	0.03	0.57	95	0.10	0.02	6.3	6.0	6.3	---	---	---	---	---
-4	43-68	B/E	20.12	1.40	0.21	0.05	21.78	5.14	26.92	81	0.24	0.06	7.5	6.9	6.8	---	---	---	0.07	0.02
-5	68-99	Btg	16.62	0.74	0.29	0.08	17.73	2.44	20.17	88	0.08	0.06	8.3	7.5	7.5	---	---	---	0.09	0.02
-6	99-165	Cg1	21.25	0.57	0.42	0.08	22.32	2.39	24.71	90	0.05	0.07	8.3	7.7	7.6	---	---	---	0.07	0.02
-7	165-203	Cg2	19.37	0.49	0.60	0.10	20.56	2.70	23.26	88	0.04	0.07	8.3	7.7	7.6	---	---	---	0.12	0.02
Zolfo fine sand:																				
S82FL-107-001-1	0-15	A	0.27	0.19	0.03	0.02	0.51	7.00	7.51	7	0.89	0.04	4.9	3.9	3.6	---	---	---	---	---
-2	15-33	E1	0.03	0.02	0.01	0.01	0.07	2.71	2.78	3	0.59	0.03	4.9	4.5	4.4	---	---	---	---	---
-3	33-81	E2	0.03	0.02	0.02	0.00	0.07	1.40	1.47	5	0.18	0.02	5.1	4.8	4.6	---	---	---	---	---
-4	81-135	E3	0.02	0.01	0.01	0.00	0.04	0.43	0.47	9	0.02	0.01	5.5	4.9	4.7	---	---	---	---	---
-5	135-162	EB	0.02	0.01	0.02	0.00	0.05	1.52	1.57	3	0.08	0.04	4.8	4.7	4.6	0.24	0.01	0.09	0.03	0.05
-6	162-203	Bh	0.02	0.02	0.01	0.00	0.05	2.47	2.52	2	0.30	0.03	4.8	4.7	4.6	0.21	0.01	0.04	0.01	0.03

TABLE 20.--CLAY MINERALOLGY OF SELECTED SOILS

Soil Name and sample number	Depth	Horizon	Clay minerals			
			Montmorillonite	14 Angstrom intergrade	Kaolinite	Quartz
	Cm		Pct	Pct	Pct	Pct
Adamsville sand:						
S83FL-107-010-1	0-15	A	14	47	14	25
-3	38-86	C2	14	46	13	27
-6	173-203	C5	26	39	13	22
Apopka sand:						
S83FL-107-008-1	0-18	A	0	20	75	5
-5	109-173	Bt1	0	13	83	4
-6	173-203	Bt2	0	10	86	4
Astatula fine sand:						
S83FL-107-016-1	0-10	A	39	32	11	18
-3	30-66	C2	21	38	9	32
-5	135-203	C3	27	43	10	20
Candler fine sand:						
S82FL-107-003-1	0-10	A	16	49	21	14
-5	155-203	E&Bt	17	39	37	7
Cassia fine sand:						
S83FL-107-011-1	0-10	A	0	0	0	100
-5	71-81	Bh1	7	23	8	62
-8	137-203	C2	0	0	0	100
Centenary fine sand:						
S82FL-107-004-1	0-20	A	15	53	13	19
-5	165-193	Bh1	15	32	19	32
Deland fine sand:						
S84FL-107-020-1	0-15	A	18	37	11	34
-5	140-155	Bh1	16	20	8	56
-7	188-203	Bh3	15	9	7	69
Florahome sand:						
S83FL-107-017-1	0-28	A1	20	31	38	10
-3	91-147	C1	21	19	43	18
-4	147-203	C2	25	8	51	16
Holopaw fine sand:						
S82FL-107-006-1	0-15	A	38	27	20	15
-5	140-175	Btg1	88	0	9	3
-6	175-203	Btg2	81	0	15	4
Lochloosa sand:						
S84FL-107-019-1	0-23	Ap	25	28	24	23
-5	81-112	Btg1	45	14	34	7
-7	157-203	Btg2	38	9	46	7
Millhopper sand:						
S83FL-107-009-1	0-8	A	17	39	21	23
-3	20-102	E2	0	21	6	73
-8	178-203	Btg	25	16	51	8
Mulat fine sand:						
S84FL-107-021-1	0-13	A1	31	16	16	37
-6	96-147	Btg2	44	20	24	12
-8	160-203	Cg2	55	14	20	10

TABLE 20.--CLAY MINERALOLGY OF SELECTED SOILS--Continued

Soil Name and sample number	Depth	Horizon	Clay minerals			
			Montmorillonite	14 Angstrom intergrade	Kaolinite	Quartz
	Cm		Pct	Pct	Pct	Pct
Narcoossee fine sand:						
S82FL-107-002-1	0-10	A	20	11	10	59
-3	56-64	Bh1	24	19	7	50
-5	74-84	BC	13	30	7	50
-8	152-203	C2	11	18	4	67
Orsino fine sand:						
S84FL-107-018-1	0-15	A	41	21	12	26
-4	91-114	Bw1	16	41	22	21
-6	162-203	C	18	33	24	25
Paola fine sand:						
S83FL-107-015-1	0-8	A	24	0	12	64
-3	68-132	B/E1	25	25	14	36
-4	132-203	B/E2	29	21	13	37
Pomona fine sand:						
S82FL-107-005-1	0-15	A	0	0	0	100
-4	51-58	Bh1	13	33	9	45
-8	107-140	Btg1	83	0	11	6
-10	185-203	Cg	85	0	12	3
Sparr sand:						
S83FL-107-013-1	0-23	Ap	14	31	37	18
-8	178-203	Bt	9	12	72	7
Tavares fine sand:						
S82FL-107-007-1	0-13	A	10	58	21	11
-3	68-114	C2	14	55	25	6
-5	170-203	C4	12	55	22	11
Wauchula fine sand:						
S84FL-107-022-1	0-15	Ap	0	14	14	72
-3	30-41	Bh1	25	10	9	56
-6	86-112	Btg	20	31	38	11
-8	157-203	Cg	46	11	33	10
Winder fine sand:						
S83FL-107-012-1	0-15	A	81	0	10	9
-4	43-68	B/E	94	0	4	2
-7	165-203	Cg2	93	0	5	2
Zolfo fine sand:						
S82FL-107-001-1	0-15	A	11	43	11	35
-5	135-162	EB	11	33	10	46

TABLE 21.--ENGINEERING INDEX TEST DATA

[Tests performed by the Florida Department of Transportation (FDOT) in cooperation with the U.S. Bureau of Public Roads, in accordance with standard procedures of the American Association of State Highway and Transportation Officials (AASHTO). See the section "Soil Series and Their Morphology" for location of pedon sampled. NP means nonplastic]

Soil name, sample number, horizon, and depth in inches	FDOT report number	Classification		Mechanical analyses*							Liquid limit	Plasticity index	Moisture density**	
		AASHTO ***	Unified (estimated)	Percentage smaller than--			Percentage smaller than--						Maximum dry density	Optimum moisture
				No. 10	No. 40	No. 200	0.05 mm	0.02 mm	0.005 mm	0.002 mm				
											Pct		Lb/ft^3	Pct
Adamsville fine sand: (S83FL-107-010)														
C2 ---------- 15-34	15	A-3(0)	SP	100	85	3	3	2	1	1	---	NP	---	---
Apopka fine sand: (S83FL-107-008)														
E2 ---------- 16-40	11	A-3(0)	SP-SM	100	89	6	6	5	3	3	---	NP	---	---
Bt1 ---------- 43-68	12	A-2-4(0)	SM	100	92	33	33	31	29	28	---	NP	111.7	14.9
Astatula fine sand: (S83FL-107-016)														
C3 ---------- 26-80	24	A-3(0)	SP-SM	100	98	5	4	2	2	1	---	NP	---	---
Candler fine sand: (S82FL-107-003)														
E1 ---------- 4-28	4	A-3(0)	SP	100	100	3	3	3	2	1	---	NP	---	---
E3 ---------- 45-61	5	A-3(0)	SP	100	100	2	2	2	1	1	---	NP	---	---
Cassia fine sand: (S83FL-107-011)														
E2 ---------- 9-24	16	A-3(0)	SP	100	100	3	4	2	1	0	---	NP	---	---
Bh1 and Bh2 -- 28-38	17	A-3(0)	SP-SM	100	100	9	4	0	0	0	---	NP	---	---
Centenary fine sand: (S82FL-107-004)														
E1 ---------- 8-37	6	A-3(0)	SP-SM	100	100	5	5	4	2	1	---	NP	---	---
Deland fine sand: (S84FL-107-020)														
E2 ---------- 12-46	28	A-3(0)	SP-SM	100	100	6	5	4	3	3	---	NP	---	---
Florahome sand: (S83FL-107-017)														
C1 ---------- 36-58	25	A-3(0)	SP-SM	100	90	6	6	5	3	3	---	NP	---	---

See footnotes at end of table.

TABLE 21.--ENGINEERING INDEX TEST DATA--Continued

Soil name, sample number, horizon, and depth in inches	FDOT report number	Classification		Mechanical analyses*							Liquid limit	Plasticity index	Moisture density**	
		AASHTO ***	Unified (estimated)	Percentage smaller than--			Percentage smaller than--						Maximum dry density	Optimum moisture
				No. 10	No. 40	No. 200	0.05 mm	0.02 mm	0.005 mm	0.002 mm				
											Pct		Lb/ft^3	Pct
Holopaw fine sand: (S82FL-107-006)														
Eg1 ---------- 6-17	9	A-2-4(0)	SP	100	100	14	10	4	2	2	---	NP	---	---
Millhopper fine sand: (S83FL-107-009)														
E2 ---------- 8-40	13	A-3(0)	SP-SM	100	94	9	6	4	2	1	---	NP	---	---
Btg ---------- 70-80	14	A-2-4(0)	SM	100	97	34	30	25	22	21	---	NP	116.5	13.3
Mulat fine sand: (S84FL-107-021)														
Eg2 ---------- 19-33	29	A-3(0)	SP-SM	100	98	9	8	6	3	2	---	NP	---	---
Btg1 --------- 33-38	30	A-2-4(0)	SC	100	99	28	28	26	25	30	30	10	106.5	18.3
Narcoossee fine sand: (S82FL-107-002)														
E ---------- 4-22	2	A-3(0)	SP	100	100	4	3	1	0	0	---	NP	---	---
C2 ---------- 40-80	3	A-3(0)	SP	100	100	3	3	2	1	1	---	NP	---	---
Orsino fine sand: (S84FL-107-018)														
B/E ---------- 24-36	26	A-3(0)	SP-SM	100	99	5	4	3	2	1	---	NP	---	---
Paola fine sand: (S83FL-107-015)														
E ---------- 3-27	22	A-3(0)	SP	100	98	3	3	3	0	0	---	NP	---	---
B/E1 --------- 27-52	23	A-3(0)	SP	100	99	3	3	2	1	1	---	NP	---	---
Pomona fine sand: (S82FL-107-005)														
E2 ---------- 10-20	7	A-2-4(0)	SM	100	100	19	13	5	2	1	---	NP	96.0	16.6
Btg1 --------- 42-55	8	A-2-4(0)	SM	100	100	33	28	20	15	15	---	NP	112.7	13.7
Sparr fine sand: (S83FL-107-013)														
E2 ---------- 17-30	18	A-2-4(0)	SM	100	90	17	13	6	3	2	---	NP	112.2	10.6
Bt ---------- 70-80	19	A-2-4(0)	SM-SC	100	88	24	23	22	22	21	22	4	118.2	12.7

See footnotes at end of table.

TABLE 21.--ENGINEERING INDEX TEST DATA--Continued

Soil name, sample number, horizon, and depth in inches	FDOT report number	Classification		Mechanical analyses*							Liquid limit	Plasticity index	Moisture density**	
		AASHTO ***	Unified (estimated)	Percentage smaller than--			Percentage smaller than--						Maximum dry density	Optimum moisture
				No. 10	No. 40	No. 200	0.05 mm	0.02 mm	0.005 mm	0.002 mm				
											Pct		Lb/ft^3	Pct
Tavares fine sand: (S82FL-107-007) C2 ---------- 27-45	10	A-3(0)	SP	100	100	4	3	2	2	2	---	NP	---	---
Wauchula fine sand: (S84FL-107-022) BE ---------- 22-34	31	A-3(0)	SP-SM	100	97	8	8	6	4	3	---	NP	---	---
Zolfo fine sand: (S82FL-107-001) E3 ---------- 32-53	1	A-3(0)	SP-SM	100	100	6	5	4	1	0	---	NP	---	---

*Mechanical analyses according to AASHTO designation T88-78. Results by this procedure differ somewhat from those obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method and the various grain-sized fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from the calculations of grain-sized fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

**Based on AASHTO designation T99-74. Dashes indicate that the test is not applicable.

***Based on AASHTO designation M145-73.

TABLE 22.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Adamsville	Hyperthermic, uncoated Aquic Quartzipsamments
Apopka	Loamy, siliceous, hyperthermic Grossarenic Paleudults
Arents	Arents
Astatula	Hyperthermic, uncoated Typic Quartzipsamments
Astor	Sandy, siliceous, hyperthermic Cumulic Haplaquolls
Bluff	Fine-loamy, siliceous, hyperthermic Typic Haplaquolls
Bonneau	Loamy, siliceous, thermic Arenic Paleudults
Candler	Hyperthermic, uncoated Typic Quartzipsamments
Cassia	Sandy, siliceous, hyperthermic Typic Haplohumods
Centenary	Sandy, siliceous, thermic Grossarenic Entic Haplohumods
Deland	Sandy, siliceous, hyperthermic Grossarenic Entic Haplohumods
Electra	Sandy, siliceous, hyperthermic Arenic Ultic Haplohumods
Florahome	Sandy, siliceous, hyperthermic Quartzipsammentic Haplumbrepts
Floridana	Loamy, siliceous, hyperthermic Grossarenic Argiaquolls
*Hobe	Sandy, siliceous, hyperthermic Grossarenic Ultic Haplohumods
Holopaw	Loamy, siliceous, hyperthermic Grossarenic Ochraqualfs
Hontoon	Dysic, hyperthermic Typic Medisaprists
Immokalee	Sandy, siliceous, hyperthermic Arenic Haplaquods
Lochloosa	Loamy, siliceous, hyperthermic Aquic Arenic Paleudults
Malabar	Loamy, siliceous, hyperthermic Grossarenic Ochraqualfs
Millhopper	Loamy, siliceous, hyperthermic Grossarenic Paleudults
Monteocha	Sandy, siliceous, hyperthermic Ultic Haplaquods
*Mulat	Loamy, siliceous, thermic Arenic Ochraquults
Myakka	Sandy, siliceous, hyperthermic Aeric Haplaquods
Narcoossee	Sandy, siliceous, hyperthermic Entic Haplohumods
Newnan	Sandy, siliceous, hyperthermic Ultic Haplohumods
Okeechobee	Euic, hyperthermic Hemic Medisaprists
Ona	Sandy, siliceous, hyperthermic Typic Haplaquods
Orsino	Hyperthermic, uncoated Spodic Quartzipsamments
Paisley	Fine, montmorillonitic, hyperthermic Typic Albaqualfs
Palmetto	Loamy, siliceous, hyperthermic Grossarenic Paleaquults
Paola	Hyperthermic, uncoated Spodic Quartzipsamments
Placid	Sandy, siliceous, hyperthermic Typic Humaquepts
Pomona	Sandy, siliceous, hyperthermic Ultic Haplaquods
Pompano	Siliceous, hyperthermic Typic Psammaquents
Riviera	Loamy, siliceous, hyperthermic Arenic Glossaqualfs
Samsula	Sandy or sandy-skeletal, siliceous, dysic, hyperthermic Terric Medisaprists
Shenks	Clayey, montmorillonitic, dysic, hyperthermic Terric Medisaprists
Sparr	Loamy, siliceous, hyperthermic Grossarenic Paleudults
St. Johns	Sandy, siliceous, hyperthermic Typic Haplaquods
Surrency	Loamy, siliceous, thermic Arenic Umbric Paleaquults
Tavares	Hyperthermic, uncoated Typic Quartzipsamments
Terra Ceia	Euic, hyperthermic Typic Medisaprists
Tomoka	Loamy, siliceous, dysic, hyperthermic Terric Medisaprists
Udorthents	Udorthents
Wabasso	Sandy, siliceous, hyperthermic Alfic Haplaquods
Wauchula	Sandy, siliceous, hyperthermic Ultic Haplaquods
Winder	Fine-loamy, siliceous, hyperthermic Typic Glossaqualfs
Zolfo	Sandy, siliceous, hyperthermic Grossarenic Entic Haplohumods

*Indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series.

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