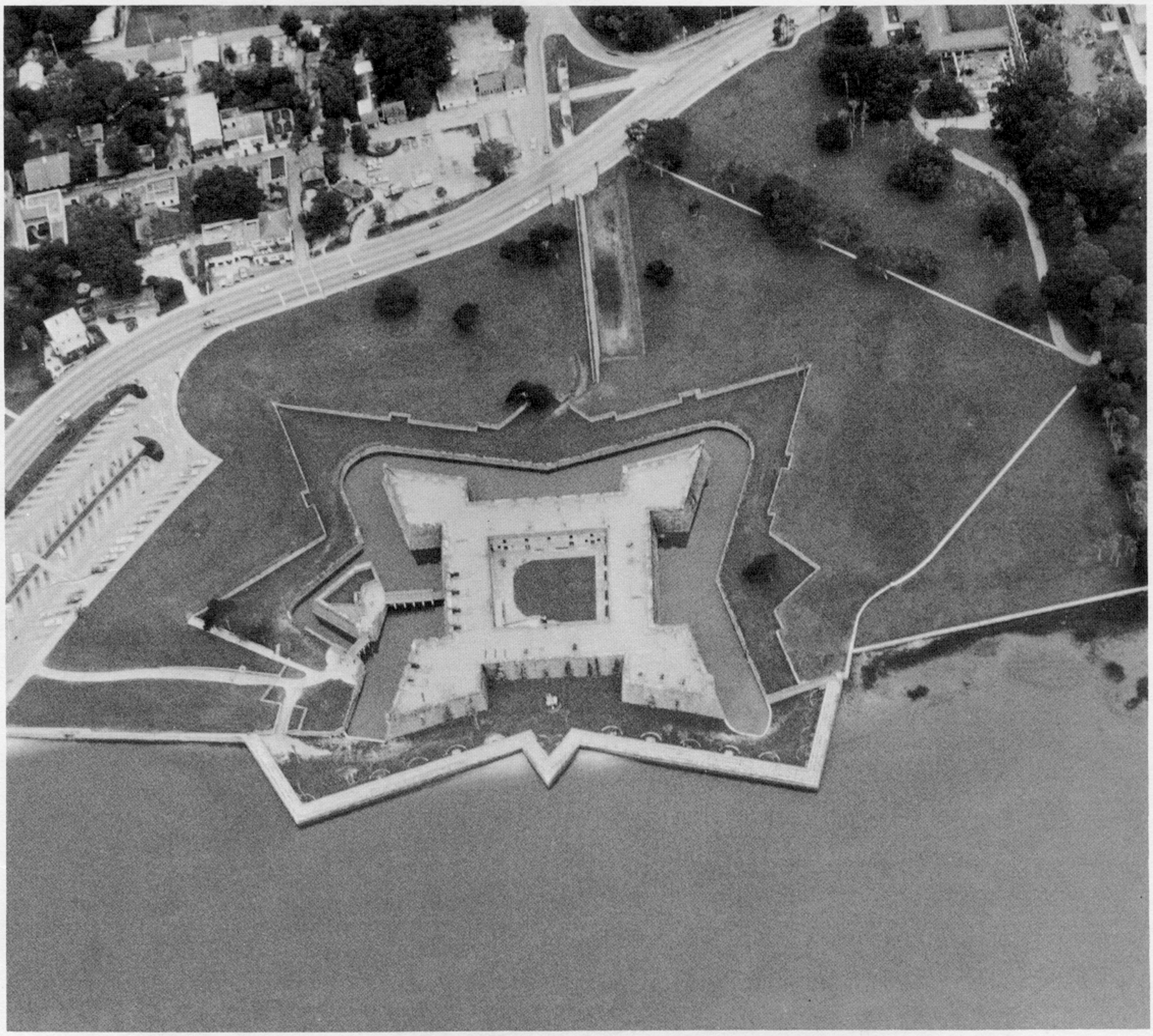
United States
Department of
Agriculture

Soil
Conservation
Service

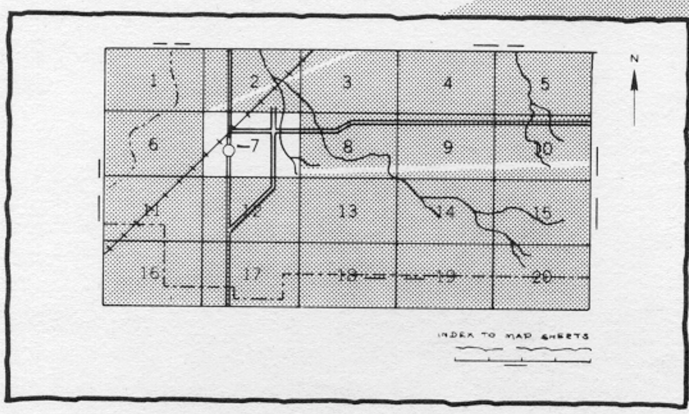
In cooperation with
University of Florida,
Institute of Food and
Agricultural Sciences,
Agricultural Experiment
Stations and Soil Science
Department, and
Florida Department of
Agriculture and
Consumer Services

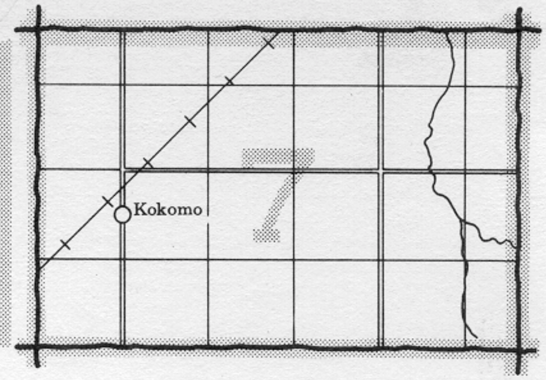
Soil Survey of St. Johns County, Florida



HOW TO USE

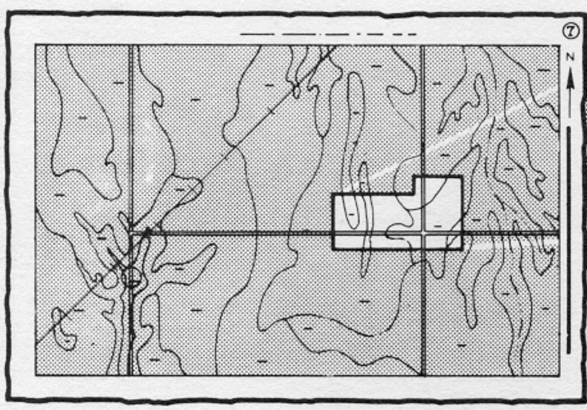
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

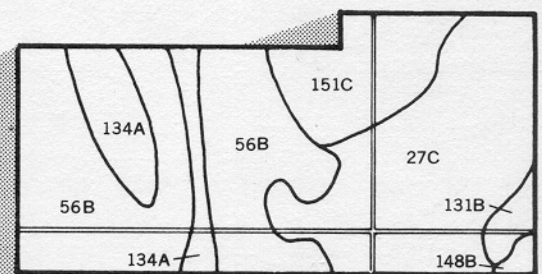




2. Note the number of the map sheet and turn to that sheet.

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





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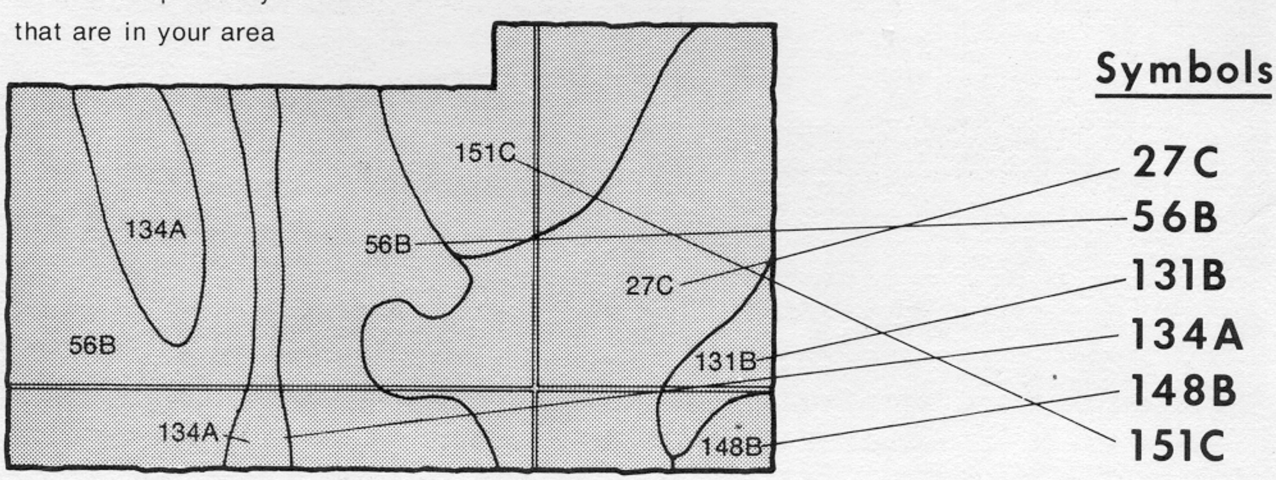
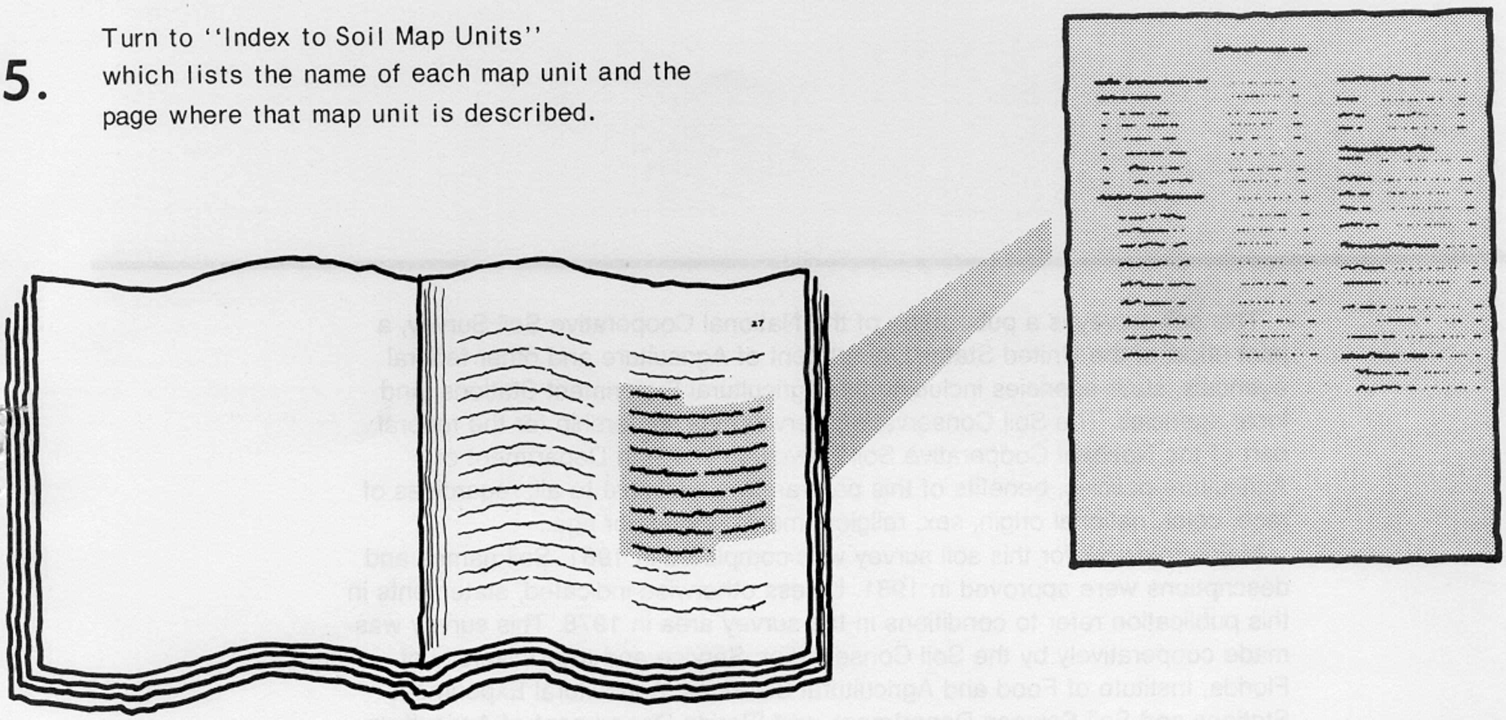
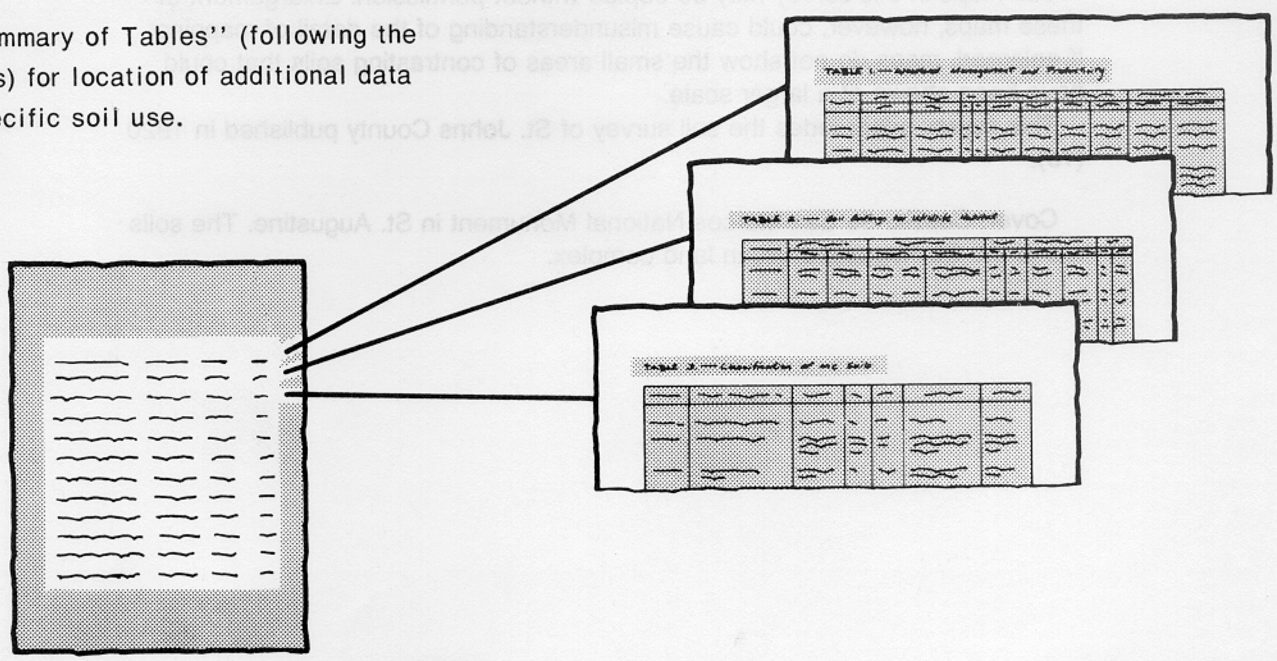


THIS SOIL SURVEY

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



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



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

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in 1981. Soil names and descriptions were approved in 1981. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1978. This survey was made cooperatively by the Soil Conservation Service and the University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations and Soil Science Department, and Florida Department of Agriculture and Consumer Services. It is part of the technical assistance furnished to the St. Johns Soil and Water Conservation District. The St. Johns County Board of Commissioners contributed financially to the acceleration of the 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 St. Johns County published in 1920 (*16*).

Cover: Castillo de San Marcos National Monument in St. Augustine. The soils are in the St. Augustine-Urban land complex.

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Soil Series

Issued October 1983

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Summary of Tables

Foreword

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

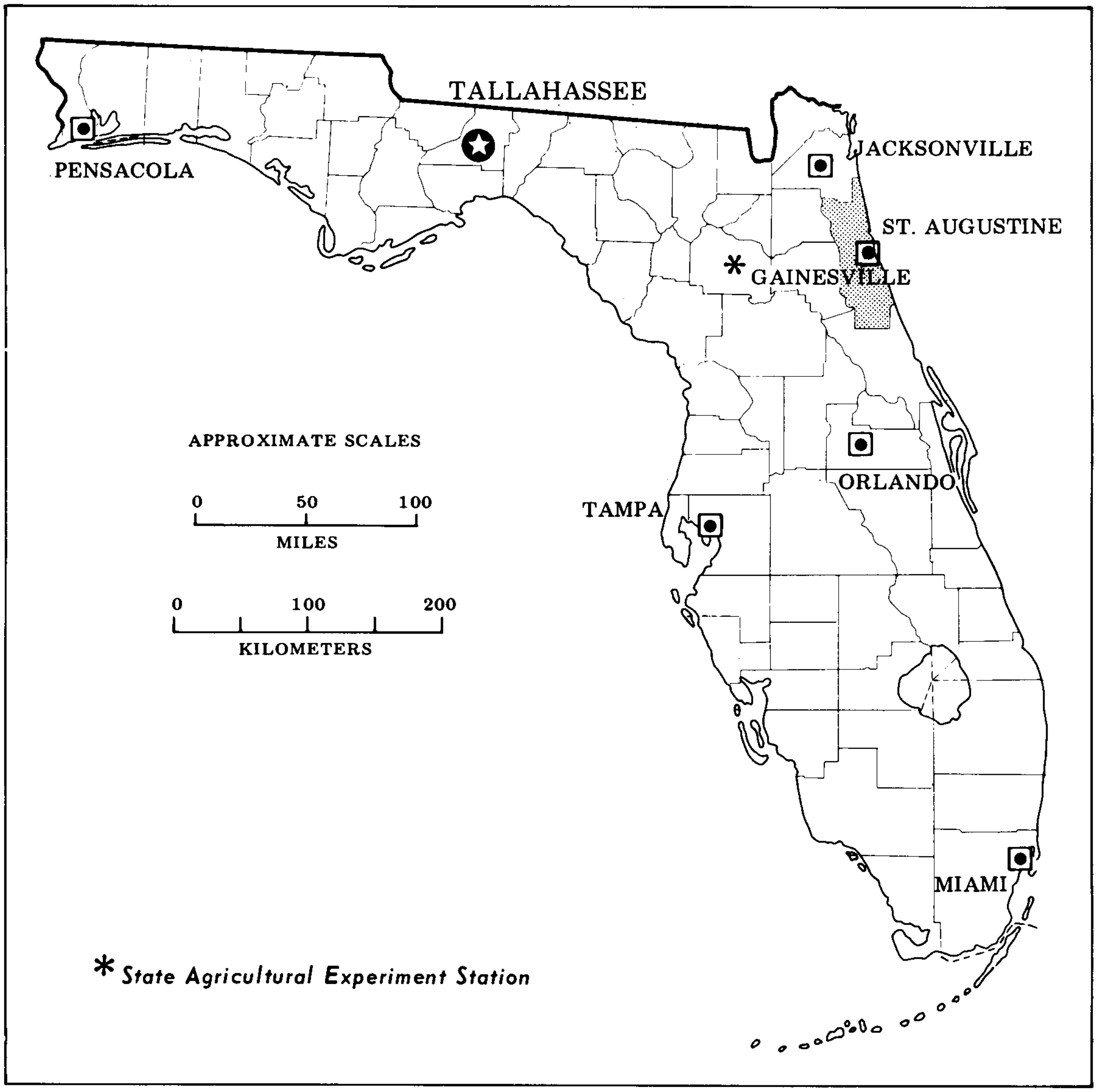
This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use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

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

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

James W. Mitchell

James W. Mitchell
State Conservationist
Soil Conservation Service



Location of St. Johns County in Florida.

Soil Survey of
St. Johns County, Florida

By Elmer L. Readle, Soil Conservation Service

Others participating in the fieldwork were Robert Baldwin, Alfred O. Jones, David A. Howell, and William B. Warmack, 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

ST. JOHNS COUNTY, the oldest county in the state, is on the Atlantic coast in the northeastern part of the Florida Peninsula. The total area of the county is 389,760 acres, or 609 square miles, including approximately 1,610 acres of water.

St. Augustine, the county seat and oldest continuously occupied European settlement in the nation, is in the east-central part of the county on the Atlantic Ocean. The population is primarily centered in and around St. Augustine and in the northeastern and northwestern parts of the county. The total population of the county is about 44,000. St. Augustine, with a population of about 12,000, is the largest city.

Agriculture, forestry, and tourism are the main businesses. Some light manufacturing industries are located in the county, but the county is not highly industrialized. The manufacturing of shrimp boats and other small commercial vessels is an important industry in St. Augustine. Companies that specialize in overhauling and refurbishing small commercial aircraft and military aircraft are growing businesses.

General Nature of the County

The following paragraphs describe the environmental and cultural factors that affect the use and management of soils in St. Johns County—the climate, the history and development, the natural resources, farming, transportation, recreation, and geology, physiography, and drainage.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina, and by the University of Florida, Institute of Food and Agricultural Sciences, Hastings Experiment Station.

St. Johns County has a subtropical maritime climate (*13*). It is characterized by long, warm, humid summers and mild, dry winters. The average temperature in summer is 80 degrees F, and the average temperature in winter is 62 degrees. Both summer and winter temperatures are moderated by nearness to the Atlantic Ocean to the east and the St. Johns River to the west. Temperatures are less extreme at St. Augustine and along the coast than at Hastings and the central part of the county.

Table 1 shows data on temperature and precipitation, as recorded at St. Augustine in the period 1951 to 1972. In winter the average daily minimum temperature is 46 degrees F. The lowest temperature on record, which occurred at St. Augustine on January 21, 1967, is 19 degrees. In summer the average daily maximum temperature is 89 degrees. The highest recorded temperature, which occurred at St. Augustine on August 19, 1972, is 102 degrees.

During summer months the average day-to-day temperature is fairly uniform. Afternoon temperatures reach 90 degrees F or higher with great regularity and at night may fall to the low 70's. Daytime temperatures rarely exceed 95 degrees because of the cooling effects of sea breezes near the coast and of thunderstorms farther inland. Temperatures may dip 10 to 15 degrees during thundershowers.

Temperatures in winter vary considerably from day to day as periodic cold fronts move southward across the state. Temperatures may vary from the 70's during mid-day to an early morning low in the high 30's. Temperatures of 32 degrees F or lower occur on the average of about 10 times per year. Temperatures usually rise above freezing during the day. On the average, the first freeze in fall is December 8, and the last frost in spring is February 20. Freeze data are shown in table 2.

The average annual rainfall is about 55 inches. Approximately 56 percent of the total annual rainfall falls during the rainy season, which lasts from June through the middle of October. The remainder is evenly distributed during the rest of the year; about 2 to 3 inches generally falls each month. Summer rains occur as convective afternoon and early evening thundershowers. These showers, which are local and of short duration, may produce 3 or more inches of rain in an hour or more. During the latter part of September and early in fall, when temperatures moderate, these showers occur earlier in the day and their frequency diminishes. Although thundershowers occur with greatest frequency during summer, they may occur in all seasons. Late in spring the thundershowers may produce intense wind and be accompanied by hailstorms. Depending on the size and duration, these storms may cause extensive damage in vegetable-growing areas. Daylong rains in summer are rare and are usually associated with tropical storms. Precipitation during drier months is usually associated with large scale weather developments and may occur during any part of the day and last longer.

Tropical disturbances, or storms, can affect the area at any time from June to November; the peak periods occur from June through September. These storms produce very high winds and copious rainfall, which may affect weather conditions for several days. Intense rains may cause considerable damage and flood the low-lying areas. The chance of wind reaching hurricane force—74 miles per hour or greater—is about 1 in 40.

The occurrence of snow in St. Johns County is rare. The only measurable snowfall at St. Augustine was 2 inches, which was on February 2, 1951.

Heavy fog is common early in the morning in fall and winter, but it usually dissipates soon after sunrise. Dew is usually heavy in the morning because of the high humidity. The relative humidity in the afternoon ranges from 40 to 50 percent and may rise to 90 or 95 percent by early morning.

Prevailing winds are easterly from the ocean but often are from the southwest or northwest. Windspeed is usually 10 to 12 miles per hour but is slightly higher late in February through March.

History and Development

Dr. Michael C. Scardaville, historian, Historic St. Augustine Preservation Board, helped prepare this section.

In 1565, Don Pedro Menendez de Aviles, one of Spain's most renowned captains, founded St. Augustine, St. Johns County's largest city and county seat. He came to expel the French from the land Ponce de Leon had claimed for Spain 52 years before and to plant a colony in a wilderness that had defeated six previous attempts at settlement (*8*). Menendez defeated the French; afterwards he devoted his resources to the development of a permanent colony. Founded 42 years before Jamestown, Virginia, and 55 years before the Pilgrims landed on Plymouth Rock, St. Augustine is the oldest permanent European settlement in the United States.

Located on the northern frontier of Spain's New-World empire, St. Augustine played an important role in the defense of that realm. Spanish treasure galleons on their way home laden with gold and silver from Mexico and Peru sailed the swift Gulf Stream through the Bahama channel past the east coast of Florida. To safeguard the vital route and to provide a haven for survivors of shipwrecks, the Spanish crown kept a permanent garrison in St. Augustine. The community became primarily a military settlement, and the Franciscan order whose friars came to Florida in the late 16th century as Christian missionaries to the Indians, made St. Augustine their headquarters for a chain of missions (*7*).

In response to pirate attacks and English settlements in South Carolina, Spain began to bolster her defenses in Florida. In 1672, work began on an impressive stone fortress, the Castillo de San Marcos (*3*). The Castillo stood off two major English assaults—one led by Governor James Moore of Carolina in 1702, and the other by James Oglethorpe of Georgia in 1740. In the former attack, however, St. Augustine was reduced to ashes.

St. Augustine was rebuilt, but Spain's hold on Florida grew weaker as English settlements pressed southward. English and Indian attacks shattered the mission system. In response, the Spanish built elaborate defense works around the city, all protected by masses of Spanish bayonet and pricklypear. Blockhouses protected strategic outlying areas.

In 1762, English forces captured Havana, Cuba, the gateway to the Caribbean; and the following year, in order to recover that vital port, Spain ceded Florida to Great Britain. The Spanish vacated St. Augustine and sailed away to new homes in Mexico and Cuba.

Not long after assuming control, the British divided Florida into two administrations (*22*). St. Augustine became the capital of East Florida. Under its new rulers the town retained its principally military character and, despite new construction, much of its Spanish appearance. East Florida remained an underdeveloped colony, even though the British through a generous land grant policy harvested the timber and agricultural resources of the region to a much greater extent than the Spaniards had.

In 1768, Dr. Andrew Turnbull of England transported 1,400 settlers from Greece, Italy, and Minorca to his colony at New Smyrna, (*14*), where they worked raising indigo. The venture collapsed in 1777.

St. Augustine provided sanctuary for thousands of loyalist refugees fleeing from Georgia and the Carolinas during the American Revolution. Great Britain's defeat ended her brief occupation of the Floridas. In 1784, they were returned to Spain.

In 1821, Spain sold East and West Florida to the United States. In a simple military ceremony at the Castillo de San Marcos, Jose Coppinger, the last Spanish governor, turned over command of St. Augustine and East Florida to Colonel Robert Butler, who represented Governor Andrew Jackson.

Florida was divided into two counties, St. Johns and Escambia, roughly approximating the old boundaries of East and West Florida. St. Johns County, with St. Augustine as its administrative center, took in an area of 39,376 square miles. By 1830, St. Johns County had been divided into 17 smaller counties, and in all, 44 of Florida's counties were formed from the original district (*6*).

St. Augustine first attracted the attention of American travelers in the 1820's. Although the city was isolated and difficult to reach, its distinctive old-world ambience and its superb climate drew a number of distinguished visitors, including Ralph Waldo Emerson and Prince Napoleon Achille Murat, nephew of Napoleon (*8*). In 1835, a severe freeze wiped out the luxuriant orange trees, a mainstay of the economy. That same year the Seminole Indians protested the government's plan to move them to reservations in the West. During the Seminole Wars that followed, St. Augustine served as military headquarters, and the Castillo de San Marcos (fig. 1), renamed Fort Marion, was used as a prison for Seminole captives, among them the tragic Osceola (*11*). Four other forts were built within the county during the war.

After the Seminole Wars, many new residents began moving into the territory. In 1845, Florida entered the Union as the 27th state. Tallahassee was the capital; St. Augustine was too remote from most parts of the state to have been an effective seat of government.

During the Civil War, St. Augustine was initially under control of the Confederacy; however, in 1862, a Union squadron sailed up to the inlet and demanded the city's surrender. Judging resistance futile, the small Confederate garrison withdrew, allowing the town to be occupied by Union forces for the duration of the war.

The construction of the Jacksonville, St. Augustine, and Halifax River Railway in 1883 greatly improved access to the city. Numerous hotels sprang up around town to handle the increased traffic. New settlements, such as Switzerland, Orangedale, Picolata, and Tocoi, also appeared along the banks of the St. Johns River as steamboat traffic down the waterway increased. Orange and vegetable production in the interior was greatly expanded to meet the needs of the early tourists.

In 1885, Henry M. Flagler was so impressed by the area's potential as a resort (*10*) that he began constructing fabulous hotels in the area. The opening of these magnificent hotels created a tourist boom, and the cream of American high society flocked to the old city, suddenly known as the "Southern Newport." The boom times brought by Flagler were short lived. As he pushed his Florida East Coast Railroad farther south and built other luxurious hotels in Palm Beach, the tourist trade followed.

In 1890, Thomas Hastings began growing vegetables 18 miles southwest of St. Augustine for the new hotels in the city. This enterprise expanded within a decade to include potatoes, now the major agricultural crop of the county. Hastings, the new town that evolved out of these early farms, was incorporated in 1907. Other settlements were established in the county, including Ponte Vedra, Vilano Beach, Crescent Beach, Spuds, Elkton, Bakersville, Durbin, and St. Augustine Beach. While the population of St. Augustine has remained relatively constant since the 1920's, the county has experienced tremendous growth, particularly east of Interstate Highway 95 near Duval County and around St. Augustine.

St. Augustine has remained a major point of interest for visitors. The central plaza and the street plan remain almost exactly as they were laid out in 1598 (*12*). On those streets, 31 houses built in colonial times still stand. The great Flagler hotels now serve as the County Courthouse, City Hall, and Flagler College.

Natural Resources

Water and soil are important resources in St. Johns County. The Atlantic on the east and the St. Johns River on the west provide excellent fishing and water sports. A large commercial shrimp fishing fleet is ported in St. Augustine. The brackish St. Johns River is one of the few rivers in the northern hemisphere which flow in a northerly direction. It is a major route for boats and barges carrying products to cities and industries on the river.

Other major streams in the county are the Matanzas, North, and Tolomato Rivers. These rivers are close to the Atlantic Ocean and in some places form tidal lagoons. They have been dredged and are maintained as part of the Atlantic Intracoastal Waterway, which extends the entire length of the eastern side of the county.

There are no major freshwater streams or lakes in the interior of St. Johns County. Freshwater for communities, agricultural irrigation, homes, and other uses is obtained

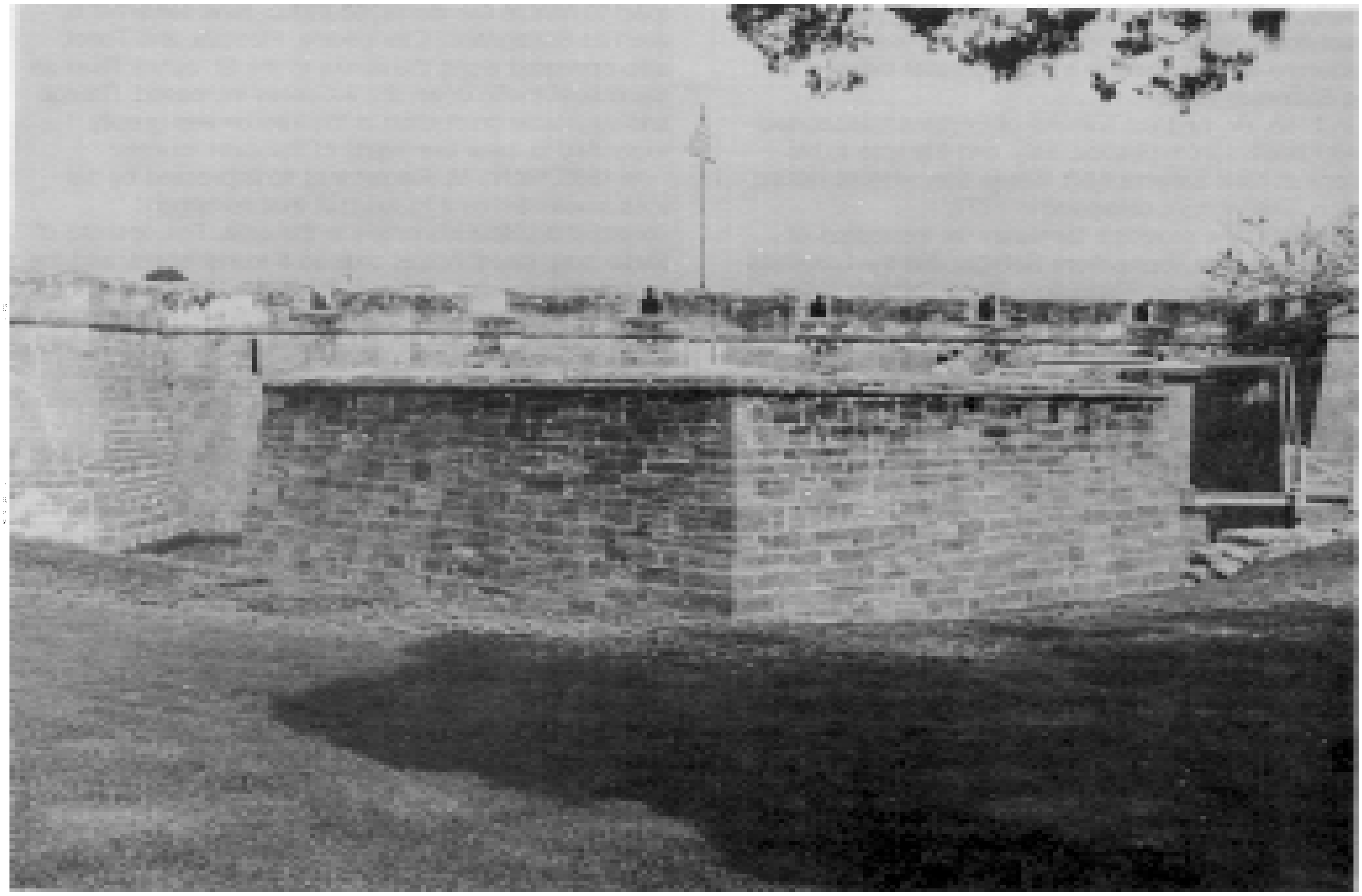


Figure 1.—Castillo de San Marcos is an important historical landmark in St. Johns County.

from shallow ground water or deep aquifer wells. Most of the rainfall, which averages about 55 inches in the county, infiltrates into the soil. There are many large swamps and low areas, where 1 to 3 feet of rainwater stands above the soil surface.

The Floridan aquifer underlying all of St. Johns County (*4*) consists of several limestone or dolomitic limestone formations that hold and transmit large amounts of freshwater. It is the source of water for most of the agricultural irrigation and the community water supply. Saltwater intrusion into the Floridan aquifer has been a problem during times of high water usage.

Farming

Farming is a major enterprise in St. Johns County. According to the 1978 Census of Agriculture Preliminary Report (*20*) for St. Johns County, there are 210 farms in the county. The farmland takes in 60,330 acres, and the average farm size is 287 acres. The size of the farms and productivity have increased over the past years. The value of the crops produced in St. Johns County made up about 87 percent of the total value of the agricultural products produced in 1978.

St. Johns County is the leading county in the state in the production of Irish potatoes and cabbage (*15*), the most important farm crops grown in the county. About 15,000 acres of potatoes and 5,000 acres of cabbage are grown each year. Crops of minor importance include other vegetable crops, cut flowers, and nursery stock.

When the first Spanish settlers arrived in St. Augustine, farming was done at a subsistence level by native Indians. The Spanish introduced cattle into St. Johns County and established a land grant system. Cattle were grazed on many of the land grants. Citrus was also introduced by the Spanish. The site of the first orange grove in the United States is on Fish Island, southeast of St. Augustine. In 1776, a large population of Minorcan descent settled in and near St. Augustine. Many of the Minorcans were farmers, and they introduced several new crops and methods of farming to the area.

In the late 1800's and early 1900's, St. Augustine became a very popular tourist resort. The large number of tourists created a great demand for vegetables, which gave rise to the present centers of local vegetable production in the southwestern and west-central parts of the county (*16*).

About 2,000 acres of corn and grain sorghum are produced each year. These crops normally are planted in early spring to mid-spring, after the potato or cabbage crops are harvested.

There are about 200 acres of commercial citrus groves in St. Johns County, mostly on farms southeast of Hastings.

Transportation

St. Johns County is served by good transportation facilities. Interstate Highway 95 and U.S. Highway 1 traverse the eastern side of the county. Several paved state and county roads serve most other parts of the county.

The Florida East Coast Railroad provides freight transportation for St. Augustine and Hastings. Scheduled bus service is available in St. Augustine. St. Augustine Airport can accommodate planes up to medium-sized business jets. Commercial air passenger service is available at nearby Jacksonville International Airport.

Recreation

Recreation is a major business in St. Johns County. The most important tourist attractions are St. Augustine Antiguo and the many miles of Atlantic Ocean beaches. The National Park Service maintains Castillo de San Marcos in St. Augustine and Fort Matanzas about 10 miles south of St. Augustine.

The Historic St. Augustine Preservation Board, a State of Florida agency, provides research and guidance in the operation and maintenance of San Augustine Antiguo, the restored area of St. Augustine.

Fishing, hunting, boating, and camping are popular. Fishing and boating are enjoyed on the Atlantic Ocean, the Intracoastal Waterway, Guano Lake, and St. Johns River. Large acreages of woodland are reserved for organized hunting clubs, which lease hunting rights from landowners. Guano Wildlife Management Area, which is controlled by the Florida Fresh Water Fish and Game Commission, provides public hunting on a permit basis.

Anastasia State Recreational Area and Faver Dykes State Park provide camping, picnicking, and nature study in rustic settings.

Golfing is a popular sport. There are several large golf courses near St. Augustine and Ponte Vedra (fig. 2).

Geology, Physiography, and Drainage

St. Johns County is in the lower part of the Atlantic Coastal Plain. The county takes in four marine terraces composed of sandy and loamy sediments of Recent or Pleistocene age (*9*). The Pamlico and Talbot Terraces, which range from 10 to 42 feet above sea level, make up most of the county. The Silver Bluff Terrace, which is 0 to 10 feet above sea level, is in narrow strands bordering the Atlantic Ocean and the St. Johns River. The Penholoway Terrace, which ranges from 42 to 70 feet above sea level, occupies only one small area of about 6 square miles. This area is about 12 miles west of Crescent Beach.

The surface sediments of Pleistocene or Recent age range in thickness from about 50 feet in the southwest corner of St. Johns County to more than 140 feet in the northwest corner (fig. 3). In some areas of the county, these sediments are mixed with marine shells. These shells are more common and closer to the surface in the area north and east of Molasses Junction and south of St. Augustine along the Atlantic coast. In the area south of St. Augustine, the small shells make up 60 to 90 percent of the material cemented into a hard mass called Coquina rock. This rock, designated the Anastasia Formation, was quarried by early Spanish soldiers in the 16th century to build Castillo de San Marcos, a well known historical landmark in the city of St. Augustine.

Between the surface materials and the upper part of the porous limestone in the Floridan aquifer lie unconsolidated lenses of sand, sandy clay, clay, and marl. In the upper part, these materials are Upper Miocene or Pliocene deposits. They range from 30 feet to 50 feet in thickness in the southwestern part of St. Johns County and are about 75 feet thick in the northwestern part. The lower part of these materials, called the Hawthorn Formation, contains some phosphatic materials. Thickness ranges from 50 feet to 100 feet in the southwestern part of the county and from 120 to 200 feet in the northwestern part. The sediments and formations above the Floridan aquifer are the source of ground water supplies for most areas of the county where central water systems and deep wells are not available.

The Floridan aquifer is composed of numerous limestone and dolomite formations of Eocene age. These formations are made up of carbonate materials that range from very hard and continuous to very soft and discontinuous. The very soft materials contain many solution cavities, which hold and transmit large quantities of water. Most of the freshwater supplies for agricultural use and large domestic use are obtained from the Floridan aquifer.

St. Johns County can be divided into four general regions based on physiography (*21*). These are: (1) the Atlantic Beach Ridge, (2) the Atlantic Coastal Lagoons, (3) the Atlantic Coastal Ridge, and (4) the Eastern Valley.

The Atlantic Beach Ridge extends along the eastern edge of St. Johns County. It is a barrier chain separated from the rest of the county by the Atlantic Coastal

Figure 2.—Golf courses provide one of the many forms of recreation in the county. The soil is Immokalee fine sand.

Lagoons. The Atlantic Beach Ridge is made up of the beach and a series of dunes, the present shoreline ridge. This physiographic region is in the area making up the Silver Bluff Terrace. The geologic material consists of quartz sand mixed with varying amounts of shell fragments. This material has been deposited by wind, which blows from the beach and forms dunes that have complex slopes. A series of dunes has been established, the dunes becoming progressively older with increasing distance from the shore. The vegetation changes from primarily palmetto and scrub live oak to laurel oak, live oak, magnolia, and a few longleaf pine farther from the beach. Much of this area has been used for residential and commercial developments.

The Atlantic Coastal Lagoons consist of the Matanzas River, San Sebastian River, North River, Tolomato River, and Guano Lake. This region consists of open water and flat grassy marshes that are subject to daily flooding by normal high tides. Most of the soils are mineral soils that are high in clay and silt content. Some are organic. The vegetation is mostly halophytic grasses and some mangrove trees.

The Atlantic Coastal Ridge is a narrow ridge lying mostly west of and parallel to the Atlantic Coastal Lagoons. It is most pronounced in the Moultrie and St. Augustine South areas and southeast of Palm Valley.

The elevations in the Atlantic Coastal Ridge region are mostly between 25 and 35 feet above sea level. The soils are mostly moderately well drained to excessively drained, gently sloping sandy soils. Some soils on the lower elevations are poorly drained or somewhat poorly drained, nearly level sandy soils that have a sandy subsoil with accumulations of organic matter. The natural vegetation on the soils at higher elevations includes sand pine, live oak, turkey oak, and scattered longleaf pine. The natural vegetation on the soils at lower elevations is dominantly slash pine, longleaf pine, and sawpalmetto. Some of this area has been used for community development. The city of St. Augustine and the communities south and southwest of St. Augustine are located in this physiographic region.

The Eastern Valley occupies the largest area of St. Johns County. It lies mostly west of the Atlantic Coastal Ridge and extends westward to the St. Johns River. Mostly flatwoods and swamps are in this region. The Pamlico and Talbot Terraces make up most of this region. The soils are poorly drained or very poorly drained sandy and loamy soils. Most of the soils have a

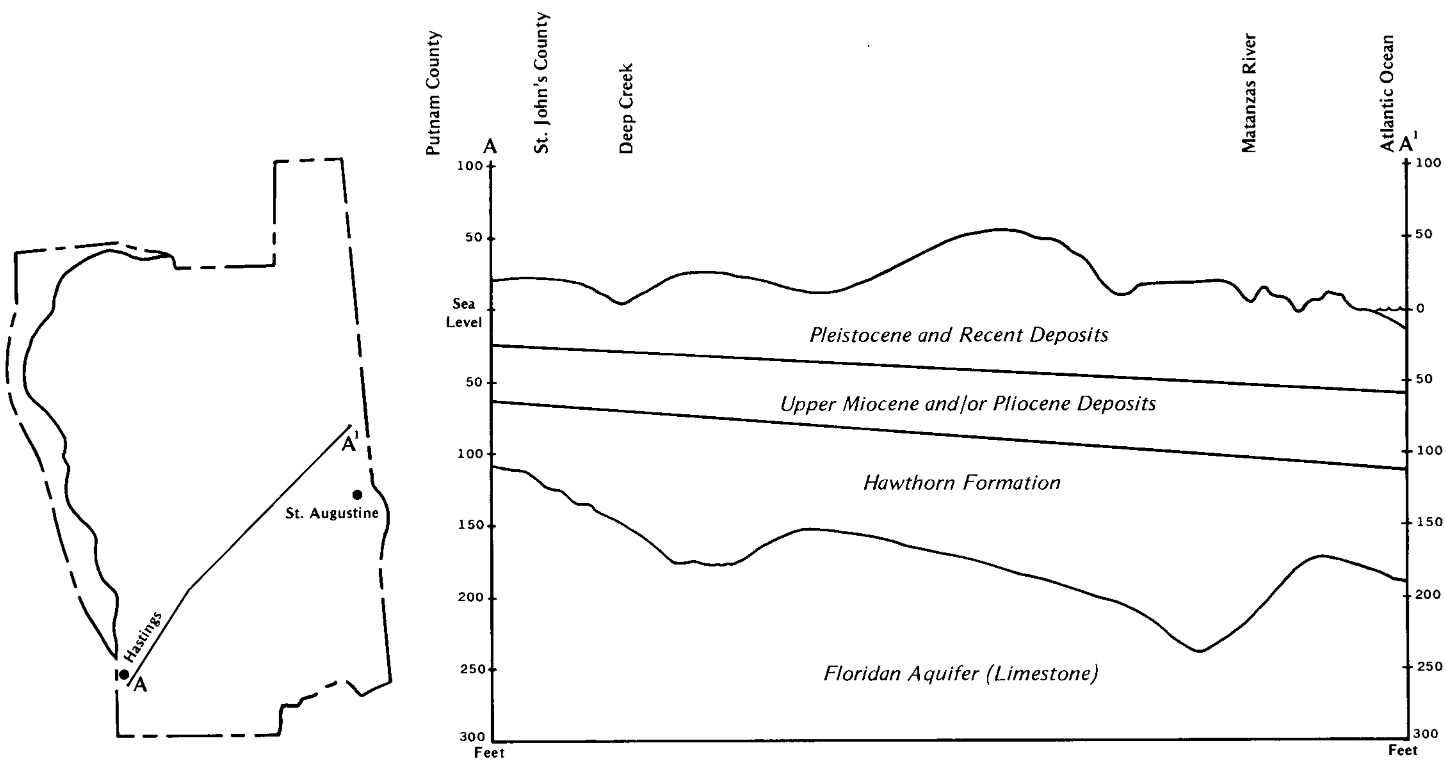


Figure 3.—Cross section of St. Johns County.

loamy subsoil or a sandy subsoil that contains organic accumulations. The natural vegetation includes slash pine, longleaf pine, and sawpalmetto in the flatwoods and hardwoods and cypress in the swamps. This region is used mostly for growing pine trees. Large areas in the southwestern and west-central parts of the county are used for winter vegetables, mostly cabbage and Irish potatoes.

Except for a few streams which flow into the St. Johns River or into the Atlantic Coastal Lagoons, drainage patterns are indistinct. The flatwoods are interspersed with many poorly defined drainageways and depressional areas, which are flooded or ponded for long periods of time.

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 in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic 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 generally are collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

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

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

Map Unit Composition

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

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 building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

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

For the soils in each map unit, table 3 shows the potential and limitations for cropland and pasture, for woodland use, and for urban uses. It also shows the degree and kind of limitations for recreation uses. Cropland is soil on which cultivated crops, such as Irish potatoes and cabbage, are grown extensively. Pasture consists of areas where pasture is grown extensively. Woodland refers to areas of native or introduced trees. Building sites include residential and commercial developments. Recreation areas are campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic.

The soils in the eleven general soil map units make up 94.6 percent of the survey area. Bodies of water larger than 3 acres make up the remaining 5.4 percent of the area.

Soil Descriptions

Soils of the sand ridges and coastal dunes

This group consists of excessively drained, moderately well drained, and somewhat poorly drained, nearly level to moderately steep soils on ridges and slopes adjacent to well defined drainageways and coastal areas. These soils are sandy throughout. They generally are along the Atlantic coast and in the western part of the county along the St. Johns River and its tributaries.

Four map units are in this group.

1. Fripp-Satellite-Paola

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

This unit consists of soils on narrow, rolling sandy ridges interspersed with narrow swales. These ridges and swales are elongated, and their long axis generally is oriented from the north to the south. They are parallel to the Atlantic coast and extend inland for about 1 mile. The ridges form the primary dunes adjacent to the ocean beach and relict beach dunes farther inland. The height of the ridges ranges from 30 to 50 feet, and the slope length is mostly 50 to 75 feet. Slopes are complex and range from 5 to 15 percent. The slope of the swales ranges from 2 to 5 percent.

This map unit makes up about 1.8 percent of the survey area. It is about 25 percent Fripp soils, 20 percent Satellite soils, and 19 percent Paola soils. The rest is minor soils.

Fripp soils are excessively drained sandy soils on the narrow ridges. These soils make up the primary dunes along the Atlantic coast, and in some places, up to 1 mile from the beach, they make up relict beach dunes. They have a gray fine sand surface layer. Below this is pale brown and white fine sand that extends to a depth of 80 inches or more.

Satellite soils are somewhat poorly drained soils in the swales between ridges. The surface layer is very dark gray fine sand. Below this is white fine sand that extends to a depth of 80 inches or more.

Paola soils are excessively drained soils on the ridges farther inland behind the primary dunes. The surface layer is gray fine sand. The subsurface layer is white fine sand. At a depth of 20 to 30 inches is strong brown fine sand. Below this is yellow fine sand that extends to a depth of 80 inches or more.

Of minor extent in this map unit are the excessively drained Astatula soils on the ridges; the somewhat poorly drained Narcoossee soils in the swales and nearly level, broad areas; the excessively drained Palm Beach soils on higher, broader ridges; and Beaches.

About 20 percent of this map unit is used for community development. Many beach homes along the Atlantic Ocean have been built on these soils. Uncleared areas remain in natural vegetation of southern magnolia, live oak, laurel oak, yaupon, cabbage palm, and sea-oats. A few longleaf pines grow in the swales.

These soils are not normally used for crops, pasture, or pine trees because of poor soil quality. Several large recreation areas, parks, and campgrounds are in this unit.

2. Astatula-Tavares

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

This map unit consists of soils on narrow, low ridges and knolls. It is located mostly along the Atlantic coast behind the primary dunes and on slopes adjacent to streams and well defined drainageways. The ridges along the Atlantic coast generally parallel the coast line and are 1/2 mile to 3 miles inland from the ocean. The largest area of this map unit includes the Moultrie area and St. Augustine South. Slopes range from 0 to 8 percent.

This map unit makes up about 3.2 percent of the county. It is about 40 percent Astatula soils and 20 percent Tavares soils. The rest is minor soils.

Astatula soils are excessively drained soils on the highest part of the landscape. They have a surface layer of light brownish gray fine sand. The underlying layers are light yellowish brown to yellow fine sand to a depth of 80 inches or more.

The Tavares soils are moderately well drained soils on the lower positions in the landscape. The surface layer is gray fine sand. The underlying material is pale brown, white, and very pale brown fine sand to a depth of 80 inches or more.

Of minor extent in this map unit are the somewhat poorly drained Adamsville and Cassia soils on lower positions on the landscape, the moderately well drained Pomello soils on slightly lower positions, and the excessively drained Paola soils on higher positions.

About 45 percent of the acreage of this map unit has been used for community development. Many residential subdivisions south and southwest of St. Augustine have been established on this unit. Another large area, north of St. Augustine and west of Guano Lake, has had little development and remains in natural vegetation of sand pine (fig. 4), live oak, laurel oak, and turkey oak.

3. Tavares-Zolfo-Sparr

Nearly level to gently sloping, moderately well drained and somewhat poorly drained sandy soils; some sandy to a depth of 40 inches or more and loamy below

In this unit are nearly level soils on low ridges and low knolls on slightly higher positions than the adjacent flatwoods and narrow areas of gently sloping soils that are adjacent to well defined drainageways. This map unit occurs mostly in the western part of St. Johns County along the St. Johns River and its tributaries. Slopes range from 0 to 5 percent.

This map unit makes up about 5.7 percent of the county. It is about 30 percent Tavares soils, 30 percent Zolfo soils, and 15 percent Sparr soils. The rest is minor soils.

The Tavares soils are moderately well drained and on low ridges and knolls in the flatwoods and on slopes along drainageways and streams. They have a surface layer of gray fine sand. The underlying material is pale brown, white, and very pale brown fine sand to a depth of 80 inches or more.

The Zolfo soils are somewhat poorly drained and are on low knolls that are slightly higher in position than the adjacent flatwoods. The surface layer is grayish brown fine sand. The subsurface layer, to a depth of 61 inches, is pale brown to light gray fine sand. The subsoil is dark brown and black fine sand to a depth of 80 inches or more.

The somewhat poorly drained Sparr soils are on low ridges and knolls in the flatwoods and in narrow areas adjacent to streams and well defined drainageways. The surface layer is gray fine sand. The subsurface layer, to a depth of 65 inches, is very pale brown to white fine sand. The subsoil is brown fine sandy loam to a depth of 80 inches or more.

Of minor extent in this map unit are the excessively drained Astatula soils on low ridges and knolls and the poorly drained Myakka, Ona, Tocoi, and St. Johns soils on the lower positions.

Some areas of this map unit have been used for community development, and a few areas are used for slash pine plantations. Other areas remain in natural vegetation of turkey oak, laurel oak, longleaf pine, slash pine, and some sand pine.

4. Cassia-Tavares

Nearly level to gently sloping, somewhat poorly drained soils and moderately well drained soils that are sandy throughout; some have a dark subsoil stained by organic matter

This map unit consists of soils on low ridges and knolls. It is mostly in the northeastern part of the county near the Duval County boundary and the Atlantic Ocean.

Figure 4.—Sand pines are commonly grown on the Astatula-Tavares map unit.

This map unit makes up about 1 percent of the survey area. It is about 55 percent Cassia soils, 20 percent Tavares soils, and 25 percent minor soils.

Cassia soils are somewhat poorly drained soils on low ridges. The surface layer is gray fine sand. The subsurface layer is light gray fine sand. The subsoil is very dark gray and dark brown fine sand coated with organic accumulations. The underlying layers, which extend to a depth of 80 inches or more, are yellowish brown and very dark gray fine sand.

Tavares soils are moderately well drained soils on slightly higher positions on the landscape. The surface layer is gray fine sand. The underlying material is pale brown, white, and very pale brown fine sand to a depth of 80 inches or more.

Of minor extent in this map unit are the excessively drained Paola soils, the moderately well drained Pomello and Orsino soils, and the poorly drained Myakka soils. The Pomello and Orsino soils are on similar positions on the landscape, and the Myakka soils are on lower positions.

The natural vegetation consists of scrub live oak, sawpalmetto, and scattered areas of longleaf and slash pines. About 50 percent of the acreage of this map unit has been used for community development, primarily single family dwellings, condominiums, and golf courses.

Soils of the flatwoods

In this group are dominantly poorly drained and very poorly drained, nearly level soils on broad, flat marine terraces. Most of the soils in this group have a loamy subsoil or a sandy subsoil that is stained by dark organic accumulations. The soils in this group are among swamps, marshes, depressions, and drainageways.

Four map units are in this group.

5. Myakka-Immokalee-St. Johns

Nearly level, poorly drained and very poorly drained sandy soils that have a dark subsoil stained by organic matter

This map unit consists of soils in broad flatwoods and narrow to broad depressional areas. It covers large parts of the county. The largest area is along U.S. Highway 1.

This unit makes up about 28.9 percent of the county. It is about 33 percent Myakka soils, 16 percent Immokalee soils, and about 12 percent St. Johns soils. The rest is minor soils.

Myakka soils are poorly drained. Typically, they have a black and dark gray fine sand surface layer about 8 inches thick. The subsurface layer is gray and light gray fine sand. The subsoil, at a depth of 23 inches, is black and very dark brown fine sand well coated with organic matter. The underlying layer to a depth of 80 inches or more is dark brown fine sand.

Immokalee soils are poorly drained. Typically, they have a surface layer of very dark gray fine sand about 8 inches thick. The subsurface layer is light gray and white fine sand. The subsoil, at a depth of 40 inches, is very dark gray fine sand coated with organic matter. The underlying layer to a depth of 80 inches or more is brown fine sand.

St. Johns soils are poorly drained and very poorly drained. The very poorly drained soils are in depressional areas. The surface layer is black and very dark gray fine sand about 10 inches thick. The subsurface layer, to a depth of 15 inches, is gray fine sand. The subsoil is black loamy fine sand in the upper 4 inches and black fine sand in the lower 9 inches. It is well coated with organic matter. Below that, to a depth of 80 inches or more, is gray, black, and dark gray fine sand.

Of minor extent in this map unit are the Cassia, Ona, Pomello, Pomona, Tomoka, Smyrna, and Wesconnett soils.

The natural vegetation consists of longleaf pine, slash pine, sawpalmetto, inkberry, bluestem, panicum, and pineland threeawn (wiregrass). The natural vegetation in the depressions is dominantly cypress, bay, sweetgum, red maple, cinnamon fern, and maidencane. Large areas of the Myakka and Immokalee soils and the St. Johns soils that are not in depressions have been planted to slash pine.

6. Holopaw-Riviera-Pompano

Nearly level, poorly drained soils; some sandy to a depth of more than 40 inches and loamy below; some sandy to a depth of 20 to 40 inches and loamy below; others sandy throughout

This map unit consists of soils in low, broad flat areas interspersed with many wet depressions and drainageways. This unit is in the central part of the county. The largest area is northeast of Molasses Junction.

This map unit makes up about 7.1 percent of the county. It is about 40 percent Holopaw soils, 30 percent Riviera soils, 10 percent Pompano soils, and 20 percent minor soils.

Holopaw soils have a surface layer that is mixed very dark gray and grayish brown fine sand in the upper 7 inches and dark gray fine sand in the lower 6 inches. The subsurface layer, to a depth of 53 inches, is light gray to gray fine sand. The subsoil, from 53 to 72 inches, is dark gray fine sandy loam. The underlying material to a depth of 80 inches or more is greenish gray loamy fine sand.

Riviera soils have a surface layer of black and dark grayish brown fine sand about 6 inches thick. The subsurface layer, which extends to a depth of 28 inches, is grayish brown fine sand. The subsoil, to a depth of 50 inches, is dark grayish brown sandy clay. In the upper 12 inches, the subsoil has pockets and tongues of fine sand. Below the subsoil, to a depth of 80 inches or more, is grayish brown fine sandy loam.

Pompano soils have a surface layer of dark grayish brown fine sand about 4 inches thick. The underlying material to a depth of 80 inches or more is white and gray fine sand.

Of minor extent in this map unit are the poorly drained EauGallie, Myakka, Pomona, and Winder soils and the very poorly drained Floridana soils.

The natural vegetation consists of slash pine, longleaf pine, waxmyrtle, and cabbage palm and a few scattered areas of sweetgum, blackgum, and maple with smilax, pineland threeawn, lopsided indiangrass, and bluestem. Large areas of this map unit have been planted to slash pine.

7. Pomona-Tocoi-Ona

Nearly level, poorly drained soils that have a dark subsoil stained by organic matter; some sandy to a depth of more than 40 inches and loamy below; some sandy throughout

This map unit consists of soils in the narrow to broad flatwoods adjacent to drainageways and low areas. This unit is mostly in the western and northwestern parts of the county.

This unit makes up about 16 percent of the county. It is about 40 percent Pomona soils, 30 percent Tocoi soils, 7 percent Ona soils, and 23 percent minor soils.

Pomona soils have a surface layer of black and very dark gray fine sand about 6 inches thick. The subsurface layers are gray and light gray fine sand. The upper part of the subsoil, between depths of 21 and 35 inches, is black and dark brown fine sand coated with organic matter. Below that, to a depth of 47 inches, is pale brown and light gray fine sand. The lower part of the subsoil, to a depth of 63 inches, is light brownish gray sandy clay loam and light gray fine sandy loam. The underlying material to a depth of 80 inches or more is light brownish gray fine sand.

Tocoi soils have a surface layer of black fine sand about 13 inches thick. The upper part of the subsoil, which extends to a depth of 40 inches, is dark brown fine sand coated with organic matter. Below that, to a depth of 45 inches, is light brownish gray fine sand. The lower part of the subsoil, to a depth of 76 inches, is light brownish gray loamy fine sand. The underlying layer to a depth of 80 inches or more is gray loamy fine sand.

Ona soils have a surface layer of very dark gray fine sand about 8 inches thick. The subsoil, to a depth of 16 inches, is black and dark brown fine sand. Between depths of 16 and 34 inches, the material is dark brown and brown fine sand that contains black fragments of subsoil material in the upper part. Below that, to a depth of 80 inches or more, is light gray and grayish brown fine sand.

Of minor extent in this map unit are the Bakersville and Wesconnett soils in depressions and the Immokalee, Myakka, and Smyrna soils on similar positions in the landscape.

The natural vegetation includes slash pine, longleaf pine, waxmyrtle, inkberry, sawpalmetto, bluestems, panicums, and pineland threeawn (wiregrass). Large areas have been planted to commercial woodland of slash pines.

8. Floridana-Placid-Ellzey

Nearly level, very poorly drained and poorly drained soils; some sandy to a depth of 20 to 40 inches and loamy below; others sandy throughout

This map unit consists of soils in low, broad flat areas. This unit is mostly in the vegetable farming area of the west-central part of the county. It extends from about the Mill Creek community southward to the area south of Hastings.

This unit makes up about 9 percent of the county. It is about 28 percent Floridana soils, 22 percent Placid soils, 22 percent Ellzey soils, and 28 percent minor soils.

Floridana soils are very poorly drained. Typically, the surface layer is black fine sand about 11 inches thick. The subsurface layers, to a depth of 30 inches, are light brownish gray and gray fine sand. The subsoil, to a depth of 46 inches, is gray sandy clay loam. Below that, to a depth of 80 inches or more, is gray fine sandy loam.

Placid soils are very poorly drained. Typically, the surface layer is black fine sand about 12 inches thick. Between depths of 12 and 51 inches are layers of dark gray, grayish brown, light gray, and dark grayish brown loamy fine sand. Below that material is dark grayish brown loamy fine sand about 7 inches thick. Next is grayish brown fine sand, which extends to a depth of 80 inches or more.

Ellzey soils are poorly drained. Typically, the surface layer is black fine sand about 12 inches thick. The subsurface layer, about 15 inches thick, is light gray fine sand. The subsoil is brownish yellow fine sand in the upper part and yellowish brown, brown, and light brownish gray loamy fine sand in the lower part. Next is gray fine sand, which extends to a depth of 80 inches or more.

Of minor extent in this map unit are the Bakersville, Holopaw, Pompano, and Riviera soils. All these soils but Bakersville soils are on similar positions in the landscape. Bakersville soils are in depressional areas.

The natural vegetation includes slash pine, longleaf pine, a few sweetgum, water oak, waxmyrtle, wild grape, smilax, and some cypress.

Most areas of this unit have been cleared and have water control established for truck farming. Much of the cabbage and Irish potatoes produced in this county is grown on the soils of this unit.

Soils of the inland and coastal wetlands

This group consists of poorly drained and very poorly drained, nearly level soils. The coastal wetlands are in tidal marshes near the Atlantic coast. The inland wetlands are on flood plains and in poorly defined drainageways and swamps scattered throughout the county.

Three map units are in this group.

9. Riviera-Holopaw-Winder

Nearly level, poorly drained soils; some sandy to a depth of 20 to 40 inches and loamy below; some sandy to a depth of more than 40 inches and loamy below; and others sandy to a depth of less than 20 inches and loamy below

This map unit is made up of soils in nearly level, freshwater hardwood and cypress swamps throughout the county.

This map unit makes up about 11.6 percent of the county. It is about 45 percent Riviera soils, 16 percent Holopaw soils, 6 percent Winder soils, and 33 percent minor soils.

Riviera soils are poorly drained. Typically, the surface layer is gray fine sand about 10 inches thick. The subsurface layer, which extends to a depth of 40 inches, is light gray and gray fine sand. The subsoil is gray fine sandy loam. Below that, to a depth of 80 inches or more, is light gray fine sandy loam and fine sand mixed with shells.

Holopaw soils are poorly drained. Typically, the surface layer is black fine sand about 6 inches thick. The subsurface layer, to a depth of 50 inches, is grayish brown and gray fine sand. The subsoil is gray fine sandy loam. Below that, to a depth of 80 inches or more, is gray loamy fine sand.

The Winder soils are poorly drained. Typically, they have a surface layer of dark grayish brown fine sand about 3 inches thick. The subsurface layer, about 11 inches thick, is light gray fine sand. The loamy subsoil extends to a depth of 42 inches. Below that, to a depth of 80 inches or more, is dark gray and olive gray sandy loam.

Of minor extent in this map unit are Bluff, EauGallie, Parkwood, Pompano, and Wabasso soils. Bluff and Parkwood soils are on similar positions in the landscape; the other soils are on slightly higher positions.

The natural vegetation includes sweetgum, red maple, loblolly-bay, waxmyrtle, and a few cypress. In most areas, these soils remain in natural vegetation. In a few areas, where water control has been established, slash pine has been planted.

10. Terra Ceia-Wesconnett-Tomoka

Nearly level, very poorly drained soils; some organic and others sandy throughout, and some organic and underlain by loamy material

This map unit is made up of nearly level soils in freshwater swamps under hardwood and cypress. It is located primarily along the St. Johns River and its tributaries. A few small areas are located throughout the county.

This map unit makes up about 6 percent of the county. It is about 40 percent Terra Ceia soils, 15 percent Wesconnett soils, 15 percent Tomoka soils, and 30 percent minor soils.

Terra Ceia soils are dark reddish brown and very dark gray muck, which extends to a depth of 80 inches or more.

Wesconnett soils have a surface layer of black fine sand about 8 inches thick. The subsoil, which extends to a depth of 34 inches, is black, dark reddish brown, and very dark gray fine sand. Below that, to a depth of 80 inches or more, is a dark grayish brown and black fine sand.

Tomoka soils are dark reddish brown and black muck to a depth of 21 inches. Below that, to a depth of 80 inches or more, is dark gray and dark grayish brown fine sandy loam.

Of minor extent in this map unit are Floridana, Holopaw, Hontoon, Myakka, St. Johns, Samsula, and Riviera soils. All the minor soils are on similar positions in the landscape.

The natural vegetation includes sweetgum, blackfern, red maple, cypress, bay, and waxmyrtle.

Most of the acreage of this map unit remains in natural vegetation.

11. Pellicer-Tisonia

Nearly level, very poorly drained soils subject to frequent tidal flooding; some loamy throughout; some organic and underlain by clayey material

This map unit is made up of soils in saltwater marshes. It is on the eastern side of the county along the Atlantic Ocean. It ranges from 1 to 3 miles in width.

This map unit makes up about 4.3 percent of the county. It is about 80 percent Pellicer soils, 6 percent Tisonia soils, and 14 percent minor soils.

Pellicer soils have a surface layer of very dark brown silty clay loam about 10 inches thick. Below that, to a depth of 80 inches or more, is dark greenish gray clay loam and sandy clay loam.

Tisonia soils have a surface layer of very dark gray mucky peat about 18 inches thick. Below that, to a depth of 65 inches or more, is dark gray clay.

Of minor extent in this map unit are Durbin, Moultrie, Riviera, and St. Augustine soils. All these soils, except the St. Augustine soils, are on similar positions in the landscape. St. Augustine soils are on higher positions in the landscape.

The natural vegetation is mostly seashore saltgrass, bushy sea-oxeye, glasswort, and needlegrass rush.

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.

The potential of a soil is the ability of that soil to produce, yield, or support the given structure or activity at a cost expressed in economic, social, or environmental units of value. The criteria used for rating soil potential include the relative difficulty or cost of overcoming soil limitations, the continuing limitations after practices in general use in overcoming the limitations are installed, and the suitability of the soil relative to other soils in St. Johns County.

A five-class system of soil potential is used. The classes are defined as follows:

Very high potential. Soil limitations are minor or are relatively easy to overcome. Performance for the intended use is excellent. Soils having very high potential are the best in the survey area for the particular use.

High potential. Some soil limitations exist, but practices necessary to overcome the limitations can be installed at reasonable cost. Performance for the intended use is good.

Medium potential. Soil limitations exist and can be overcome with recommended practices; limitations, however, are mostly of a continuing nature and require practices that are more difficult or costly than average. Performance for the intended use ranges from fair to good.

Low potential. Serious soil limitations exist, and they are difficult to overcome. Practices necessary to overcome the limitations are relatively costly compared to those required for soils of higher potential. Necessary practices can involve environmental values and considerations. Performance for the intended use is poor or unreliable.

Very low potential. Very serious soil limitations exist, and they are most difficult to overcome. Initial cost of practices and maintenance cost are very high compared to those of soils with high potential. Environmental values are usually depreciated. Performance for the intended use is inadequate or below acceptable standards.

The soils are rated for pine trees in terms of their potential productivity for growing pines. The ratings are *high, moderately high, moderate, low, and very low.*

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

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

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

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

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

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

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

1—Adamsville fine sand. This is a somewhat poorly drained, nearly level soil on broad flat areas and low knolls. Areas range from 16 to 70 acres. Slope is smooth to convex and ranges from 0 to 2 percent.

Typically, the surface layer is gray fine sand about 8 inches thick. The underlying layers are fine sand, which extends to a depth of 80 inches or more. The soil material is pale brown with light gray mottles to a depth of 30 inches and below that is light gray and white.

Included with this soil in mapping are small areas of Immokalee, Tavares, and Zolfo soils. The included areas do not exceed 15 percent of any mapped area.

In most years the seasonal high water table is at a depth of 20 to 40 inches for 2 to 6 months. It is at a depth of 10 to 20 inches for up to 2 weeks in some years. Available water capacity is low in the surface layer and upper underlying layers and medium below. Permeability is very rapid in the surface layer and is rapid in the underlying material. Natural fertility and organic matter content are low.

The natural vegetation includes sawpalmetto, longleaf and slash pines, laurel and water oaks, greenbrier, lopsided indiangrass, and pineland threeawn.

This soil has severe limitations for cultivated crops. The root zone is limited by a water table that is 10 to 40 inches below the surface much of the time. This soil is droughty during times of low rainfall. Natural fertility is low, but response to fertilizer is good. Internal drainage is slow under natural conditions, but response to water control systems is rapid. Potential for a number of vegetable crops is medium. A water control system designed to remove excess water during wet seasons and provide irrigation during dry seasons is needed. Other good management practices include use of crop rotations and cover crops. All crop residue should be returned to the soil, and fertilizer and lime should be applied as needed by the crop.

This Adamsville soil has medium potential for improved pasture. A simple water control system is needed to remove excess surface water during rainy seasons. Deep-rooted drought-resistant grasses, such as bahiagrass, are the best varieties to grow. Controlled grazing and the use of fertilizer and lime are required to reach full potential of the soil.

This soil has moderately high potential for pine trees. Slash pine is the best variety to grow. The main management concerns are limitations to the use of equipment, seedling mortality, and plant competition. Timely scheduling of harvesting, site preparation, and planting operations is needed to overcome these limitations.

Potential for community development is high. Some water control systems are needed for the construction of dwellings without basements, small commercial buildings, and local roads and streets. Water outlets are generally available for area drainage. Potential for use as sites for septic tank absorption fields is high. If this soil is used as a site for absorption fields, about 2 1/2 feet of suitable fill material is needed to raise the field above the high water table.

This soil is in capability subclass IIIw and woodland ordination group 3w.

2—Astatula fine sand, 0 to 8 percent slopes. This is an excessively drained, nearly level to sloping soil on knolls and narrow to broad ridges. Areas of this soil range from 30 to 800 acres. Slopes are complex.

Typically, the surface layer is light brownish gray fine sand 5 inches thick. Below that, to a depth of 80 inches or more, is light yellowish brown to yellow fine sand.

Included in mapping are small areas of Orsino, Paola, and Tavares soils. Also included are small areas of similar soils that have a dark accumulation of organic matter below a depth of 60 inches. In the area located south of St. Augustine and bordered on the east by the Matanzas River and on the west by U.S. Highway 1 is an area of other soils that are similar to this Astatula soil but range from neutral to moderately alkaline. The included soils are less than 15 percent of any mapped area.

Permeability is very rapid throughout. Available water capacity is low. Natural fertility and organic matter content are very low. The seasonal high water table is at a depth of more than 72 inches under natural conditions.

The natural vegetation consists of live oak, bay, magnolia, cabbage palm, sawpalmetto, hickory, sand pine, and American holly. Native grasses include paspalum and pineland threeawn.

This soil is not suited to cultivated crops and is only poorly suited to improved pasture grasses. Droughtiness and low fertility restrict this soil for those uses. The potential for cultivated crops is very low, and the potential for improved pasture grasses is low. The maximum potential can be achieved by adding lime and fertilizer to the soil and by irrigating.

Under high-level management, the potential is low for slash and longleaf pines, and it is high for sand pine. Limitations to the use of equipment and seedling mortality are the main management concerns. Sand pines are better suited to planting than other trees.

The potential for community development is very high. This soil has no limitations or only slight limitations for dwellings, small commercial buildings, and local roads and streets. Areas that are used for lawns and landscaping require frequent watering and fertilization because of droughtiness. Potential for septic tank absorption fields is very high. There is a slight chance of ground water contamination because of the very rapid permeability of this soil.

This Astatula soil is in capability subclass VIs and woodland ordination group 5s.

3—Myakka fine sand. This is a nearly level, poorly drained soil that occurs in the flatwoods and formed in marine deposits of sandy material. Areas of Myakka soils are irregular in shape and range in size from 40 to 260 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is black and dark gray fine sand about 8 inches thick. The subsurface layer is gray and light gray fine sand about 15 inches thick. The subsoil is about 30 inches thick. It is black fine sand in the upper 7 inches, and it is very dark brown fine sand in the lower 23 inches. The underlying layer to a depth of 80 inches or more is dark brown fine sand with black pockets of fine sand.

Included in mapping are small areas of Immokalee, Ona, and Smyrna soils. Also included are small areas of a moderately well drained to poorly drained soil with shell fragments 1/8 inch to 1/4 inch in diameter at a depth of 60 to 80 inches. Also included are small areas of similar soils in which the subsoil extends to a depth of 80 inches or more. The included soils make up less than 15 percent of any area mapped.

The seasonal high water table is at a depth of less than 10 inches for 1 to 4 months in most years. It is at a depth of more than 40 inches during dry seasons. Available water capacity is very low in the surface and subsurface layers, moderate in the subsoil, and very low in the underlying material. Permeability is rapid in the surface and subsurface layers, moderate or moderately rapid in the subsoil, and rapid in the underlying material. The organic matter content and natural fertility are low.

The native vegetation is longleaf pine, slash pine, sawpalmetto, running oak, inkberry, and waxmyrtle. Native grasses include pineland threeawn, bottlebrush threeawn, chalky bluestem, creeping bluestem, lopsided indiangrass, and low panicum.

Because of wetness, this soil is very severely limited for growing cultivated crops. The root zone is limited by a water table that is within 10 inches of the surface during the rainy season. During dry seasons this soil is droughty. The response to fertilizer is moderate. With intensive management and soil-improving measures, this soil has medium potential for a number of vegetable crops. A water control system is needed to remove excess water in wet seasons. Irrigation is required during dry seasons. Close-growing, soil-improving cover crops should be planted after crops are harvested. All crop residue should be returned to the soil. Bedding of the rows is needed in seedbed preparation. Fertilizer and lime should be added according to the needs of the crop.

Potential for growing improved pasture is high. Bahiagrass and bermudagrass grow well when well managed. After heavy rains, surface ditches are needed to quickly remove excess water. Regular use of fertilizer and lime and controlled grazing are required for best yields.

Potential for pine trees is moderate. Limitations to the use of equipment during wet seasons and seedling mortality are the main management concerns. Use of surface ditches for removing excess water and site preparation that includes bedding of the rows are good management practices to follow.

Potential for community development is medium. Wetness that is the result of a seasonal high water table rising to within 10 inches of the surface is the main limitation. Dwellings without basements and local roads and streets require special construction measures to remove excess surface water quickly. If adequate water control is not possible, roadbeds and building sites should be raised by the use of fill material to increase the depth to the water table. The potential for use as sites for septic tank absorption fields is medium. If the soil is used as a site for absorption fields, about 4 feet of suitable fill material is needed to raise the field above the high water table.

This soil is in capability subclass IVw and woodland ordination group 4w.

4—Myakka fine sand, depressional. This is a nearly level, very poorly drained sandy soil that is in shallow depressions in the flatwoods. Areas of this soil are covered with standing water for a period of 6 to 9 months or more in most years. The areas range from 5 to 50 acres. Slopes are less than 1 percent and are concave.

Typically, the surface layer is dark gray fine sand about 4 inches thick. The subsurface layer is fine sand about 17 inches thick. It is light brownish gray in the upper 10 inches, and it is grayish brown in the lower 7 inches. The subsoil is black and dark reddish brown fine sand about 14 inches thick. The underlying layer is dark brown fine sand about 12 inches thick. Below that, to a depth of 80 inches or more, is very pale brown fine sand.

Included in mapping are small areas of Ona, Smyrna, and St. Johns soils. Also included are small areas of similar soils, some of which are in poorly defined drainageways and are subject to flooding, and others which have a thicker subsoil that extends to a depth of more than 80 inches. The included soils make up less than 10 percent of any area mapped.

This soil is covered with 4 inches to 2 feet of standing water for 6 to 9 months during most years. Available water capacity is very low in the surface and subsurface layers, moderate in the subsoil, and very low in the underlying material. Permeability is rapid in the surface and subsurface layers, moderate or moderately rapid in the subsoil, and rapid in the underlying material. Organic matter content and natural fertility are low.

The natural vegetation is pond pine, tupelogum, sawpalmetto, waxmyrtle, broomsedge bluestem, pineland threeawn (wiregrass), and panicums.

Under natural conditions, this soil is not suited to cultivated crops. The potential for vegetable crops is very low because water stands on the surface for long periods. Establishing adequate drainage systems is difficult because suitable outlets generally are not available.

This Myakka soil has low potential for growing improved pasture grasses. Water standing above the surface for 6 to 9 months a year is a limitation that must be overcome. Because suitable outlets generally are not available, adequate drainage systems are difficult to establish.

The potential for growing longleaf and slash pines is low because water stands on the surface for extended durations. Sufficient drainage is difficult because of inadequate outlets. Limitations to the use of equipment and seedling mortality are limitations that must be overcome. This soil generally is not in commercial use because of the cost of drainage.

Potential for community development is low. Water stands on the surface of the soil for long periods during the wet season. Suitable outlets for removal of the standing water and for lowering the high water table generally are not available. This soil could be used for community development by designing an adequate water control system; however, construction and maintenance of the system would be expensive and difficult. Roadbeds for local roads and streets, foundations for houses, and septic tank absorption fields would require the use of large amounts of fill material to elevate them above the seasonal high water table.

This Myakka soil is in capability subclass VIIw. It is not assigned a woodland ordination symbol.

5—St. Johns fine sand, depressional. This is a very poorly drained, nearly level soil in depressions in the flatwoods (fig. 5). Areas of this soil are irregular in shape and range from 3 to 40 acres. Slopes are less than 1 percent.

Typically, the surface layer is black fine sand about 13 inches thick. The subsurface layer is fine sand, which is about 12 inches thick. It is dark gray in the upper 3 inches and gray in the lower 9 inches. The subsoil begins at a depth of 25 inches. It is compact fine sand that has high organic matter content. It is black in the upper 10 inches and dark reddish brown in the lower 15 inches. Below that, to a depth of 80 inches or more, is grayish brown fine sand.

Included in mapping are small areas of Myakka and Wesconnett soils. Also included is a similar soil in which the surface and subsurface layers combined are more than 30 inches thick. Also included are similar soils, some of which have 2 to 10 inches of muck on the surface, and some that are on flood plains and are frequently flooded. The included soils make up about 15 percent of any area mapped.

This soil is covered with standing water for periods of 6 to 12 months in most years. Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. Available water capacity is moderate in the surface layer and subsoil and low in the subsurface layer. Natural fertility is low, and organic matter content is moderate.

The natural vegetation consists of sweetgum, red maple, pond cypress, hickory, cabbage palm, waxmyrtle, willow, and a few pond and longleaf pines. The understory vegetation is brackenfern, cinnamon fern, chalky bluestem, and St. Johnswort.

St. Johns fine sand, depressional, has severe limitations for cultivated crops in its natural state. The soil is very wet, and water stands above the surface for long periods. Because the soil is in depressions where water outlets are not available, establishing water control systems generally is difficult and expensive. Potential for cultivated crops is low.

Potential for improved pasture is low because of excessive wetness. Because the soil is on a low position in the landscape, removal of excess surface water is difficult. Water stands on the surface for long periods, severely limiting plant growth.

Potential for growing pine trees is low. Excessive soil wetness is the main limitation. Equipment mobility, seedling mortality, plant competition, and windthrow hazard are management concerns. Water control is needed to remove excess surface water before trees can be planted. This soil is rarely used for commercial tree production because of the cost of drainage.

Potential for community development is very low. Water standing above the surface restricts the use of this soil for residential or commercial development. Adequate outlets for water removal are not available or are difficult to install. With adequate water control, these areas could be developed, but maintenance of water control installations would be expensive. Sites for buildings, septic tank absorption fields, and roadbeds require a large amount of suitable fill material because of the high water table.

This St. Johns, depressional, soil is in capability subclass VIIw. It is not assigned a woodland ordination symbol.

6—Tavares fine sand, 0 to 5 percent slopes. This is a moderately well drained, nearly level to gently sloping soil on narrow to broad low ridges and knolls. Slopes are convex. Areas of this soil range from 10 to 195 acres.

Typically, this soil has a gray fine sand surface layer about 5 inches thick. It is underlain by about 4 inches of

Figure 5.—An area of St. Johns fine sand, depressional, which is covered with water for 6 to 12 months in most years.

pale brown fine sand. Below that, to a depth of 80 inches or more, is very pale brown and white fine sand.

Included in mapping are small areas of Adamsville, Astatula, and Orsino soils. Also included are small areas of soils that are similar to this Tavares soil, except some are dark brown or black and others are better drained to a depth of more than 60 inches. The included soils make up less than 20 percent of any area mapped.

The seasonal high water table is between depths of 40 and 80 inches for 6 to 8 months during most years, but it recedes to a depth greater than 80 inches during periods of lower rainfall. Permeability is very rapid throughout. Available water capacity is very low or low. Natural fertility is low.

The natural vegetation includes slash and longleaf pines, live oak, sand live oak, laurel oak, turkey oak, and scattered sawpalmetto. Native grasses include pineland threeawn, grassleaf goldaster, and low panicum.

This soil is severely limited for cultivated crops because of droughtiness and low natural fertility. Potential is low for vegetable crops. Planting soil-improving cover crops, fertilization, liming, and irrigation are needed to achieve maximum potential.

This soil has medium potential for improved pasture under high-level management. Fertilizers leach rapidly from this soil. Drought-resistant varieties, such as bahiagrass and bermudagrass, produce moderate yields if well managed. Controlled grazing is needed for best yields.

Potential for pine trees is moderately high. Limitations to the use of equipment and seedling mortality are important management concerns. Good site preparation and timely planting are necessary.

Potential for community development is very high. Limitations are only slight for single family dwellings and local roads and streets. Where the slope exceeds 4 percent, use of this soil for small commercial buildings is moderately limited. Potential for septic tank absorption fields is also very high, and no fill material is needed to raise filter fields above the high water table.

This Tavares soil is in capability subclass IIIs and woodland ordination group 3s.

7—Immokalee fine sand. This is a poorly drained, nearly level soil on broad flats and low knolls in the flatwoods. Areas of this soil range from 5 to 400 acres. The areas generally are broad and elongated and have slopes ranging from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 8 inches thick. The subsurface layer, which is about 32 inches thick, is light gray and white sand. The subsoil, from 40 to 64 inches, is very dark gray fine sand that is coated with organic matter. Below that, to a depth of more than 80 inches, is brown fine sand.

Included in mapping are small areas of Myakka, Ona, Pottsburg, Smyrna, and Wesconnett soils. Also included are small areas of similar soils, some of which have a subsoil that extends to a depth of 80 inches or more, and others which have sand texture throughout. The included soils make up less than 15 percent of any area mapped.

The seasonal high water table is at a depth of less than 10 inches for about 2 months of the year. It is at a depth of 10 to 40 inches for more than 8 months of the year, and it recedes to a depth of more than 40 inches during extended dry periods. Available water capacity is low in the surface layer, very low in the subsurface layer, and moderate in the subsoil. Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. Organic matter content and natural fertility are low.

In most areas, the natural vegetation includes slash pine, longleaf pine, sawpalmetto, fetterbush, inkberry, and a few scrub oak and running oak, blackberry, and sumac. Native grasses are mostly chalky bluestem, creeping bluestem, and pineland threeawn.

This soil is severely limited for cultivated crops because of wetness. The root zone is limited by a high water table during the wet season. The soil is droughty during the dry season. Natural fertility is low, and response to fertilizer is moderate. Potential for vegetable crops is medium if a water control system can be installed to remove excess water and supply additional moisture through subsurface irrigation. Close-growing cover crops should be planted after cash crops are harvested. All crop residue should be used to protect the soil from erosion. Good seedbed preparation includes bedding of the rows. Fertilizer and lime should be added.

Potential for growing improved pasture is medium. Use of surface ditches, which quickly remove excess water after heavy rains, is needed. Fertilization and liming and other good management practices that include controlled grazing are needed to maintain healthy plants.

This soil has a moderate potential for slash pine under high-level management. A high water table during periods of higher rainfall limits this soil for this use. Equipment mobility during wet seasons, seedling mortality, and plant competition are management concerns. Use of surface ditches, which remove excess water, is a good management practice. Timely scheduling of site preparation, planting, and harvesting is required. Site preparation should include bedding of the rows.

Potential for community development is medium if measures are taken to lower the seasonal high water table, which is at a depth of less than 10 inches about 2 months of the year. Special measures are needed for removing excess surface water and increasing the depth to the seasonal high water table for dwellings without basements, small commercial buildings, and local roads and streets. Adequate outlets for the disposal of excess water generally are not available. Building sites and roadbeds may need to be raised by the use of fill material. Potential for use as a site for septic tank absorption fields is medium. Suitable fill material is needed to raise the absorption field above the high water table.

This Immokalee soil is in capability subclass IVw and woodland ordination group 4w.

8—Zolfo fine sand. This is a somewhat poorly drained, nearly level soil on broad landscapes that are slightly higher than the adjacent flatwoods. This soil is sandy throughout. Areas of this soil are moderately broad and elongated and range from 10 to 85 acres. Slope ranges from 0 to 2 percent and is convex.

Typically, the surface layer is grayish brown fine sand about 5 inches thick. The subsurface layer is pale brown to light gray fine sand, which extends to a depth of about 66 inches. The subsoil to a depth of 80 inches is fine sand. It is dark brown in the upper 3 inches and black in the lower part. The sand grains in this layer are coated with organic matter.

Included in mapping are small areas of the poorly drained Immokalee and Ona soils and somewhat poorly drained Adamsville soils. The included soils make up about 10 percent of any area mapped.

This Zolfo soil has a seasonal high water table at a depth of 24 to 40 inches for 2 to 9 months in most years under natural conditions. Permeability is very rapid or rapid in the surface and subsurface layers and moderate in the subsoil. Available water capacity is low in the surface and subsurface layers and very high in the subsoil. Natural fertility and organic matter content are low or very low.

The natural vegetation includes inkberry, slash and longleaf pines, water oak, blackjack oak, scrub oak, and sawpalmetto. Native grasses include greenbrier, chalky bluestem, dwarf huckleberry, and pineland threeawn.

This soil is severely limited for cultivated crops because of periodic wetness. The root zone is limited by a water table that is 24 to 40 inches below the surface much of the time. Available water capacity is low in the root zone. Natural fertility is low, but response to fertilizers is good. Internal drainage is slow under natural conditions, but response to water control systems is rapid. Potential for cabbage, potatoes, and other vegetable crops is medium. A water control system that removes excess water during wet seasons and provides subsurface irrigation during dry seasons is needed. Other good management practices include bedding rows and growing cover crops when the soil is not in use. All crop residue should be returned to the soil. Fertilizer and lime should be added at regular intervals, according to the needs of the crop.

Potential for improved pasture is medium. Surface ditches are needed to remove excess water during times of high rainfall. Improved pasture grasses such as bahiagrass and bermudagrass grow well. Regular applications of fertilizer and lime are required. Grazing should be controlled to maintain plant vigor.

Potential for pine trees is moderately high. Limitations to the use of equipment, seedling mortality, and plant competition are management concerns. Good site preparation and timely scheduling of planting and harvesting operations are required. Rows should be bedded. Slash pines are the best trees to plant.

Potential for community development is high. Some water control is required for the construction of dwellings without basements, small commercial buildings, and local roads and streets. In most areas, water outlets are available for area drainage. Potential for use as sites for septic tank absorption fields is high. If the soil is used as a site for absorption fields, about 2 1/2 feet of suitable fill material is needed to raise the field above the high water table.

This soil is in capability subclass IIIw and woodland ordination group 3w.

9—Pomona fine sand. This poorly drained, nearly level soil is in broad areas in the flatwoods. Areas of this soil are irregularly shaped and range from 25 to 300 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is black to very dark gray fine sand about 6 inches thick. The subsurface layer, which is about 15 inches thick, is gray and light gray fine sand. The subsoil to a depth of 31 inches is black and dark brown fine sand coated with organic matter. Below this depth is pale brown to gray fine sand, which extends to a depth of 47 inches. Between 47 and 56 inches, the subsoil is light brownish gray loamy material. From 56 to 63 inches, it is light gray fine sandy loam. Below that, to a depth of 80 inches or more, is light brownish gray fine sand.

Included in mapping are small areas of Bakersville, EauGallie, Myakka, St. Johns, and Wesconnett soils. Also included are small areas of soils that are similar to this Pomona soil. Some of these similar soils have a subsoil more than 30 inches thick; some are weakly cemented in the upper part of the subsoil; some are loamy in the lower part of the subsoil; and some are yellowish brown in the lower part of the subsoil. Some soils have a lighter colored surface layer than this soil and are better drained. The included areas make up less than 20 percent of any area mapped.

The water table in this Pomona soil is within a depth of 10 inches for 1 to 3 months and is at a depth of 10 to 40 inches for 6 months or more. During extended dry periods, the water table recedes to a depth of more than 40 inches. Permeability is rapid in the surface and subsurface layers and moderate in the upper part of the subsoil. Available water capacity is very low or low in the surface and subsurface layers, and it is moderate in the upper part of the subsoil. Organic matter content and natural fertility are low.

The natural vegetation includes longleaf pine, slash pine, gallberry, and sawpalmetto. The grasses include chalky bluestem, bushy bluestem, creeping bluestem, lopsided indiangrass, and pineland threeawn.

This soil has severe limitations for cultivated crops. The root zone is limited by a water table that is less than 10 inches below the surface in wet seasons. Natural fertility is low, but response to fertilizer is good. Potential for a number of vegetable crops is medium. To reach full potential, a water control system that removes excess water in rainy seasons and provides subsurface irrigation in dry seasons is required. After cash crops are harvested, close-growing, soil-improving crops should be grown. All crop residue should be returned to the soil. Fertilizer and lime should be added according to the needs of the crop.

Potential for improved pasture is medium. Bahiagrass, bermudagrass, and clovers grow well if well managed. Use of surface ditches is needed to remove excess water during wet seasons. Controlled grazing and regular use of fertilizer and lime are needed for highest yields.

Potential for pine trees is moderately high. The main management concerns are limitations to the use of equipment and seedling mortality. Use of surface ditches to remove excess water is needed. Trees should be planted on bedded rows.

Potential for community development is medium. The main limitation for this use is soil wetness caused by a high water table that is within 10 inches of the surface for long periods. Water control systems are necessary but are normally difficult to install because adequate water outlets are not available. Local roads and streets require special measures, such as the construction of deep side ditches, to remove excess water. Elevating the roadbed to increase the effective depth to the seasonal high water table may be needed. Single family dwellings and small commercial buildings require measures for removing excess surface water. Fill material is needed for elevating building sites in order to increase the effective depth to the high water table. If this soil is used as a site for septic tank absorption fields, about 4 feet of fill material is needed to raise the field above the high water table.

This Pomona soil is in capability subclass IVw and woodland ordination group 3w.

11—Smyrna fine sand. This is a poorly drained, nearly level soil on broad areas in the flatwoods. Areas are irregular in shape and range from 5 to 100 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is black fine sand about 7 inches thick. The subsurface layer is gray fine sand to a depth of 14 inches. The subsoil is loamy fine sand about 7 inches thick. The upper 4 inches is black, and the lower 3 inches is dark brown. Below that is brown sand, about 11 inches thick, that has very dark brown subsoil fragments; dark brown and brown fine sand about 30 inches thick; and grayish brown fine sand that extends to a depth of 80 inches or more.

Included in mapping are small areas of Immokalee, Myakka, and St. Johns soils. Also included are small areas of similar soils, but they have shell fragments at a depth of 60 to 80 inches. Included areas make up less than 15 percent of any area mapped.

The seasonal high water table is at a depth of less than 10 inches for 1 to 4 months, and it recedes to a depth of 10 to 40 inches for more than 6 months in most years. During the rainy seasons, the water table rises above the surface briefly. Permeability is rapid in the surface and subsurface layers and moderate or moderately rapid in the subsoil. Available water capacity is very low to moderate in the surface and subsurface layers and moderate to very high in the subsoil. Natural fertility is low. Organic matter content is moderate or moderately low.

The natural vegetation includes longleaf and slash pines, sawpalmetto, inkberry, waxmyrtle, running oak, pineland threeawn, dwarf huckleberry, and panicum.

This Smyrna soil has medium potential for cultivated crops. Wetness, low natural fertility, and susceptibility to drought are severe limitations to this use. The root zone is limited by a seasonal high water table that is within 10 inches of the surface during wet seasons. Response to fertilizers is moderate. With adequate water control measures that remove excess water and intensive management that includes regular fertilization and irrigation, good yields of potatoes and cabbage crops can be obtained. Soil-improving cover crops should be planted after crops are harvested. All crop residue should be returned to the soil.

This soil has high potential for improved pasture grasses, such as bermudagrass and bahiagrass. Water control measures are needed to remove excess surface water after heavy rains, and regular additions of fertilizer are needed. Controlled grazing is needed to maintain best yields.

This soil has moderately high potential for pines. Slash pines are the most productive. Limitations to the use of equipment during wet seasons and high seedling mortality are the primary management concerns. For the removal of excess surface water, water control systems are needed. Bedding of the rows and good site preparation help establish seedlings and keep plant competition at a minimum.

Potential for community development is medium. A seasonal high water table that is at or near the surface during rainy seasons is a severe limitation for urban uses. Removal of excess surface water and lowering the water table are sometimes difficult because adequate water outlets generally are not available. Local roads and streets and dwellings without basements require adequate water control, which lowers the high water table to a depth of at least 2.5 feet. If adequate water control is not possible, roadbeds and building sites should be elevated by the use of fill material to increase the effective depth to the water table. Potential for use as a site for septic tank absorption fields is medium. If this soil is used as a site for absorption fields, about 4 feet of suitable fill material is needed to raise the field above the high water table.

This Smyrna soil is in capability subclass IVw and woodland ordination group 3w.

12—Ona fine sand. This is a nearly level, poorly drained sandy soil in flatwood areas. Areas of Ona fine sand are irregular in shape and range from 5 to 125 acres. Slope ranges from 0 to 2 percent.

Typically, the surface layer, about 8 inches thick, is very dark gray fine sand. The subsoil between depths of 8 and 16 inches is black to dark brown fine sand. Between depths of 16 and 34 inches, the subsoil is dark brown and brown fine sand. The substratum to a depth of 80 inches or more is light gray and grayish brown fine sand.

Included in mapping are small areas of Adamsville, Smyrna, St. Johns, and Tocoi soils. Also included are small areas of soils, some of which have a layer of sandy loam below a depth of 40 inches, and others which have a thicker subsoil. The included areas in any one map unit do not exceed 15 percent.

The seasonal high water table is at a depth of 10 to 40 inches for periods of 4 to 6 months during most years. It rises to a depth of less than 10 inches for periods of 1 to 4 months and may recede to a depth of more than 40 inches during very dry seasons. Available water capacity is moderate in the surface layer and subsoil, and it is very low or low in the underlying material. Permeability is rapid in the surface layer and moderate in the subsoil. Natural fertility and organic matter content are moderate.

The natural vegetation consists of slash and longleaf pines, sawpalmetto, huckleberry, gallberry, chalky bluestem, and pineland threeawn.

This Ona soil has severe limitations for growing cultivated crops. The root zone is limited by a water table that is less than 10 inches below the surface in wet seasons. Natural fertility is low, but response to fertilizer is good. Potential for a number of vegetable crops is high. To reach full potential, a water control system that removes excess water in rainy seasons and provides subsurface irrigation in dry seasons is required. Close-growing, soil-improving crops should be grown after cash crops are harvested. All crop residue should be returned to the soil. Fertilizer and lime should be added according to the needs of the crop.

Potential for improved pasture is high. Bahiagrass, bermudagrass, and clovers grow well if the soil is well managed. Surface ditches are needed to remove excess water during wet seasons. Controlled grazing and regular applications of fertilizer and lime are needed for highest yields.

Potential for pine trees is moderately high. Limitations to the use of equipment and seedling mortality are the main concerns of management. Surface ditches that remove excess water are needed. Trees should be planted on bedded rows.

Potential for community development is medium. The main limitation for this use is soil wetness caused by a high water table that is within 10 inches of the surface for long periods. A water control system is needed to remove excess water. It is normally difficult to install because of lack of adequate water outlets. Local roads and streets require special measures, such as the construction of deep side ditches, to remove excess water. Elevating the roadbed to increase the effective depth to the water table may be required. For single family dwellings and small commercial buildings, measures are needed to remove excess surface water. Building sites should be elevated to increase the depth to the seasonal high water table. If this soil were used as a site for absorption fields, about 4 feet of suitable fill material would be needed to raise the field above the high water table.

This Ona soil is in capability subclass IIIw and woodland ordination group 3w.

13—St. Johns fine sand. This is a poorly drained, nearly level soil in broad flatwoods and landscapes adjacent to drainageways. Mapped areas of this soil range from 5 to 350 acres. Slope ranges from 0 to 2 percent and is convex.

Typically, the surface layer is about 7 inches of black fine sand over 3 inches of very dark gray fine sand. The subsurface layer is gray fine sand that extends to a depth of 15 inches. The upper 4 inches of the subsoil is black loamy fine sand, and the lower 9 inches is black fine sand. The sand grains in the subsoil are well coated with organic matter. Below the subsoil is gray fine sand about 14 inches thick, black fine sand about 24 inches thick, and dark gray fine sand to a depth of 80 inches or more.

Included in mapping are small areas of Myakka, Ona, and Smyrna soils. Also included are small areas of a similar soil that has a very thick subsoil. The included areas make up less than 10 percent of any area mapped.

The seasonal high water table is at a depth of 0 to 15 inches for 2 to 6 months and at 15 to 30 inches during periods of lower rainfall in most years under natural conditions.

Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. Natural fertility is low, and organic matter content is moderate. Available water capacity is moderate in the surface layer and subsoil and very low or low in the other layers.

The natural vegetation consists of slash pine, loblollybay, sawpalmetto, waxmyrtle, American holly, and inkberry. Native grasses are chalky bluestem, cinnamon fern, and pineland threeawn.

In its natural state, this soil is limited for cultivated crops by a seasonal high water table. The root zone is limited by a water table that is within 10 inches of the surface during wet seasons. Available water capacity is low or moderate in the root zone. Natural fertility is low, but response to fertilizer is good. This soil has high potential for growing vegetable crops, such as Irish potatoes. A well designed water control system is needed to remove excess water during wet seasons and provide irrigation in dry seasons. Good management is needed that includes growing cover crops and use of crop residue to protect the soil from erosion. Seedbed preparation should include bedding of the rows. Fertilizer and lime should be added according to crop needs.

This soil has high potential for improved pasture. Water control measures which remove excess surface water during periods of high rainfall are required. Regular applications of fertilizer and lime are needed.

This soil has a moderately high potential for slash pine under high-level management. A seasonal high water table during periods of higher rainfall limits this soil for this use. Equipment mobility during wet seasons, seedling mortality, and plant competition are management concerns. The use of simple water control measures that remove excess surface water is a good management practice. Timely scheduling of site preparation, planting, and harvesting are required. Site preparation should include bedding of the rows.

Potential for community development is medium. Excessive soil wetness is the main limitation for this use. A seasonal high water table is at or near the soil surface during times of high rainfall. Water control measures, which lower the water table to a depth of 2.5 feet, are needed for constructing houses, small commercial buildings, and local roads and streets. In many places, where water outlets are not available or are difficult to install, construction sites and roadbeds should be elevated to increase the effective depth to the water table. Potential for use as septic tank absorption fields is medium. If this soil were used as a site for absorption fields, about 4 feet of suitable fill material would be needed to raise the field above the high water table.

This St. Johns soil is in capability subclass IIIw and woodland ordination group 3w.

14—Cassia fine sand. This is a nearly level, somewhat poorly drained soil that occurs on low ridges that are slightly higher than the adjacent flatwoods. Areas of this soil range from 6 to 175 acres in size. Slope ranges from 0 to 2 percent and is convex.

Typically, the surface layer is gray fine sand, which is about 3 inches thick. The subsurface layer, about 15 inches thick, consists of light gray fine sand with grayish brown stains along root channels. The subsoil, from 18 to 32 inches, is very dark gray and dark brown, compact fine sand. The material between depths of 32 and 75 inches is light yellowish brown fine sand. Below that, to a depth of 80 inches or more, is very dark gray fine sand.

Included in mapping are small areas of Immokalee, Jonathan, Myakka, and Pomello soils. Also included are small areas of similar soils. Some of these soils have a thin, brown subsoil in which the sand grains are only lightly coated with organic accumulations; some have a very thick subsoil; and others have shell fragments below a depth of 60 inches.

In most years the seasonal high water table is at a depth of 15 to 40 inches for about 6 months under natural conditions. Permeability is rapid in the surface and subsurface layers and is moderate or moderately rapid in the subsoil. Available water capacity is very low or low in the surface and subsurface layers and moderate in the subsoil.

The natural vegetation consists of slash pine, running oak, sand live oak, sand pine, a few longleaf pines, and sawpalmetto. Native grasses include low panicum, cinnamon fern, and broomsedge bluestem.

This soil has low potential for crops. The root zone is restricted by a water table that is 15 to 40 inches below the surface during wet seasons. The soil is droughty and has very low natural fertility. The response to fertilizer is slight.

This soil has low potential for growing improved pasture grasses. To achieve maximum potential for improved pasture, water control systems and applications of lime and fertilizer are needed. Deep-rooting grasses, such as bahiagrass and bermudagrass, are the best varieties to grow.

This soil has moderate potential for pine trees. Unsatisfactory seedling survival rates can be expected during dry years. The very low available moisture during dry seasons and a very low level of plant nutrients severely limit tree growth.

Potential for community development is high. This soil is easily drained if adequate water outlets are available. Water control measures are commonly used to make the soil suitable for building houses, small commercial buildings, and local roads and streets. If this soil were used as a site for septic tank absorption fields, about 2-1/2 feet of suitable fill material would be needed to raise the field above the high water table.

This Cassia soil is in capability subclass VIs and woodland ordination group 4s.

15—Pomello fine sand, 0 to 5 percent slopes. This is a moderately well drained, nearly level to gently sloping soil on long, broad to narrow, slightly higher ridges and knolls in the flatwoods. Areas range from about 3 to 80 acres.

Typically, the surface layer is gray fine sand about 4 inches thick. The subsurface layer, to a depth of 40 inches, is gray, white, and light gray fine sand. Next is dark gray fine sand about 5 inches thick. The subsoil is at a depth of 45 inches. The upper 6 inches is black fine sand, and the lower 6 inches is dark reddish brown fine sand. Below that, to a depth of 80 inches or more, is dark reddish brown fine sand mixed with black fragments of the subsoil.

Included in mapping are small areas of Cassia and Immokalee soils. Also included are small areas of a similar soil where the subsoil is below a depth of 50 inches. On Anastasia Island, north of Crescent Beach, there are small areas of shells and shell fragments 60 inches or more deep. Near the Atlantic coast and Inland Waterway are small areas of similar soils, which are slightly acid to neutral. The included soils make up less than 15 percent of any area mapped.

This soil has a seasonal high water table at a depth of 24 to 40 inches for 1 to 4 months during the normal wet seasons. During the drier seasons, the water table recedes to a depth of 40 to 60 inches. The available water capacity is low in the surface layer, very low in the subsurface layer, and moderate in the subsoil. Permeability is very rapid in the surface and subsurface layers and moderate in the subsoil. Organic matter content is low in the surface and subsurface layers and moderate in the subsoil. Natural fertility is low throughout.

The natural vegetation includes scrub and dwarf live oaks, sand pine, longleaf and slash pines, sawpalmetto, and pineland threeawn. A few areas have been cleared and used for slash pine plantations. Other areas have been cleared and used for improved pasture.

Potential is low for cultivated crops. This soil is severely limited for crops because of droughtiness. Plant nutrients leach rapidly from this soil.

Potential for improved pasture is low. Even with good management, yields are only fair. Deep-rooted grasses, such as bahiagrass, are better suited than other grasses. Clovers are not suited. The droughty nature of this soil severely limits pasture yields. Regular applications of fertilizer and lime are needed. Grazing should be greatly restricted to maintain vigorous growth and highest yields.

Potential for pine trees is moderate. Sand pines are a better variety to plant than other trees. Limitations to the use of equipment, seedling mortality, and plant competition are major management concerns.

Potential of this soil is medium for community development. Dwellings without basements and small commercial buildings require some water control to maintain the water table below a depth of 2 1/2 feet. Local roads and streets require only slight elevation of the roadbed, or shallow side ditches are needed to increase the depth to the water table. Potential for use as a site for septic tank absorption fields is high. If this soil were used as a site for absorption fields, about 2 1/2 feet of suitable fill material would be needed to raise the field above the high water table.

This Pomello soil is in capability subclass VIs and woodland ordination group 4s.

16—Orsino fine sand, 0 to 5 percent slopes. This is a moderately well drained, nearly level to gently sloping soil on low ridges and knolls and on slopes adjacent to soils on higher positions. Areas of this soil are irregular or somewhat rounded in shape and range from 10 to 70 acres. Slopes are convex.

Typically, the surface layer is gray fine sand about 4 inches thick. The subsurface layer, to a depth of 18 inches, is white fine sand. Below that is about 26 inches of brownish yellow fine sand containing dark reddish brown, noncemented bodies of fine sand. Tongues of white fine sand extend into this layer from the above layer. The material between depths of 44 and 59 inches is yellow fine sand. Below this, to a depth of 80 inches or more, is white fine sand.

Included in mapping are small areas of Paola, Pomello, and Tavares soils. Also included are small areas of similar soils that have layers darkened by accumulations of organic matter extending to a depth of more than 70 inches and soils that have a seasonal high water table at a depth of 20 to 40 inches. Included soils in this map unit make up about 10 percent of any area mapped.

The seasonal high water table is at a depth of 40 to 60 inches for more than 6 months during most years, but it recedes to a depth of more than 60 inches during periods of low rainfall. Permeability is very rapid. Available water capacity is low. Natural fertility is low. The organic matter content is moderately low in the surface layer and low or very low below.

The natural vegetation includes southern magnolia, hickory, American holly, sand pine, sand live oak, and sawpalmetto. Native grasses include pineland threeawn and panicum.

This soil has severe limitations for growing cultivated crops. The potential for vegetable crops is low. Intensive management is required when the soil is cultivated. Droughtiness and rapid leaching of plant nutrients limit the yields and the number of crops that can be grown. Close-growing cover crops should be grown frequently, and all crop residue should be left on the ground. The variety of crops that can be grown without irrigation is limited to a few.

Potential for improved pasture is medium. Deep-rooting plants such as bahiagrass grow well, but yields are reduced during periodic drought. Regular fertilization and liming are needed. Controlled grazing is needed to maintain vigorous plant growth.

This soil has moderately high potential for slash, longleaf, and sand pines under high-level management. Limitations to the use of equipment, seedling mortality, and plant competition are management concerns.

This soil has high potential for community development. It has only slight limitations for constructing dwellings without basements, small commercial buildings, and local roads and streets. Potential for septic tank absorption fields is also high. Filter fields do not require elevation. Local experience indicates that absorption fields function properly without water control, and adequate outlets are generally available.

This Orsino soil is in capability subclass IVs and woodland ordination group 4s.

18—Floridana fine sand, frequently flooded. This is a very poorly drained, nearly level soil on flood plains and in broad, shallow drainageways. Areas of this soil range from 5 to 60 acres. They are oblong or narrow and elongated in shape. Slopes range from 0 to 2 percent.

Typically, the surface layer is black fine sand about 18 inches thick. The subsurface layer is grayish brown fine sand about 10 inches thick. The subsoil, about 17 inches thick, is dark gray fine sandy loam. Below the subsoil is dark gray sandy clay loam that extends to a depth of 80 inches or more.

Included in mapping are small areas of Holopaw and Riviera soils. Also included are small areas of soils that are similar to this Floridana soil, but some have carbonatic accumulations within 80 inches, some have organic surfaces, and others that are subject to ponding are in depressions. The included soils make up less than 25 percent of any area mapped.

This Floridana soil is subject to flooding for 1 to 3 months during the rainy season. The water table is at a depth of less than 10 inches for more than 6 months during most years. Permeability is rapid in the surface and subsurface layers and very slow in the subsoil and below. Available water capacity is moderate in the surface layer and subsoil and low in the subsurface layer. Natural fertility is medium, and organic matter content is moderate.

The natural vegetation includes black tupelo, red maple, sweetgum, cypress, loblollybay, waxmyrtle, sawgrass, and cinnamon fern.

This soil has low potential for cultivated crops. Flooding and wetness are the primary management concerns. A water control system is needed that provides protection from flooding and removes excess surface water and internal water rapidly before crops can be grown. Good soil management includes use of crop rotations that keep the soil in close-growing cover crops (fig. 6) when it is not being cultivated. The cover crop and all other 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 has medium potential for most pasture grasses. Water control systems which provide flood protection and quickly remove excess surface water are needed before grasses can be grown.

The potential for pine trees is moderately high. Limitations to the use of equipment, seedling mortality, and plant competition are the main management concerns. A water control system that protects the soil from flooding and removes excess surface water is required. Bedding of the rows helps overcome limitations caused by excessive wetness. Timely scheduling of site preparation, planting, and harvesting is required.

The potential for community development is very low. Excessive wetness and flooding restrict the use of this soil for dwellings, small commercial buildings, and local roads and streets. The low position on the landscape makes water control and protection from flooding difficult. The soil has very low potential for use as a site

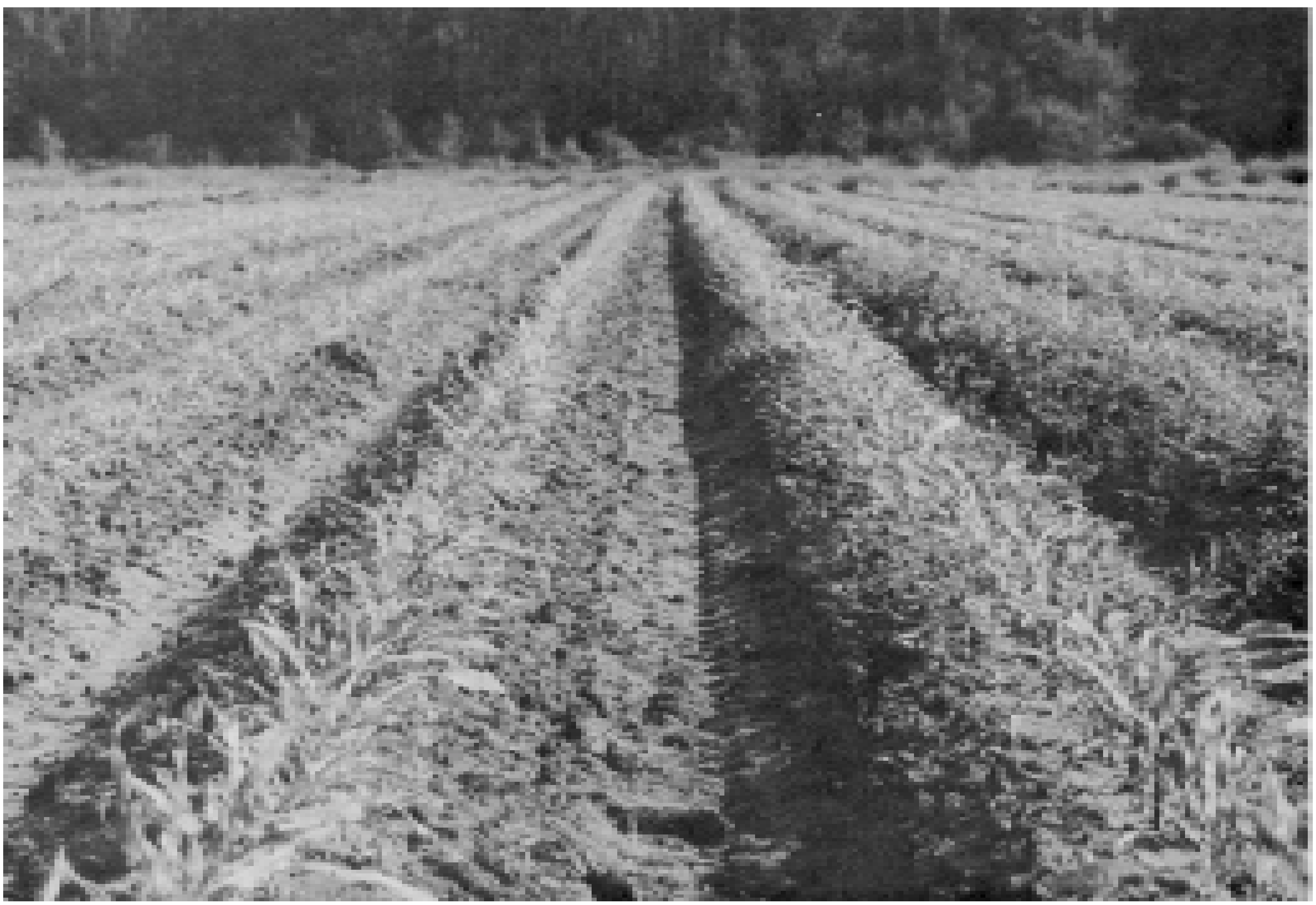


Figure 6.—Cover crops, such as this sorghum, are planted after cultivated crops of Irish potatoes or cabbage are harvested. The soil is Floridana fine sand.

for septic tank absorption fields. Large amounts of fill material would be needed before filter fields could be elevated above the high water table. Possibility of ground water contamination during flooding would continue to exist.

This Floridana soil is in capability subclass Vw and woodland ordination group 3w.

19—Pompano fine sand. This is a poorly drained, nearly level soil in low areas bordering poorly to well defined drainageways and broad low flat areas. Areas are irregular in shape and range from 3 to 200 acres. Slopes are less than 2 percent.

Typically, the surface layer is very dark grayish brown fine sand about 4 inches thick. The material between depths of 4 and 28 inches is white fine sand. Below this, and extending to a depth of 80 inches or more, is light gray and light olive gray fine sand mixed with sand-sized shell fragments.

Included in mapping are small areas of Adamsville, Holopaw, and Riviera soils. Also included are small areas of soils that are similar to this Pompano soil, except that some have a loamy fine sand subsurface layer, some are ponded or flooded, and some are adjacent to tidal marshes and have a high salt content. The included soils make up less than 10 percent of any area mapped.

The seasonal high water table is at a depth of less than 10 inches for 2 to 6 months of the year, and it recedes to within a depth of 30 inches for more than 9 months during most years. Permeability is rapid or very rapid throughout. Available water capacity is very low. Natural fertility and organic matter content are low.

The natural vegetation consists of slash pine, longleaf pine, scattered sweetgum, waxmyrtle, bluestem, panicum, and brackenfern.

Because wetness is a severe limitation, this soil has medium potential for cultivated crops. The root zone is limited by a water table that is less than 10 inches below the surface. With a complete water control system, this soil will produce good yields of cabbage or potatoes. The water control system that is used must remove excess water rapidly and provide a means for subsurface irrigation during dry seasons. Cover crops should be grown when the soil is not being farmed. All cover crops and crop residue should be returned to the soil. Applications of fertilizer and lime should be applied according to the needs of the crop.

Potential for improved pasture grasses and legumes is medium. A simple water control system is needed in order to quickly remove excess surface water. Bahiagrass, bermudagrass, and clovers grow well. Regular applications of fertilizer and lime are needed for vigorous plant growth.

Potential for pine trees is moderate. Limitations to the use of equipment and high seedling mortality resulting from excessive wetness are management concerns. Adequate surface water control and bedding of rows are needed for low plant mortality.

Potential for community development is medium. A seasonal high water table that is at or near the surface during rainy seasons is a severe limitation for urban uses. Removal of excess surface water and lowering the water table are sometimes difficult because adequate water outlets generally are not available. Local roads and streets and dwellings without basements require adequate water control, which lowers the high water table to a depth of at least 2.5 feet. If adequate water control is not possible, roadbeds and building sites should be elevated by the use of fill material to increase the effective depth to the water table. If this soil were used as a site for absorption fields, about 4 feet of suitable fill material would be needed to raise the field above the high water table.

This Pompano soil is in capability subclass IVw and woodland ordination group 4w.

21—Wabasso fine sand. This is a poorly drained, nearly level soil on broad landscapes in the flatwoods. Areas of this soil are irregular in shape and range from 15 to 120 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer consists of black fine sand that has a salt and pepper appearance in the upper 4 inches and is very dark gray fine sand in the lower 2 inches. The subsurface layer is light gray fine sand, extending to a depth of about 25 inches. The upper part of the subsoil is 7 inches thick. The upper 3 inches is black fine sand, and the next 4 inches is very dark brown fine sand. The lower part of the subsoil is about 13 inches thick. The upper 8 inches is brown fine sandy loam; the next 5 inches is grayish brown sandy clay loam. Below that, to a depth of 80 inches or more, is gray loamy fine sand and fine sand.

Included in mapping are small areas of EauGallie, Ellzey, and Floridana soils. Also included are small areas of soils which are similar to this Wabasso soil, except some have a light gray surface layer, some are more acid in the lower part of the subsoil, and others are sandy clay in the lower part of the subsoil. The included soils make up about 15 percent of any area mapped.

The seasonal high water table is at a depth of 10 to 40 inches for more than 6 months during most years. It is at a depth of more than 40 inches during very dry seasons.

In this Wabasso soil, permeability is rapid in the surface and subsurface layers. It is moderate in the upper part of the subsoil, slow in the lower part of the subsoil, and rapid in the substratum. Available water capacity is very low in the surface and subsurface layers, moderate in the upper and lower parts of the subsoil, and low in the substratum. Natural fertility and organic matter content are low.

The natural vegetation includes longleaf and slash pines, cabbage palms, and live oak, with an undergrowth of sawpalmetto, laurel, waxmyrtle, and pineland threeawn.

Wetness is a severe limitation if this soil is used for cultivated crops. If well managed, the soil has medium potential for cabbage, potatoes, and other vegetable crops. A water control system is required to remove excess water in wet seasons and provide water through subsurface irrigation in dry seasons. Row crops should be rotated with close-growing, soil-improving crops. Fertilizer and lime should be added according to the needs of the crops.

Potential for improved pasture grasses is high. Bahiagrass, bermudagrass, and clovers grow well if they are well managed. They require simple water control measures to remove excessive water during times of high rainfall. Regular applications of fertilizer and lime and controlled grazing are needed for best yields.

This soil has moderately high potential for slash and longleaf pines. Limitations to the use of equipment and seedling mortality are management concerns. Adequate water control helps to minimize the seedling mortality. Timely scheduling of site preparation, planting, and harvesting operations is needed. Bedding of the rows is needed for good site preparation.

Potential for community development is medium. A seasonal high water table that is within 10 inches of the surface is the main limitation. Dwellings without basements, small commercial buildings, and local roads and streets require special measures to remove excess surface water and lower the high water table. Adequate outlets to dispose of excess water are often not available or difficult to install. Building sites may need to be elevated by the use of fill material. Potential as a site for septic tank absorption fields is medium. Suitable fill material is needed to raise the field above the high water table.

This Wabasso soil is in capability subclass IIIw and woodland ordination group 3w.

22—Manatee fine sandy loam, frequently flooded. This is a very poorly drained, nearly level soil on flood plains and in poorly defined drainageways. Areas are irregular and elongated in shape and range from 15 to 200 acres. Slopes are less than 2 percent.

Typically, the surface layer is very dark gray and black fine sandy loam about 13 inches thick. The subsoil, which extends to a depth of 34 inches, is very dark gray fine sandy loam in the upper 12 inches and dark gray sandy clay loam in the next 9 inches. From 34 to 52 inches, the material is dark gray loamy fine sand. Below that, to a depth of 80 inches or more, is dark gray loamy fine sand and fine sand mottled with yellowish red.

Included in mapping are small areas of Bluff, Parkwood, and Riviera soils and small areas of soils that are similar to this Manatee soil, except that some have a subsoil at a depth of more than 20 inches, some have a light colored surface layer, and some have a surface layer of mucky fine sand or loamy fine sand. Others have a finer textured subsoil. Also included are small areas of this Manatee soil, which are in depressions and are ponded for more than 6 months of the year. The included soils make up about 15 percent of any area mapped.

This soil has a water table within 10 inches of the surface for 2 to 4 months in most years. It is subject to flooding for long periods during seasons of high rainfall. Permeability is very rapid to moderately rapid in the surface layer and moderate in the subsoil. Available water capacity is high or very high in the surface layer and high in the subsoil. The organic matter content is very high to moderate in the surface layer and low or very low in the subsoil. The natural fertility is high.

The natural vegetation includes sweetgum, cabbage palm, blackgum, cypress, water oak, cinnamon fern, waxmyrtle, and wild grape.

In its natural state, this soil is not suited to most agricultural uses, but if it is well managed and an adequate water control system is used, this soil can be used for cultivated crops. Potential for this use is low. Fertilization, the use of crop rotations, good seedbed preparation, and a well designed water control system are needed to remove excess water and provide flood protection during rainy periods. Cover crops should be rotated with row crops. All crop residue should be returned to the soil.

This soil has a medium potential for improved pasture grasses. With adequate water control, fertilization, and controlled grazing, this soil produces high yields of the common improved pasture grasses and legumes.

On this soil, potential for slash and longleaf pines is high. Limitations to the use of equipment, seedling mortality, and plant competition are the main management concerns. Bedding of the rows and adequate drainage are needed to overcome the wetness limitation.

Potential for community development is very low. Excessive wetness and flooding restrict the use of this soil for dwellings, small commercial buildings, and local roads and streets. The low position on the landscape makes water control and protection from flooding difficult. Potential for use as a site for septic tank absorption fields is very low. If this soil is used as a site for absorption fields, large amounts of fill material are needed to raise the filter field above the high water table. Possibility of ground water contamination during flooding would continue to be a hazard.

This Manatee soil is in capability subclass IIIw and in woodland ordination group 2w.

23—Paola fine sand, 0 to 8 percent slopes. This is an excessively drained, nearly level to sloping soil on narrow to broad ridges and on hillsides adjoining marshes and drainageways. Slopes are convex. Areas of the soil are narrow and irregular in shape and range from 10 to 100 acres.

This soil is fine sand throughout. Typically, the surface layer, about 4 inches thick, is gray. The next layer, between depths of 4 and 17 inches, is white. Between depths of 17 and 32 inches is a brownish yellow subsoil that is tongued with white. The substratum to a depth of 80 inches or more is very pale brown.

Included in mapping are small areas of Astatula and Orsino soils. Also included are small areas of soils similar to this Paola soil, except some have a finer texture below a depth of 70 inches; some have a very thick subsoil; others are underlain by shells and shell fragments; and others have a substratum that is slightly acid or neutral. The included soils make up less than 10 percent of any one mapped area.

Under natural conditions, the seasonal high water table is at a depth of more than 72 inches. Permeability is very rapid. Available water capacity is low. Natural fertility is low, and organic matter content is very low.

The natural vegetation includes live oak, laurel oak, sand pine, sand live oak, and sawpalmetto. Near the Atlantic coast, southern magnolia, eastern redcedar, and American holly are also included. Native grasses include a few panicum and scattered bluestem.

This soil has very low potential for cultivated crops. Natural fertility is low, and fertilizers are rapidly leached from the soil. This soil is droughty because of the low available water capacity in the root zone.

Potential for growing improved pasture is low. Irrigation, liming, fertilization, and use of improved grasses, such as bahiagrass, are needed to reach the maximum potential for pasture.

Potential for slash and longleaf pines is low. Sand pines are better suited to planting than other trees. Seedling mortality and limitations to the use of equipment are management concerns.

Potential for community development is very high. There are no limitations or only slight limitations for dwellings without basements, local roads and streets, and small commercial buildings on slopes up to 4 percent. Areas of this soil used for lawns and landscaping require frequent watering and fertilization. Potential as a site for septic tank absorption fields is also very high. There is a slight chance of ground water contamination because the soil is very rapidly permeable. Local experience indicates that seepage of effluent is not a problem when the distance between filter fields and water wells meets minimum requirements.

This Paola soil is in capability subclass VIs and woodland ordination group 5s.

24—Pellicer silty clay loam, frequently flooded. This is a very poorly drained, nearly level soil that is in low tidal marshes along stream estuaries near the Atlantic coast. Soil areas are wide and elongated in shape and are 60 to several thousand acres. Slopes are less than 1 percent.

Typically, the surface layer is very dark brown silty clay loam about 10 inches thick. Between depths of 10 and 55 inches, the material is dark greenish gray clay loam. Below that, to a depth of 70 inches, is dark greenish gray sandy clay with lenses of gray sandy and loamy material. The lower layer, which extends to a depth of 80 inches or more, is dark greenish gray sandy clay loam with pockets of gray fine sand, loamy fine sand, and sandy clay.

Included in mapping are small areas of Durbin, Moultrie, St. Augustine, and Tisonia soils. Also included are small areas of soils that are similar to this Pellicer soil. Some of these similar soils have an organic surface layer; some have a sandy clay loam surface layer 10 to 20 inches thick that is underlain by sandy and loamy layers; and others have a clayey surface layer less than 40 inches thick that is underlain by sandy and loamy layers. The included soils make up about 10 percent of any area mapped.

This soil is flooded twice daily by normal high tides. The water table fluctuates with the tide. Permeability is slow in the surface layer and very slow in the upper part of the substratum. Available water capacity is high in the surface layer and moderate in the substratum. Organic matter content is very high. Natural fertility is limited by excess salt.

The natural vegetation consists of seashore saltgrass, bushy sea-oxeye, glasswort, and needlegrass rush.

This Pellicer soil is not suited to cultivated crops, improved pasture, or trees; the potential for those uses is very low. Reclaiming the soil for agricultural uses would require extensive water control using dikes and pumps. The high salt and sulfur content, high clay content, and low strength severely restrict the use of this soil for agricultural purposes. The soil becomes extremely acid when it is dry for long periods. The low soil strength will not support grazing cattle or equipment.

Potential for community development is very low. The hazard of flooding, excessive wetness, and low strength make the soil poorly suited to the construction of buildings or local roads and streets. Overcoming these limitations is impractical.

Areas of this soil are an important wildlife habitat (fig. 7). The native vegetation and fauna are important links in the food chain for many sport and commercial finfish and shellfish.

This Pellicer soil is in capability subclass VIIIw. It is not assigned a woodland ordination symbol.

25—Parkwood fine sandy loam, frequently flooded. This is a poorly drained, nearly level soil on flood plains and in poorly defined drainageways. Areas of this soil are commonly elongated and irregular in shape and range from 15 to 80 acres. Slopes are less than 2 percent and smooth to concave.

Figure 7.—Marshland north of Guano Lake on Pellicer silty clay loam, frequently flooded. This soil provides habitat for wetland wildlife. Soils in the Fripp-Satellite complex are in the foreground.

Typically, the surface layer, about 7 inches thick, consists of black fine sandy loam. The subsurface layer, about 3 inches thick, is grayish brown fine sand. The subsoil extends to a depth of 55 inches, and it is mixed with carbonate accumulations. The upper 8 inches is dark gray fine sandy loam, and the lower 21 inches is white fine sandy loam. Between depths of 39 and 55 inches, the subsoil is light gray sandy clay loam. The substratum to a depth of 80 inches or more is greenish gray loamy fine sand.

Included in mapping, and making up about 10 percent of the map unit, are small areas of Manatee, Bluff, and Floridana soils. Also included are small areas of soils similar to this Parkwood soil, except some have an organic surface layer less than 10 inches thick, some have a thinner or lighter colored surface layer, and others have a very thick surface layer.

This Parkwood soil is flooded for 1 to 3 months during rainy seasons. The water table is within 10 inches of the soil surface for 2 to 4 months during most years. Permeability is rapid in the surface and subsurface layers and slow or moderately slow in the subsoil. Available water capacity is very high in the surface layer, low in the subsurface layer, and moderate to high in the subsoil. Natural fertility is high, and organic matter content is very high in the surface layer and very low in the other layers.

The natural vegetation includes sweetgum, blackgum, cabbage palm, water oak, waxmyrtle, cypress, sawgrass, and cinnamon fern.

In its natural state, this soil has severe limitations for most agricultural uses, but with adequate water control and good management, it can be used for a variety of crops.

Potential is low for cultivated crops. Because of the seasonal high water table, good water control is needed to remove excess water during rainy periods. Floodwater must also be controlled. Good seedbed preparation, use of crop rotations, returning cover crops and all crop residue to the soil, and regular applications of fertilizer are also needed.

Potential is medium for improved pasture. The use of adequate water control systems and controlled grazing, along with applications of fertilizer, will maximize potential for pasture.

Potential for pine trees is moderately high. Limitations to the use of equipment, high seedling mortality, and plant competition are management concerns. To help overcome excessive seedling mortality, a water control system that protects the soil from floodwater and quickly removes excess surface water is needed. Bedding of the rows and thorough site preparation are good management practices. Timely scheduling of planting and harvesting operations is required.

Potential for community development is very low. Excessive wetness and flooding restrict the use of this soil for dwellings, small commercial buildings, and local roads and streets. The low position on the landscape makes water control and protection from flooding difficult. Potential for use as a site for septic tank absorption fields is very low. If this soil were used as sites for absorption fields, large amounts of fill material would be required to raise the filter field above the high water table. Possibility of ground water contamination during flooding would continue to exist.

This Parkwood soil is in capability subclass Vw and in woodland ordination group 3w.

26—Samsula muck. This is a very poorly drained soil in narrow to broad swamps and depressional areas in the flatwoods. Areas of this soil are irregular in shape and range from 8 to 60 acres. Slopes are less than 1 percent and are concave.

Typically, the surface layer is black muck about 31 inches thick. The substratum to a depth of 49 inches is very dark grayish brown fine sand. Below that, it is grayish brown and gray fine sand, which extends to a depth of 80 inches.

Included in mapping are small areas of Hontoon, Tomoka, and Wesconnett soils. Also included are small areas of soils which are similar to this Samsula soil, except that they have an organic surface layer less than 16 inches thick. The included soils make up less than 10 percent of any area mapped.

Under natural conditions, in most years, the seasonal high water table is at or above the surface, except during extended dry periods. Permeability is rapid throughout. Available water capacity is very high in the surface layer and very low or low in the substratum. Natural fertility and organic matter content are high.

The natural vegetation includes blackgum, cypress, loblollybay, waxmyrtle, greenbrier, and cinnamon fern.

In its natural state, this soil is severely limited for cultivated crops or improved pasture grasses. However, with adequate drainage where outlets are available, this soil has high potential for cultivated crops. A well designed and maintained water control system is needed. The water control system should provide for removing excess surface water during times when crops are being grown. This system should also permit the soil to be kept saturated at times when crops are not grown. Fertilizers that contain phosphates, potash, and minor elements are needed. Large amounts of lime are needed. Water-tolerant cover crops should be grown when this soil is not used for row crops. All crop residue should be plowed under.

Potential for unimproved pasture grasses and clovers is high when water is properly controlled. A water control system should maintain the water table near the surface to prevent excessive oxidation and subsequent subsidence. Fertilizers high in potash, phosphorus, and minor elements are needed. Grazing should be controlled for maximum yields of hay and pasture.

Potential of this soil for slash and longleaf pines is very low. Limitations to the use of equipment, seedling mortality, and windthrow hazard limit its use for trees of commercial value.

Potential for community development is very low. Water standing on the soil surface and low soil strength are the main limitations. Water outlets to remove excess water are difficult to install or do not exist in many places. Muck must be removed, and large quantities of fill material must be spread before this soil can be used for building sites or for local roads and streets. Potential as a site for septic tank absorption fields is very low. If this soil were used as a site for absorption fields, large quantities of fill material would be required to raise the field above the high water table.

This Samsula soil is in capability subclass IVw. It is not assigned a woodland ordination symbol.

27—St. Augustine fine sand. This is a somewhat poorly drained, nearly level soil on narrow to broad flat areas and low knolls adjacent to tidal marshes and estuaries along the Atlantic coast and Intracoastal Waterway. It formed in marine sands mixed with shell fragments and loamy or clayey fragments. This soil is formed by dredging, cutting, and filling operations. Individual areas range from 3 to 125 acres. The shape of the areas ranges from irregular and rounded to straight and angular. Slopes are less than 2 percent.

Typically, the surface layer, about 4 inches thick, consists of very dark gray fine sand that is mixed with shell fragments. The material between depths of 4 and 10 inches consists of brown loamy fine sand and light gray fine sand and shell fragments. Below that, to a depth of 33 inches, is light gray and gray fine sand mixed with shell fragments and fragments of sandy clay. Below that, to a depth of 80 inches or more, is gray fine sand mixed with shell fragments.

Included in mapping are small areas of Moultrie and Pellicer soils and St. Augustine soils that have a clayey substratum. Also included are small areas of soils that are similar to this St. Augustine soil, except that some lack loamy or clayey fragments; some have black or dark reddish brown fragments of sandy material coated with organic accumulations; and some are better drained and have steeper slopes.

In most years the water table is at a depth of 20 to 30 inches for 2 to 6 months. It rises to a depth of less than 20 inches during heavy rains. The soil is subject to flooding for very brief periods during severe hurricanes. Permeability is rapid in the surface layer and upper underlying layers and moderate to rapid in the lower layers. Available water capacity is very low or low. Natural fertility and the organic matter content are low.

The natural vegetation varies widely. In most areas of this soil, vegetative growth is very sparse, but in some, there is a good growth of trees, shrubs, and grasses. This vegetation includes waxmyrtle, southern redcedar, pricklypear, and sawpalmetto. The grasses include creeping bluestem, bushybeard bluestem, panicum, and pineland threeawn.

This soil has low potential for cultivated crops. Available water capacity is very low in the root zone. The root zone is limited by a water table that is 20 to 40 inches below the surface most of the time.

Potential for growing pasture grasses is low. Low natural fertility and droughtiness severely limit yields of improved pasture grasses.

Potential for pine trees is very low. Limitations to the use of equipment and seedling mortality are the main management concerns. Droughtiness and low natural fertility result in an excessive rate of seedling mortality.

Potential for community development is high. This soil is subject to flooding for very brief periods during severe hurricanes, but tropical storms of hurricane intensity very rarely affect St. Johns County. On this soil, wetness is a severe limitation for dwellings without basements, small commercial buildings, and local roads and streets, but this limitation can usually be overcome. Some water control measures are needed, or building sites may need some elevation by use of fill material. Water outlets are generally available for area drainage. Potential for septic tank absorption fields is also high. If this soil were used as a site for absorption fields, about 2 1/2 feet of suitable fill material would be needed to raise the field above the high water table.

This St. Augustine soil is in capability subclass VIIs. It is not assigned a woodland ordination symbol.

28—Beaches. Beaches consist of long narrow strips of nearly level sand along the Atlantic Ocean. Seawater covers these areas twice daily during normal high tides. Beaches also include some small areas of low dunes that are adjacent to the narrow strips that are overwashed by tidal waves. The material making up Beaches is a mixture of light gray to white quartz sand, few to many brown and black sand-size grains of heavy minerals, and sea shells and shell fragments. It is subject to movement by wind and tide and is practically bare of vegetation.

Beaches are associated with Fripp, Pomona, and Satellite soils. These included soils are on higher positions and are not subject to wave action or flooding by normal high tides.

The natural vegetation grows only on some of the low dunes. It is sparse and consists of sea-oats, morningglory, and a few other salt-tolerant plants.

Beaches are not suited to vegetable crops, improved pasture, or pine trees. Periodic flooding, excessive salt content, low natural fertility, and droughtiness prevent this soil material from being used for agricultural purposes.

Beaches are used intensively for recreation. In most places they are smooth and wide enough at low tide to permit automobile traffic. Because Beaches are in a unique location and are valuable for recreation, other uses are not practical.

Beaches are not assigned to a capability subclass or given a woodland ordination symbol.

29—Satellite fine sand. This is a somewhat poorly drained, nearly level soil in narrow to broad swales between higher relict beach sand dunes, on low knolls adjacent to drainageways, and on slight ridges in the flatwoods. Most of this soil is in the area between the Inland Waterway and Atlantic Ocean. Areas are generally elongated in shape and range from 3 to 40 acres. Slope ranges from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 6 inches thick. The material between depths of 6 and 33 inches is white fine sand that has brownish yellow mottles. Below that is about 8 inches of light gray fine sand. Below that, to a depth of 80 inches or more, is light brownish gray fine sand. Fine shell fragments and heavy mineral grains are in this layer.

Included in mapping are small areas of Fripp, Pompano, and Moultrie soils. Also included are small areas of soils that are similar to this Satellite soil, but they have a brown subsurface layer. The included soils make up less than 15 percent of any area mapped.

The seasonal high water table is within a depth of 10 to 40 inches for 2 to 6 months in most years. Permeability is rapid in the surface layer and very rapid below. Available water capacity is moderate in the surface layer and very low in the underlying layers. Natural fertility is low. Organic matter content is high in the surface layer and very low in the other layers.

The natural vegetation includes sand live oak, water oak, and sawpalmetto. In coastal areas, the vegetation includes cabbage palm, magnolia, yaupon holly, and southern redcedar.

Potential for vegetable crops, such as Irish potatoes and cabbage, is low. Limitations are severe for cultivated crops. The root zone is limited by a shallow water table that is 10 to 40 inches below the surface for long periods during wet seasons. The available water capacity averages very low in the root zone. Natural fertility is very low, and response to fertilizer is very low. The soil would be subject to wind erosion if cleared for cultivation.

Potential for improved pasture is medium. Bahiagrass and bermudagrass are well adapted. Surface ditches, which quickly remove excess water during times of high rainfall, are needed. Additions of fertilizer and controlled grazing are needed to maintain good yields and vigorous plant growth.

Potential for pine trees is moderate. Limitations to the use of equipment, seedling mortality, and plant competition are the main management concerns. Slash pines are better adapted than other species.

Potential for community development is high. Wetness is a severe limitation for dwellings without basements, small commercial buildings, and local roads and streets. This limitation can usually be overcome. Some water control systems are needed, or building sites may require some elevation by use of fill material. Water outlets are generally available for area drainage. Potential for use as septic tank absorption fields is also high. If this soil were used as a site for absorption fields, about 2 1/2 feet of suitable fill material would be needed to raise the field above the high water table.

This Satellite soil is in capability subclass VIs and woodland ordination group 4s.

30—Wesconnett fine sand, frequently flooded. This is a very poorly drained, nearly level soil in narrow to broad, weakly defined drainageways in the flatwoods. Areas are irregular to elongated in shape and range from 8 to 75 acres. Slope ranges from 0 to 2 percent and is concave.

Typically, the surface layer is covered by partly decomposed leaves, roots, and twigs about 3 inches thick. The surface layer is black fine sand about 8 inches thick. The subsoil extends to a depth of 34 inches. It is black fine sand in the upper 10 inches, dark reddish brown fine sand in the next 6 inches, and very dark gray fine sand in the lower 10 inches. The sand grains throughout the subsoil are well coated with organic matter. Below the subsoil, to a depth of 80 inches or more, is dark grayish brown fine sand over black fine sand.

Included in mapping are small areas of Bakersville, Myakka depressional, St. Johns depressional, and Tomoka soils. Also included are small areas of soils that are similar to this Wesconnett soil, except some have a thicker subsoil, some have a thicker surface layer, some are in depressional areas, and others lack a subsoil. The included soils make up less than 10 percent of any area mapped.

The seasonal high water table is at a depth of less than 10 inches for 6 to 12 months during most years under natural conditions. It is subject to flooding during wet seasons. Permeability is rapid in the surface layer and moderately rapid in the subsoil. Available water capacity is moderate in the surface layer and subsoil. Natural fertility is low, and organic matter content is moderate.

The natural vegetation includes cypress, pond pine, loblollybay, sweetgum, red maple, and inkberry. Native grasses include maidencane, cinnamon fern, chalky bluestem, and indiangrass.

This Wesconnett soil is severely limited for cultivated crops in its natural state. The soil is very wet, and it is subject to flooding for 1 to 3 months of the year. Before crops can be grown, water control systems that protect the soil from flooding are needed. Water control systems are generally difficult and expensive to establish. Potential for cultivated crops is low.

Flooding and excessive wetness cause the potential for improved pasture to be low. Because the soil is in a low position in the landscape, protection from flooding and removal of excess surface water are difficult. With adequate water control, bahiagrass, bermudagrass, and clovers grow well. Regular applications of fertilizer and lime are needed for best yields.

Potential for pine trees is high if water is controlled. Excessive soil wetness and flooding are the main limitations. Equipment mobility, seedling mortality, plant competition, and windthrow hazard are management concerns. A water control system is needed to remove excess surface water before trees can be planted.

Potential for community development is very low. Because of the hazard of flooding, the use of this soil for residential or commercial development is severely limited. Protection from flooding is necessary. Adequate outlets for water removal are not available or are difficult to install. With adequate water control, these areas could be developed, but maintenance of water control installations would be expensive. Sites for buildings, septic tank absorption fields, and roadbeds would require large amounts of fill material to elevate them sufficiently above the high water table.

This Wesconnett soil is in capability subclass VIw and woodland ordination group 2w.

31—Fripp-Satellite complex. In this map unit are excessively drained, rolling or hilly Fripp soil on narrow relict beach dunes (fig. 8) and somewhat poorly drained, nearly level Satellite soil in narrow swales between areas of the Fripp soil. These soils formed in thick sandy deposits of marine origin mixed with small amounts of shell and shell fragments. Slope of the Fripp soil ranges from 8 to 15 percent. Slopes are convex and short; the lengths generally range from 50 to 75 feet from crest to base. Slope of the Satellite soil ranges from 0 to 2 percent and is concave and narrow. Areas of this map unit range from 3 to 400 acres. The areas of these soils are so intricately mixed or are so small that they could not be shown separately at the scale used for mapping.

Figure 8.—Dunes along the Atlantic coast are subject to wind erosion when the vegetative cover is disturbed or removed. The soils are in the Fripp-Satellite complex.

Fripp fine sand makes up 40 to 70 percent of the complex. Typically, the surface layer is gray fine sand about 5 inches thick. The upper 1 inch of the surface layer contains many black organic matter particles. Below the surface layer is fine sand, which is mixed with black sand-sized grains of heavy minerals and extends to a depth of 80 inches or more. It is pale brown and very pale brown in the upper 44 inches and white below that depth.

Fripp fine sand has rapid permeability and very low available water capacity. Natural fertility and organic matter content are low. The water table is below a depth of 80 inches during most years.

Satellite fine sand makes up 20 to 35 percent of the complex. Typically, this soil has a very dark gray fine sand surface layer about 6 inches thick. The next layer is white fine sand about 27 inches thick. Below that is light gray fine sand that extends to a depth of 80 inches or more.

Satellite fine sand has a water table at a depth of 10 to 40 inches for 2 to 6 months during most years and within a depth of 10 inches for up to a few days during wet seasons. Permeability is rapid in the surface layer and very rapid below. Available water capacity is moderate in the surface layer and very low in the other layers. Natural fertility is low. The organic matter content is high in the surface layer and very low in the other layers.

Included in mapping, and making up about 10 to 25 percent of the complex, are Narcoossee and Pompano soils. Also included are other soils that are similar to the Fripp soil but have slopes less than 8 percent and soils having slopes of 15 to 40 percent. In some small areas, earth-moving operations have smoothed and reworked the soil material.

The natural vegetation on Fripp fine sand consists of live oak, yaupon, southern magnolia, and sea-oats. Near the ocean it is primarily scrub live oak and sawpalmetto. On Satellite fine sand, it is live oak, laurel oak, cabbage palm, southern redcedar, and sawpalmetto.

Fripp fine sand is not suited to cultivated crops or improved pasture grasses. Soil droughtiness, steep slopes, and rapid leaching of fertilizer severely limit this soil for those uses.

Potential for growing pine trees is very low on the Fripp soil. Most areas are affected by salt spray from the Atlantic Ocean. Limitations to the use of equipment and seedling mortality are management concerns. The areas not affected by salt spray have moderate potential productivity.

Potential for community development is very high. The Fripp soil is very desirable for homesites because it is on relatively high positions near the ocean beaches. Small commercial buildings and local roads and streets may require special construction measures because of slope. Potential for septic tank absorption fields is very high. Although this soil has poor filtering capacity, local experience indicates that contamination of ground water supplies by sewage effluent is not a concern.

Satellite fine sand is not suited to cultivated crops. Its root zone is limited by a seasonal high water table 10 to 30 inches below the surface for long periods during rainy seasons. The available water capacity is very low in the root zone. Natural fertility is very low. This soil would be subject to wind erosion if cleared and cultivated.

Potential for growing improved pasture on Satellite fine sand is medium. This soil is well suited to bahiagrass and bermudagrass. Use of surface ditches that quickly remove excess water during periods of intense rainfall is needed to obtain good yields. Fertilizer and controlled grazing are needed for maintaining yields and vigorous plant growth.

Potential for growing pine trees is moderate. Limitations to the use of equipment, seedling mortality, and plant competition are the main management concerns. This soil is better suited to slash pines than other species.

Satellite fine sand has high potential for community development. Some water control measures are needed to lower the seasonal high water table to a depth of about 2 1/2 feet. This Satellite soil is in low swales between the higher areas of Fripp soil, and in most areas, water outlets are not available. Elevation of building sites and roadbeds by use of fill material would be beneficial where water control systems could not be established. Potential for use as septic tank absorption fields is high. Suitable fill material is needed to raise the field about 2 1/2 feet above the high water table.

These soils are in capability subclass VIIs and woodland ordination group 4s.

32—Palm Beach sand, 0 to 5 percent slopes. This is a well drained to excessively drained, nearly level to gently sloping soil on dunelike ridges parallel to the Atlantic coast. Areas of this soil are narrow to somewhat broad and elongated in shape and range from 30 to 200 acres.

Typically, the surface is covered with a discontinuous root mat, leaves, stems, and other partially decomposed organic material, which is 2 inches thick. The next layer is about 3 inches thick. It consists of grayish brown sand mixed with about 5 percent shell fragments. Below that, to a depth of 28 inches, is light brownish gray and light gray sand mixed with about 10 percent shell fragments. The next layer, to a depth of 80 inches or more, is white coarse sand mixed with about 70 percent shell fragments.

Included in mapping are small areas of Astatula, Fripp, Narcoossee, and Paola soils. Also included are small areas of soils that are similar to this Palm Beach soil, except some areas of these soils have up to 95 percent shell fragments throughout, and others have been disturbed by man. The included soils make up about 10 percent of any area mapped.

The water table is more than 80 inches deep. Permeability is very rapid. Available water capacity is low. The organic matter content is low or very low. Natural fertility is low.

The natural vegetation includes live oak, eastern redcedar, yucca, and sawpalmetto.

This soil has very low potential for cultivated crops because of droughtiness. Water moves through this soil too fast, and fertilizers leach too rapidly for crop production.

Potential for pasture is also very low. Soil amendments, such as peat or other organic materials, are needed to achieve maximum potential, but may be impractical to use on large acreages. The maximum potential for pasture is easier to achieve on the older landscapes, farther from the ocean. In those areas vegetation is established, soil tilth is better, and organic matter content is higher.

This soil has very low potential for growing slash or longleaf pines commercially.

Potential for community development is very high. This Palm Beach soil has no limitations or only slight limitations for dwellings, small commercial buildings, and local roads and streets. If areas of this soil were used for lawns and landscaping, frequent watering and fertilization would be required because of droughtiness. Potential for septic tank absorption fields is very high. Although the soil is very rapidly permeable, local experience indicates there is little probability of contamination of ground water supplies.

This Palm Beach soil is in capability subclass VIIs. It is not assigned a woodland ordination symbol.

33—Jonathan fine sand. This is a moderately well drained, nearly level soil on low ridges and knolls in the flatwoods. Areas are irregularly shaped and range from 3 to 50 acres. Slopes are 0 to 2 percent.

Typically, the surface layer is gray fine sand about 4 inches thick. The subsurface layer, between depths of 4 and 71 inches, is light gray and white fine sand. The subsoil is black, weakly cemented fine sand, which extends to a depth of 80 inches.

Included in mapping, and making up about 10 percent of the map unit, are small areas of Cassia, Myakka, Pomello, and Pottsburg soils. Also included are small areas of soils that are similar to this Jonathan soil, but some lack a subsoil within a depth of 80 inches, and others have loamy layers beneath the subsoil.

This Jonathan soil has a water table that is 30 to 40 inches below the surface for 4 to 6 months. It is at a depth of 24 to 30 inches for brief periods during wet seasons. It recedes to a depth of more than 40 inches during prolonged dry periods. Available water capacity is very low or low in the surface and subsurface layers and very high in the subsoil. Permeability is rapid in the surface and subsurface layers and slow in the subsoil. Organic matter content is very low, and natural fertility is low.

The natural vegetation includes sand pine, a few slash and longleaf pines, sand live oak, dwarf live oak, sawpalmetto, and pricklypear. The grass vegetation consists of sparse pineland threeawn, bluestem, and panicum.

Potential for cultivated crops is very low. Droughtiness and rapid leaching of plant nutrients do not allow plants to flourish. This soil is not suited to most cultivated crops.

Potential for improved pasture grasses is low. Even with good management, yields are low. This soil is best suited to bahiagrass and other grasses, which can withstand droughts. Regular applications of fertilizer and lime are needed. Controlled grazing is necessary to maintain healthy plants.

Potential for pine trees is low. Sand pine grows best and is better for planting than other trees. The main concerns are limitations to the use of equipment, seedling mortality, and plant competition.

Potential for community development is high. Some water control systems are needed to keep the seasonal high water table at a depth of at least 2 1/2 feet. Water outlets generally are available. Potential for septic tank absorption fields is high. If this soil were used as a site for septic tank absorption fields, suitable fill material would be needed to raise the field slightly above the high water table.

This Jonathan soil is in capability subclass VIs and in woodland ordination group 5s.

34—Tocoi fine sand. This poorly drained, nearly level soil is in broad flatwood areas. Slopes range from 0 to 2 percent. Areas of this soil are irregular in shape and range from 15 to 400 acres.

Typically, the surface layer is black fine sand about 13 inches thick. The upper part of the subsoil consists of very dark brown and dark reddish brown fine sand, which extends to a depth of 23 inches. It is underlain by 17 inches of dark brown fine sand and then by 5 inches of light brownish gray fine sand. The lower part of the subsoil, at a depth of 45 inches, is light brownish gray loamy fine sand about 31 inches thick. Below that, to a depth of 80 inches or more, is gray loamy fine sand.

Included in mapping are small areas of Myakka, Ona, Placid, Pompano, and St. Johns soils. The Placid and Pompano soils are on slightly lower positions. Also included are small areas of soils that are similar to this Tocoi soil, except that in some, the lower part of the subsoil is at a depth of less than 40 inches; some have a subsoil of fine sandy loam or sandy clay loam; and others are mildly alkaline to strongly alkaline in the subsoil. The included soils make up less than 15 percent of any area mapped.

The seasonal high water table is at a depth of less than 10 inches for 2 to 4 months during rainy seasons. It is within a depth of 20 to 40 inches for 6 months or more during most years.

In this Tocoi soil, permeability is rapid in the surface layer and moderate or moderately rapid in most of the lower layers. Available water capacity is very low or low in the surface layer, low or moderate in the upper part of the subsoil, and moderate or high in the lower part of the subsoil. Natural fertility and organic matter content are low.

The natural vegetation consists of slash and longleaf pines, waxmyrtle, sawpalmetto, greenbrier, inkberry, bluestem, and pineland threeawn.

This soil has high potential for cultivated crops; Irish potatoes grow well on this soil. In its natural state, its root zone is limited by a water table that is less than 10 inches below the surface much of the time. A water control system is needed for removing excess surface water during growing seasons and providing irrigation during dry seasons. Additional management practices include planting close-growing, soil-improving cover crops when the soil is not being farmed and plowing under all crop residue. Fertilizer and lime should be applied according to the needs of the crops.

Potential for improved pasture and hay crops is high. Where surface ditches are used to remove excess water, bermudagrass, bahiagrass, and clovers grow well. For high yields, regular applications of fertilizer and lime are needed.

This soil has moderately high potential productivity for pine trees. Limitations to the use of equipment and seedling mortality are important management concerns. Use of surface ditches, which remove excess surface water, and bedding of the rows are needed to overcome these limitations. Slash pines are the best suited.

Potential for community development is medium. A seasonal high water table that is at or near the surface during rainy seasons is a severe limitation for urban uses. Removal of excess surface water and lowering the seasonal high water table are sometimes difficult because adequate water outlets generally are not available. Local roads and streets and dwellings without basements require adequate water control systems, which lower the seasonal high water table to a depth of at least 2.5 feet. If adequate water control is not possible, roadbeds and building sites should be elevated by the use of fill material to increase the effective depth to the water table. Potential for use as septic tank absorption fields is medium. If this soil were used as a site for septic tank absorption fields, about 4 feet of suitable fill material would be needed to raise the field higher than the water table.

This Tocoi soil is in capability subclass IIIw and woodland ordination group 3w.

35—Hontoon muck. This is a very poorly drained, nearly level organic soil in depressional areas. Areas of this soil are oval or narrow to broad and elongated in shape and range from 5 to 200 acres. Slopes are less than 1 percent.

Typically, the muck layer is 55 inches thick. The upper 7 inches of soil material is black, and the next 48 inches is dark reddish brown and black. The material between depths of 55 and 70 inches is black mucky fine sand. Below that, to a depth of 80 inches or more, is very dark gray fine sand.

Included in mapping are small areas of Samsula and Wesconnett soils. Also included are small areas of soils that are similar to this Hontoon soil, but some have a muck layer less than 16 inches thick, and others are poorly drained sandy soils. The included areas make up less than 10 percent of any area mapped.

The seasonal high water table is at or above the soil surface for most of the time under natural conditions. Permeability is rapid throughout, and available water capacity is very high. Natural fertility is high. The organic matter content is very high.

The natural vegetation includes loblollybay, waxmyrtle, sweetgum, and cypress, with an understory of fern, grape, greenbrier, and fetterbush.

In its natural state, this soil is not suited to cultivated crops, pasture grasses, or commercial trees. With adequate water control, this soil has high potential for growing cultivated crops and pasture grasses. A good drainage system which removes excess water is essential where drainage outlets are available. The use of equipment is limited because of low strength. Heavy applications of lime and fertilizers are also needed. This soil should be flooded when cultivated crops are out of season, and cover crops should be returned to the soil to help maintain the thickness of organic material.

The potential for growing slash and longleaf pines is very low. Limitations to the use of equipment, seedling mortality, and windthrow hazard are the main concerns in producing commercial trees.

Potential for community development is very low. Water standing above the soil surface and low strength are the main limitations. A water outlet to provide necessary removal of excess water is difficult to install or many times does not exist. Muck must be removed and large quantities of fill material must be spread before this soil can be used for building sites or for local roads and streets. Potential for septic tank absorption fields is very low. Large quantities of fill material would be required to raise the absorption field above the high water table.

This Hontoon soil is in capability subclass IIIw. It is not assigned a woodland ordination symbol.

36—Riviera fine sand, frequently flooded. This is a poorly drained, nearly level soil in poorly defined drainageways and on flood plains. Areas of this soil are irregular in shape and range from about 40 to 200 acres. Slopes are 0 to 2 percent.

Typically, the surface layer is gray fine sand about 10 inches thick. The subsurface layer is light gray fine sand to a depth of 23 inches. The upper 5 inches of the subsoil is gray fine sandy loam with vertical intrusions of gray fine sand extending into it from the subsurface layer above. The lower part of the subsoil is gray fine sandy loam 6 inches thick. Below that, the soil material is light gray fine sandy loam, which extends to a depth of 55 inches. The substratum to a depth of 80 inches or more is light gray fine sandy loam and fine sand mixed with shells or shell fragments.

Included in mapping are small areas of Bluff, Floridana, Holopaw, Manatee, and Winder soils. Also included are small areas of similar soils that have a sandy clay subsoil and soils that have layers of yellowish brown to yellow fine sand or loamy fine sand above the subsoil. The included soils make up less than 15 percent of any area mapped.

The seasonal high water table is within 10 inches of the surface for 2 to 4 months in most years. It is below a depth of 40 inches in driest seasons. This soil is subject to flooding for up to 3 months during times of high rainfall. Available water capacity is low or very low in the surface and subsurface layers, moderate in the subsoil, and low in the substratum. Permeability is rapid or very rapid in the surface and subsurface layers, very slow or slow in the subsoil, and moderate or moderately rapid in the substratum. Organic matter content is low. Natural fertility is low.

The natural vegetation includes a few slash pines, cabbage palms, sweetgum, water oaks, waxmyrtle, sawpalmetto, and various ferns. Some areas have been cleared and replanted in slash or longleaf pines.

This soil has low potential for cultivated crops. Flooding and wetness are the primary management concerns. Before crops can be grown, a water control system is needed to protect the soil from flooding and remove excess surface and internal water rapidly. Good soil management should include crop rotations that keep the soil in close-growing cover crops at least two-thirds of the time. The cover crop and all other crop residue should be plowed under. Seedbed preparation should include bedding. Fertilizer should be applied according to crop needs.

This soil has low potential for most pasture grasses. Water control systems which provide flood protection and quickly remove excess surface water are needed to realize the full potential of the soil. With adequate water control, this soil is well suited to bermudagrass, bahiagrass, and clovers. Regular applications of fertilizer and lime are required for good yields.

Potential for slash and longleaf pines is moderately high. For low seedling mortality and good tree growth, installation of water control systems to remove excess surface water and bedding of the rows are needed.

Potential for community development is very low. Excessive wetness and flooding restrict the use of this soil for dwellings, small commercial buildings, and local roads and streets. The low position on the landscape makes it difficult to control water and protect the soil from flooding. Potential for use as a site for septic tank absorption fields is very low. Large amounts of fill material would be required to raise the filter field above the high water table, and it is likely that ground water contamination during flooding would continue to exist.

This Riviera soil is in capability subclass Vw and woodland ordination group 3w.

38—Pits. This miscellaneous area consists of excavations from which soil and geologic material have been removed, primarily for use in road construction, fill for low areas, and building foundations. Pits, locally called borrow pits, range in size from less than 1 acre to about 30 acres. Included in mapping are waste materials, mostly mixtures of sand, shells, and shell fragments and sandy loam material. These materials are scattered around the edge of the pits. Pits have little or no value for agricultural crops or growing pine trees.

This unit is not assigned a capability subclass or given a woodland ordination symbol.

40—Pottsburg fine sand. This is a poorly drained, nearly level soil in the flatwoods. It formed in deep sandy marine sediments. Areas of this soil are broad and irregularly shaped and range from 4 to 300 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is black fine sand about 5 inches thick. The subsurface layer is fine sand, which extends to a depth of 60 inches. It is grayish brown in the upper 7 inches, light gray in the next 19 inches, and white in the lower 29 inches. The subsoil is at a depth of 60 inches. The upper part of the subsoil is very dark grayish brown fine sand about 5 inches thick. The lower part of the subsoil, to a depth of 80 inches or more, is black fine sand that contains pockets of lighter colored fine sand and sand grains which are lightly coated with organic matter.

Included in mapping are small areas of Immokalee, Myakka, and Smyrna soils. Also included are small areas of soils that are similar to this Pottsburg soil, except that some have a subsoil containing sand grains that are only lightly coated with organic matter, and others have a dark surface layer more than 10 inches thick. Between the Atlantic Ocean and the Inland Waterway are similar soils in which the lower part of the subsurface layer and the subsoil are neutral or mildly alkaline. The included soils make up 10 percent of any area mapped.

The seasonal high water table is at a depth of less than 10 inches for 2 to 4 months in most years during the wet season. It is at a depth of 10 to 40 inches for about 8 months in most years and recedes to a depth of more than 40 inches during long dry periods. Available water capacity is very low or low in the surface and subsurface layers and moderate in the subsoil. Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. Organic matter content and natural fertility are low.

In most areas, the natural vegetation includes longleaf and slash pines, sawpalmetto, inkberry, and waxmyrtle. Creeping bluestem, chalky bluestem, and pineland threeawn are common grasses. Some areas on slightly higher positions support a few sand live oaks and running oaks.

Wetness is a severe limitation for cultivated crops. The root zone is limited by a water table that is within 10 inches of the surface during wet seasons. Available water capacity is very low to low in the root zone. Potential for vegetable crops, such as cabbage and Irish potatoes, is medium. Adequate water control and soil-improving measures are needed. A water control system is required to maintain the water level needed by the particular crop. It must remove excess water in wet seasons and provide water during dry seasons. Close-growing cover crops should be planted after row crops are harvested. Cover crops help prevent fertilizer leaching and add organic matter if returned to the soil. Seedbed preparation should include bedding of the rows. Fertilizer and lime should be added as required by the crop being grown.

This soil has high potential for improved pasture grasses, such as bermudagrass and bahiagrass. Water control measures that remove excess surface water after heavy rains and regular fertilization are needed. Controlled grazing is also needed for high yields.

Potential productivity for pine trees is moderate. Slash pines are the best suited. Management concerns are limitations to the use of equipment during wet seasons, seedling mortality, and plant competition. A simple water control system which removes excess surface water is needed. Trees should be planted in bedded rows.

Potential for community development is medium. The soil is severely limited for urban uses because of a seasonal high water table that is at or near the surface during rainy seasons. Removal of excess surface water and lowering the water table are sometimes difficult because outlets generally are not available. Local roads and streets and dwellings without basements require water control, which lowers the high water table to a depth of at least 2.5 feet. If adequate water control is not possible, roadbeds and building sites should be raised by the use of fill material to increase the depth to the water table. Potential for use as sites for septic tank absorption fields is medium. About 4 feet of suitable fill material is needed to raise the field above the high water table.

This soil is in capability subclass IVw and woodland ordination group 4w.

41—Tomoka muck. This is a very poorly drained soil in weakly defined drainageways and depressional areas. Areas of this soil are rounded or elongated in shape and are 5 to 150 acres. Slopes are less than 1 percent.

Typically, the muck layer is about 21 inches thick. It is dark reddish brown in the upper 9 inches and black in the next 12 inches. Below that is dark gray and dark grayish brown fine sandy loam that extends to a depth of 80 inches or more.

Included in mapping are small areas of Hontoon and Samsula soils. Also included are small areas of soils similar to this Tomoka soil, except that some have a sandy clay layer beneath the organic layer, others are slightly acid through strongly alkaline in the mineral layer, and others have carbonates or shell fragments in the mineral layers. The included soils make up less than 20 percent of any area mapped.

This soil has a water table at or above the surface, except during extended dry periods. Permeability is rapid in the muck layer and moderate or moderately rapid in the substratum. Available water capacity is very high in the muck layer and moderate in the substratum. Natural fertility is medium. Organic matter content is very high.

In its natural state, this soil has severe limitations for cultivated crops. With adequate water control, this soil has high potential for a number of vegetables. Where drainage outlets are available, a good drainage system which removes excess water is needed. The use of equipment is limited because of low soil strength. Heavy applications of lime and fertilizers are also needed. This soil should be flooded when cultivated crops are out of season. Cover crops should be returned to the soil to help build up the organic material.

Potential for improved pasture grasses and clover is high. A water control system which regulates the depth of the water table is needed. This soil has low strength and because of this limitation, cattle grazing and use of equipment are limited when it is saturated with water. The seasonal high water table should be maintained at a shallow depth to prevent excessive subsidence.

The potential of this soil for slash pine is very low. Limitations to the use of equipment, seedling mortality, and windthrow hazard limit this soil for producing trees of commercial value.

Potential for community development is very low. Water standing above the soil surface and low soil strength are the main limitations. Water outlets to provide necessary removal of excess water are difficult to install or do not exist in many places. Muck must be removed, and large quantities of fill material must be spread on this soil before it can be used for building sites or for local roads and streets. Potential for septic tank absorption fields is very low. Large quantities of fill material would be required to elevate the field above the high water table.

This Tomoka soil is in capability subclass IIIw. It is not assigned a woodland ordination symbol.

42—Bluff sandy clay loam, frequently flooded. This is a very poorly drained, nearly level soil in drainageways and on flood plains. Areas are irregular in shape and range from 10 to 300 acres. Slopes are less than 1 percent.

Typically, in undisturbed areas a 3-inch layer of black muck is on the surface. The surface layer is very dark gray sandy clay loam about 6 inches thick. The subsoil, which extends to a depth of about 50 inches, is sandy clay loam and loam. It is very dark gray in the upper 7 inches and gray below, and it contains fine and medium, white accumulations of calcium carbonate. The substratum to a depth of 80 inches or more is greenish gray loamy fine sand with pockets of dark gray sandy clay loam and gray sand.

Included in mapping are small areas of Floridana, Manatee, and Parkwood soils. Also included are soils that are similar to this Bluff soil, except in some areas, the surface layer is clay, and in others, it is dark and over 24 inches thick. The included soils in this map unit are less than 15 percent of any area mapped.

The seasonal high water table is at a depth of less than 10 inches or is above the surface for 6 months or more. It seldom recedes to a depth of more than 20 inches. The soil is subject to frequent flooding for long durations. Available water capacity is very high in the organic surface layer and is high in the subsoil. Permeability is moderately rapid in the surface layer and very slow to moderately slow in the subsoil. Natural fertility is high. Organic matter content is high.

The natural vegetation includes sweetgum, hickory, pond pine, cabbage palm, water oak, cypress, waxmyrtle, sawpalmetto, and wild grape.

This Bluff soil is too wet for cultivated crops in its natural state. The root zone is limited by a high water table or by flooding for long periods in most years. Water control systems that protect the soil from flooding are needed. This soil is high in natural fertility, but the texture of the subsoil, wetness, and the hazard of flooding severely limit its use for cultivated crops. Potential for cultivated crops is low.

With adequate water control measures, this soil has medium potential for improved pasture. Because it is difficult to install water control systems, the soil is seldom used for improved pasture.

Potential for pine trees is high. Water control measures, which include protection from flooding, are required to make tree planting feasible. Bedding of rows is needed. Limitations to the use of equipment and seedling mortality because of excessive soil wetness are the primary management concerns.

Potential for community development is very low. Excessive wetness and flooding restrict the use of this soil for dwellings, small commercial buildings, and local roads and streets. The low position on the landscape makes water control and protection from flooding difficult. Potential for use as septic tank absorption fields is very low. If this soil were used as a site for absorption fields, large amounts of fill material would be needed to raise the field above the high water table; however, possibility of ground water contamination during flooding would continue to exist.

This Bluff soil is in capability subclass Vw and woodland ordination group 2w.

44—Sparr fine sand, 0 to 5 percent slopes. This is a somewhat poorly drained, nearly level to gently sloping soil adjacent to drainageways and on low knolls in the flatwoods. Areas of this soil are narrow and long or irregular in shape and range from 10 to 100 acres.

Typically, the surface layer is gray fine sand about 3 inches thick. The subsurface layers are fine sand, which extends to a depth of 68 inches. They are very pale brown to white. The subsoil to a depth of 80 inches or more is grayish brown fine sandy loam.

Included in mapping are small areas of Adamsville, Ona, Pomona, and Tavares soils. Also included are small areas of soils that are similar to this Sparr soil. Some are better drained; some have a loamy sand subsoil; and some have a subsoil between depths of 20 and 40 inches. The included soils make up less than 15 percent of any area mapped.

The seasonal high water table is at a depth of 20 to 40 inches for 1 to 4 months during most years. Permeability is rapid or very rapid in the surface and subsurface layers and very slow in the subsoil. Available water capacity is low in the surface and subsurface layers and high in the subsoil. Natural fertility and organic matter content are low.

The natural vegetation includes turkey oak, water oak, laurel oak, southern magnolia, sawpalmetto, pineland threeawn, and bluestems.

This soil has a medium potential for cultivated crops. The root zone is limited by a seasonal high water table. For optimum growth of vegetable crops, a good water control system and bedding of rows are needed. Irrigation is needed when crops are grown during dry periods. All crop residue should be returned to the soil, and cover crops should be rotated with vegetable crops. Cover crops add organic matter to the soil and help prevent leaching of fertilizers. Response to fertilizers is moderate. Fertilizer and lime are needed for best yields.

Potential of this soil for improved pasture grasses is medium. Controlled grazing and adequate amounts of fertilizer and lime are needed for optimum growth of improved pasture grasses.

Potential is moderately high for slash pine under high-level management. The moderate limitation to the use of equipment and moderate seedling mortality are important management concerns.

Potential for community development is high. Some water control is required for the construction of dwellings without basements, small commercial buildings, and local roads and streets. Water outlets generally are available for area drainage. Potential for use as septic tank absorption fields is also high. If this soil is used as a site for septic tank absorption fields, about 2 1/2 feet of suitable fill material is needed to raise the field higher than the water table.

This soil is in capability subclass IIIs and woodland ordination group 3s.

45—St. Augustine fine sand, clayey substratum. This is a somewhat poorly drained, nearly level soil on narrow to broad low flat areas and low knolls adjacent to tidal salt marshes and estuaries along the Atlantic coast and Intracoastal Waterway. It formed in marine sands mixed with shells and shell fragments and fragments of loamy or clayey materials overlying loamy or clayey layers. This soil formed as the result of dredging operations in the Inland-Waterway. The dredged material has been deposited on adjacent tidal marsh soils that have a loamy or clayey surface layer and underlying material. Areas are rounded to irregular and range from 3 to 250 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is very dark grayish brown fine sand about 1 inch thick. The material between depths of 1 and 48 inches is fine sand. It is grayish brown in the upper 3 inches and very pale brown in the next 17 inches. The lower 27 inches is greenish gray and contains a few fragments or bodies of dark greenish gray sandy clay. Below that is 5 inches of greenish gray fine sandy loam. Below that, to a depth of 80 inches or more, is dark greenish gray sandy clay.

Included in mapping are small areas of Pompano soils. Also included are small areas of soils similar to this St. Augustine soil, except that layers of well decomposed organic material (muck) are in the subsoil of some soils, and others have a substratum darkened by organic accumulations. The included soils occupy similar positions in the landscape and make up about 10 percent of the unit.

In most years the water table is at a depth of 20 to 30 inches for 2 to 6 months. It rises above a depth of 20 inches for brief periods after heavy rains. During extended dry periods, the water table recedes to a depth of more than 50 inches. During severe hurricanes this soil may be flooded for short times by excessively high tides.

Available water capacity is very low in the surface layer and upper part of the underlying material. It is moderate to high in the middle part of the underlying material and low in the lower part. Permeability is moderately rapid or rapid in the sandy layers and moderately slow to very slow in the loamy and clayey layers. Natural fertility and the organic matter content are low.

The natural vegetation consists of southern redcedar, waxmyrtle, cabbage palm, and sparse bluestem.

This soil has low potential for cultivated crops. Available water capacity is very low in the root zone. The root zone is limited by a water table that is 20 to 40 inches below the surface most of the time. The salt content of the soil and of the ground water is high enough to have an adverse effect on some plants.

Potential for pasture grasses is low. Low natural fertility and droughtiness severely limit yields of improved pasture grasses.

Potential for pine trees is very low. Limitations to the use of equipment and seedling mortality are the main management concerns. Low natural fertility, droughtiness, and high salt content result in an excessive seedling mortality rate.

Potential for community development is high. Flooding is a hazard for very brief periods during severe hurricanes, but tropical storms of hurricane intensity seldom affect St. Johns County. The soil is severely limited by wetness for dwellings without basements, small commercial buildings, and local roads and streets, but this limitation can usually be overcome. Some water control measures are needed, or building sites may require some elevation by use of fill material. Water outlets are generally available for area drainage. Potential for use as septic tank absorption fields is also high. If this soil is used as a site for septic tank absorption fields, about 2 1/2 feet of suitable fill material is needed to raise the field higher than the water table.

This St. Augustine soil is in capability subclass VIIs. It is not assigned a woodland ordination symbol.

46—Holopaw fine sand. This is a poorly drained, nearly level soil in low, broad areas in the flatwoods. Areas are elongated and irregular in shape and range from 25 to 400 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is covered with partly decomposed litter and organic matter about 1 inch thick. It is mixed very dark gray and grayish brown fine sand in the upper 7 inches, and it is dark gray fine sand in the lower 6 inches. The subsurface layer, which extends to a depth of about 53 inches, is light gray to gray fine sand. The subsoil, about 19 inches thick, consists of dark gray fine sandy loam that has pockets of loamy sand and sandy clay loam. Below that is greenish gray loamy fine sand, which has pockets of sandy loam and extends to a depth of 80 inches or more.

Included in mapping are small areas of Pompano, Riviera, and Winder soils. Also included are small areas of soils that resemble this Holopaw soil. Some of the similar soils are more acid, some have yellowish brown sandy layers above the subsoil, and others have a thick dark surface layer. Some map units have a loamy fine sand subsoil. The included soils make up about 20 percent of any area mapped.

The seasonal high water table is at a depth of less than 10 inches for 1 to 3 months, but may recede to a depth of 10 to 40 inches for 3 to 4 months in most years. Permeability is rapid or moderately rapid in the surface and subsurface layers and moderately slow in the subsoil. Available water capacity is very low in the surface and subsurface layers and moderate in the subsoil. Natural fertility and organic matter content are low.

The natural vegetation includes slash pine, sweetgum, water oak, waxmyrtle, wild grape, smilax, and a few small cypress. Native grasses include cinnamon fern, lopsided indiangrass, and bluestem.

This soil has medium potential for cultivated crops. Wetness is a severe limitation. The root zone is limited by a water table that is less than 10 inches below the surface. With a complete water control system, this soil will produce good yields of cabbage or potatoes. The water control system used must remove excess water rapidly and provide a means for subsurface irrigation during dry seasons. Cover crops should be grown when the soil is not being farmed. All cover crops and crop residue should be returned to the soil. Applications of fertilizer and lime should be applied according to the needs of the crop.

Potential for improved pasture grasses and legumes is medium. A simple water control system is required to quickly remove excess surface water. Bahiagrass, bermudagrass, and clovers grow well. Regular applications of fertilizer and lime are needed for vigorous plant growth.

Potential for growing pine trees is moderately high. Limitations to the use of equipment and high seedling mortality caused by excessive wetness are management concerns. Adequate control of excess surface water and bedding of the rows are required for low plant mortality.

Potential for community development is medium. A seasonal high water table that is at or near the surface during rainy seasons is a severe limitation for urban uses. Removal of excess surface water and lowering the water table are sometimes difficult because adequate water outlets generally are not available. Local roads and streets and dwellings without basements require adequate water control, which lowers the high water table to a depth of at least 2.5 feet. If an adequate water control system is not possible to install, roadbeds and building sites should be elevated by the use of fill material to increase the effective depth to the water table. Potential for use as septic tank absorption fields is medium. If this soil were used as a site for septic tank absorption fields, about 4 feet of suitable fill material would be needed to raise the field higher than the water table.

This soil is in capability subclass IVw and woodland ordination group 3w.

47—Holopaw fine sand, frequently flooded. This is a very poorly drained, nearly level sandy soil in broad, shallow drainageways. Areas of Holopaw fine sand are irregular in shape and range from 15 to 150 acres. Slopes are 0 to 2 percent.

Typically, the surface layer is black fine sand about 6 inches thick. The subsurface layer, about 44 inches thick, is grayish brown and gray fine sand. The subsoil, which extends to a depth of 68 inches, is gray fine sandy loam. The substratum to a depth of 80 inches or more is gray loamy fine sand.

Included in mapping are small areas of Floridana and Riviera soils and of the Myakka depressional soil. Also included are small areas of soils, in depressions, that are similar to this Holopaw soil and areas of other soils that are more acid than this soil. Included areas make up less than 10 percent of any area mapped.

This soil is flooded for more than 1 month during most years. A water table is within 10 inches of the soil surface for 2 to 6 months annually. Available water capacity is very low in the surface and subsurface layers and moderate in the subsoil. Permeability is rapid or moderately rapid in the surface and subsurface layers and moderately slow in the subsoil. Natural fertility and organic matter content are low.

The natural vegetation is slash and pond pines, cypress, loblollybay, sweetgum, and cinnamon fern.

This soil has low potential for cultivated crops. Flooding and wetness are the primary management concerns. A water control system is needed for protecting the soil from flooding and removing excess surface water and internal water rapidly. Good soil management includes the use of crop rotations that keep the soil in close-growing cover crops at least two-thirds of the time. The cover crop and all other crop residue should be returned to the soil. Bedding of rows is needed in seedbed preparation. Fertilizer should be applied according to the needs of the crop.

This soil has low potential for most pasture grasses. A water control system that provides flood protection and quickly removes excess surface water is needed to realize the full potential. With an adequate water control system, this soil is well suited to bermudagrass, bahiagrass, and clover. Regular applications of fertilizer and lime are required for good yields.

Potential for pine trees is moderately high. Limitations to the use of equipment, high seedling mortality, and plant competition are the main management concerns. To overcome excessive seedling mortality, a water control system is needed for providing protection against floodwater and removing excess surface water quickly. Bedding of the rows and thorough site preparation are good management practices. Timely scheduling of planting and harvesting operations is required.

Potential for community development is very low. The main limitations—excessive wetness and flooding—restrict the use of this soil for dwellings, small commercial buildings, and local roads and streets. The low position on the landscape makes water control and protection from flooding difficult. Potential for use as a site for septic tank absorption fields is very low. Large amounts of fill material would be needed to raise the field above the high water table. Possibility of ground water contamination during flooding would continue to exist.

This Holopaw soil is in capability subclass VIw and woodland ordination group 3w.

48—Winder fine sand, frequently flooded. This is a poorly drained, nearly level soil that formed in loamy marine materials. It is on flood plains and in poorly defined drainageways. Areas are elongated and irregular in shape and range from 20 to 100 acres. Slopes are less than 2 percent.

Typically, the surface layer is dark gray fine sand about 3 inches thick. The subsurface layer is light gray fine sand about 8 inches thick. The subsoil in the upper 5 inches is grayish brown sandy loam with vertical intrusions of light gray fine sand from the subsurface layer. It is dark grayish brown sandy clay loam in the next 13 inches and gray sandy loam in the lower 13 inches. The substratum to a depth of 80 inches or more is 20 inches of dark gray sandy loam mixed with shell fragments over olive gray sandy loam mixed with shells and shell fragments.

Included in mapping are small areas of Bluff, Holopaw, Manatee, and Riviera soils. Also included in mapping are small areas of soils that are similar to this Winder soil, except some have an accumulation of carbonates within the upper 20 inches of the subsoil; some have a more acid subsoil; some are in depressional areas; and others have a sandy clay subsoil. Also included is a similar soil that has a surface layer less than 3 inches thick. The included soils make up less than 15 percent of any area mapped.

The seasonal high water table is within a depth of 10 inches for 2 to 6 months during most years. The soil is subject to flooding for periods up to 3 months during times of high rainfall in most years.

Available water capacity is very low or low in the surface and subsurface layers. It is low in the upper part of the subsoil and moderate in the lower part. It is low or moderate in the substratum. Permeability is rapid in the surface and subsurface layers, moderately slow to very slow in the subsoil, and slow in the substratum. Organic matter content is very low to moderately low. Natural fertility is medium.

The native vegetation consists of cabbage palms, sweetgum, red maple, loblollybay gordonia, hornbeam, sawpalmetto, waxmyrtle, and a few cypress.

The soil has low potential for cultivated crops. Wetness and flooding are the primary management concerns. Before crops can be grown, a water control system which removes excess surface water and internal water rapidly and controls flooding is needed. Good soil management includes crop rotations that keep the soil in close-growing cover crops at least two-thirds of the time. The cover crop and all other crop residue should be returned to the soil. Seedbed preparation should include bedding. Fertilizer should be applied according to the needs of the crop.

Potential for most pasture grasses is medium. Water control systems should be designed to quickly remove excess surface water and provide flood control. Regular applications of fertilizer and controlled grazing are needed to realize the full potential. This soil is well suited to bermudagrass, bahiagrass, and clover.

Potential for slash and longleaf pines is high. A water control system is needed to provide protection from flooding. Limitations to the use of equipment, seedling mortality, and plant competition are management concerns. Bedding of the rows is necessary for low seedling mortality and good tree growth.

Potential for community development is very low. This soil is limited by excessive wetness and flooding, which restrict its use for dwellings, small commercial buildings, and local roads and streets. The low position on the landscape makes water control and protection from flooding difficult. Potential for use as septic tank absorption fields is very low. Large amounts of fill material would be required to raise the field above the high water table. Possibility of ground water contamination during flooding would continue to exist.

This Winder soil is in capability subclass Vw and woodland ordination group 2w.

49—Moultrie fine sand, frequently flooded. This very poorly drained, nearly level soil is in tidal marsh areas, generally in long narrow areas on the margins of the tidal marsh or on low "islands" in the tidal marsh. Individual areas of this soil range from 5 to 60 acres. Slopes range from 0 to 1 percent.

Typically, the surface layer is dark grayish brown fine sand about 2 inches thick. The subsurface layer is light gray fine sand in the upper 6 inches and grayish brown fine sand in the lower 14 inches. The subsoil is very dark gray fine sand in the upper 4 inches and very dark brown fine sand in the lower 3 inches. The next layer is brown fine sand about 18 inches thick. The substratum is grayish brown fine sand, which extends to a depth of 80 inches or more.

Included in mapping are small areas of Pellicer and Tisonia soils. Also included are small areas of other soils that are similar to this Moultrie soil. Some have a mucky surface layer, some have a thin clayey surface layer, and some do not have a subsoil. The other included soils are on similar positions in the landscape. The included soils make up 10 to 15 percent of any area mapped.

The seasonal high water table is at a depth of less than 10 inches most of the time and is directly influenced by tidal fluctuations. This soil is flooded periodically by abnormally high tides caused by storms or other unusual conditions.

In this Moultrie soil, permeability is very rapid in the surface and subsurface layers and in the substratum. It is rapid or moderately rapid in the subsoil. Available water capacity is very low in the surface and subsurface layers and in the substratum and is moderate in the subsoil. Natural fertility and organic matter content are low.

The natural vegetation includes seashore saltgrass, bushy sea-oxeye, glasswort, big leaf sumpweed, and red mangrove.

This Moultrie soil has severe limitations for growing vegetable crops, improved pasture, or pine trees. Potential for these uses is very low. Excessive salt content and periodic tidal flooding restrict the use of this soil for agricultural purposes. This soil is used mainly for aquatic wildlife habitat.

Potential for community development is very low. Excessive wetness and flooding restrict the use of this soil for dwellings, small commercial buildings, and local roads and streets. The low position on the landscape makes water control and protection from flooding difficult. Potential for use as septic tank absorption fields is very low. Large amounts of fill material are needed to raise the field above the high water table. Possibility of ground water contamination during flooding would continue to exist.

This Moultrie soil is in capability subclass VIIIw. It is not assigned a woodland ordination symbol.

50—Narcoossee fine sand, shelly substratum. This is a somewhat poorly drained, nearly level soil on narrow flats and low knolls adjacent to relict beach dunes and tidal salt marshes. It formed in sandy marine sediments mixed with shells and shell fragments. Areas of this soil are irregular in shape and range from 10 to 75 acres. Slopes range from 0 to 2 percent.

This soil is fine sand throughout. Typically, the surface layer, about 3 inches thick, is black. The subsurface layer, which extends to a depth of 11 inches, is gray. The upper 3 inches of the subsoil is dark reddish brown and contains shells and shell fragments. Below that, the subsoil is yellowish brown to gray and contains shells and shell fragments in the upper part.

Included in mapping are small areas of Adamsville Variant and Pompano soils. Also included are small areas of soils that resemble this soil but do not have shells or shell fragments and soils that have a water table within 10 inches of the surface during the rainy season. Included areas in this map unit make up about 10 percent of any area mapped.

The water table is at a depth of 20 to 40 inches for 4 to 6 months. During periods of very heavy rainfall, it rises to a depth of 10 to 20 inches for brief periods. During extended dry periods, the water table recedes to a depth of more than 40 inches. Available water capacity is very low to low in the surface layer and very low in the subsurface layer. It is low in the subsoil and very low or low in the substratum. Permeability is rapid or very rapid in the surface layer, subsurface layer, and substratum and moderately rapid to very rapid in the subsoil. Natural fertility and organic matter content are low.

The natural vegetation includes live oak, laurel oak, scattered longleaf pine, waxmyrtle, sweetbay, sawpalmetto, creeping bluestem, pineland threeawn, and panicums.

Seasonal wetness and droughtiness are severe limitations for growing cultivated crops. Potential is medium for vegetable crops under intensive management. A water control system designed to remove excess water and provide irrigation in dry seasons is necessary to overcome the limitations. Fertilizer should be added, and all crop residue should be returned to the soil.

Potential for improved pasture grasses is medium. Use of surface ditches to remove excess water during heavy rainfall is needed to realize the full potential of the soil. Grazing should be carefully controlled to maintain vigorous plants for highest yields. Fertilizer and lime should be added according to the needs of plants.

This soil has moderately high potential for slash pines. Limitations to the use of equipment, seedling mortality, and plant competition are management concerns. The use of good site preparation and planting techniques helps overcome limitations caused by poor soil quality. Bedding of the rows concentrates organic matter in the rows and improves soil quality.

Potential for community development is high. Some water control is necessary to lower the seasonal high water table to a depth of 2 1/2 feet. Water outlets for area drainage generally are available. Potential for use as septic tank absorption fields is also high. If this soil is used as a site for septic tank absorption fields, about 2 1/2 feet of clean fill material is needed to raise the field higher than the water table.

This soil is in capability subclass IIIw and woodland ordination group 3w.

51—St. Augustine-Urban land complex. This map unit consists of nearly level, somewhat poorly drained St. Augustine soils that have been used for urban development. Most areas of this unit are located near the Atlantic coast and along the Intracoastal Waterway. Many areas are adjacent to tidal marshes and other low areas or bodies of water from which sandy soil material has been dredged. This is the material from which the St. Augustine soils formed. Individual areas range from 40 to 800 acres and contain about 65 percent St. Augustine soils and 35 percent Urban land. The areas of soils and the areas of Urban land are so intricately mixed or so small that they could not be shown separately at the scale used for mapping.

Typically, the St. Augustine soils have a surface layer about 4 inches thick. It is very dark gray fine sand mixed with shell fragments. Below this, to a depth of 10 inches, is brown and light gray fine sand mixed with shell fragments. Between depths of 10 and 33 inches, the material is light gray and gray fine sand mixed with fragments of sandy clay and shells. Below this is gray fine sand and shell fragments.

Urban land consists mainly of streets, sidewalks, parking lots, buildings, and other structures which obscure or alter the soils to such a degree that identification of the soil is not feasible.

Included in this unit are small areas of the St. Augustine soils that have a clayey substratum and of Fripp and Satellite soils. Also included are small areas of soils that are similar to the St. Augustine soils, but some do not have loamy or clayey fragments, some have a thicker surface layer, and others are better drained. Also included are a few areas where Urban land makes up more than 65 percent of the unit.

The water table is at a depth of 20 to 30 inches for 2 to 6 months. It rises to a depth of less than 20 inches briefly during times of high rainfall. This map unit is subject to flooding for very brief periods during passage of hurricanes. Available water capacity of the St. Augustine soils is very low. Permeability is rapid in the surface layer and upper part of the underlying material and moderate to rapid in the lower part. Natural fertility and the organic content are low.

Present land use precludes the use of the soils for cultivated crops, improved pasture, or pine trees. St. Augustine soils, the open part of the unit, are used for lawns, parks, playgrounds, and open space. Potential for these uses is medium. Regular applications of fertilizer and water are needed to maintain lawn grasses and ornamental plants in good condition. Good-quality topsoil should be spread before planting lawns. Use of drought-resistant plant varieties is a good practice. Where nearness to the Atlantic Ocean or other bodies of salty water is a factor, salt-tolerant plants should be grown.

These soils are not assigned to a capability subclass or given a woodland ordination symbol.

52—Durbin muck, frequently flooded. This is a very poorly drained, nearly level soil in narrow estuaries and broad tidal basins near the Atlantic Ocean and Inland Waterway. Individual areas of this soil are narrow and elongated and range from 15 to 500 acres. Slopes are less than 1 percent.

Typically, the surface layer is very dark grayish brown muck about 6 inches thick. Between depths of 6 and 59 inches is very dark gray and black muck. The substratum is very dark grayish brown fine sand and extends to a depth of 80 inches or more.

Included in mapping are small areas of Moultrie, Pellicer, and Tisonia soils. Also included are small areas of soils similar to this Durbin soil, except they have a muck layer only 20 to 35 inches thick. Total included soils make up about 10 percent of any area mapped.

This soil is continuously saturated. It is flooded daily by normal high tides. During high tides salty water 6 to 24 inches deep stands above the soil surface.

Permeability is rapid throughout. Available water capacity is very high in the organic layer and moderate in the sandy substratum. The organic matter content is high. Natural fertility is high, but is limited by high salt and sulfur content.

This Durbin soil has natural vegetation that includes seashore saltgrass, needlegrass rush, smooth cordgrass, bushy sea-oxeye, glasswort, and bigleaf sumpweed.

This soil has very low potential for vegetable crops, improved pasture, or pine trees. It is flooded daily by fluctuating tide levels. The high salt content and extreme wetness permit only the most salt- and water-tolerant plants to grow. The high sulfur content makes this soil extremely acid when dry. Its location in low, concave tidal basins makes reclamation difficult. Water control could be accomplished only by diking and pumping.

Potential for community development is very low. The hazard of flooding, excessive soil wetness, and low strength make this soil unsuitable for construction of buildings or local roads and streets. Overcoming these limitations is impractical.

Areas of this Durbin soil provide important wildlife habitat. The native vegetation and fauna are important links in the food chain for many sport and commercial finfish and shellfish.

This Durbin soil is in capability subclass VIIIw. It is not assigned a woodland ordination symbol.

53—Immokalee-Urban land complex. This map unit consists of poorly drained, nearly level Immokalee soils and Urban land. Individual areas of this map unit range from 50 to 650 acres in size and contain from 40 to 60 percent Immokalee soils and 30 to 40 percent Urban land. The areas of Immokalee soils and the areas of Urban land are so mixed or are so small that they could not be shown separately at the scale used for mapping.

Typically, Immokalee soils have a surface layer that is very dark gray fine sand about 6 inches thick. The subsurface layer is fine sand, which extends to a depth of 37 inches. The upper 5 inches of the soil material is gray. The next 26 inches is light gray, and the lower 17 inches is mottled with very dark gray, dark gray, and dark grayish brown. The subsoil consists of very dark gray fine sand about 14 inches thick. Below that is dark grayish brown fine sand.

Urban land consists mainly of streets, sidewalks, parking lots, buildings, and other structures which obscure or alter the soils to such a degree that identification of the soil is not feasible.

Included in mapping are small areas of Cassia, Myakka, Smyrna, Ona, Pomello, Pottsburg, and Tavares soils, of which Myakka soils are the most extensive. Also included are a few small areas where Urban land makes up as much as 60 percent of the unit.

Immokalee soils have a seasonal high water table at a depth of less than 10 inches. Available water capacity is low in the surface layer, very low in the subsurface layer, and moderate in the subsoil. Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. Organic matter content and natural fertility are low.

Present land use prevents the use of these soils for growing cultivated crops, pasture, or commercial trees. The Immokalee soils, or the open part of this unit, are used for lawns, parks, playgrounds, cemeteries, or open space. These soils have medium potential for growing lawn grasses and ornamental shrubs. For maintaining lawns in good condition, regular applications of fertilizer are needed. Also, water control measures are needed to supply water during droughty periods and to quickly remove excess surface water during periods of high rainfall.

Potential for community development is medium. Immokalee soils are limited by excessive wetness caused by a seasonal high water table that is within 10 inches of the surface during periods of high rainfall. Where adequate water outlets are available, a water control system is needed to increase the depth to the water table to about 2 1/2 feet. If outlets are not available, building sites and roadbeds should be elevated with fill material to increase the depth to the water table. Potential for septic tank absorption fields is medium. If Immokalee soils were used as a site for septic tank absorption fields, about 4 feet of fill material would be needed to raise the field above the high water table.

These soils are not assigned to a capability subclass or given a woodland ordination symbol.

54—Astatula-Urban land complex. This map unit consists of nearly level to sloping, excessively drained Astatula soils on broad upland ridges and Urban land.

Individual areas of this complex range from about 40 to 400 acres and contain 40 to 60 percent Astatula soils and 30 to 40 percent Urban land. The areas of Astatula soils and the areas of Urban land are so intricately mixed or so small that they could not be shown separately at the scale used for mapping.

Typically, Astatula soils have a surface layer of very dark grayish brown fine sand about 6 inches thick. Below that is fine sand, which extends to a depth of 80 inches or more. It is yellowish brown and has pockets of very dark grayish brown in the upper 11 inches. Below that, the material is strong brown and has pockets of light yellowish brown. Below that is yellow fine sand.

Urban land consists mainly of streets, sidewalks, parking lots, buildings, and other structures, which obscure or alter the soils to such a degree that identification of the soil is not feasible.

Included in mapping are small areas of Immokalee, Myakka, Paola, Pomello, Tavares, and Wesconnett soils. The excessively drained Paola soils are on similar positions and are the most extensive. The moderately well drained Pomello and Tavares soils are on lower positions in the landscape, generally on the lower part of ridges and side slopes. Also included are poorly drained to very poorly drained soils in low flat areas, sloughs, and depressions and a few small areas where Urban land makes up as much as 60 percent. Near the Atlantic Ocean, small areas of Fripp soils are included. These excessively drained soils occupy similar positions on long narrow ridges. The included areas make up 20 to 45 percent of this unit.

Astatula soils have a water table at a depth of more than 72 inches. Available water capacity is very low, and permeability is rapid throughout. Natural fertility and the organic matter content are low.

Present land use precludes the use of these soils for cutivated crops, pasture, or commercial trees. The Astatula soils, in the open spaces of this map unit, are used for lawns, parks, playgrounds, cemeteries, or open space. The potential is moderate for growing lawn grasses and ornamental shrubs. Regular applications of fertilizer and water are needed to maintain lawns in good condition. Selection of drought-resistant plant varieties helps overcome the droughtiness of these soils. Where the surface soil has been removed to prepare for community development, additions of good-quality topsoil may be needed for vigorous plant growth.

These soils are not assigned to a capability subclass or given a woodland ordination symbol.

55—Arents, 0 to 2 percent slopes. Arents are nearly level soils made up of heterogeneous soil material that was removed from other soils and used in land leveling, as fill material, or as a final covering for sanitary landfill. This material is a mixture of fine sand or sand and fragments of sandy subsoil material that have dark organic accumulations. Areas occur throughout the county. Individual areas are square, rectangular, or irregular in shape and range from 3 to 150 acres.

Arents do not have an orderly sequence of soil layers. In most areas, the upper 20 to 60 inches is variable and contains discontinuous lenses, pockets, and streaks of black, gray, grayish brown, brown, or yellowish brown sand. It contains few to common, black or dark reddish brown sandy fragments from subsoil material. Below this is an undisturbed sandy soil.

In some areas, large cells of solid waste refuse are below a depth of 2 to 4 feet. This refuse consists of plastic, wood, glass, concrete, metal, and other material ranging in thickness from 2 to 10 feet. It is generally stratified with layers of soil material that was used as daily cover. A final layer of soil material is spread on top of the refuse and then smoothed. These areas of sanitary landfill are identified on the soil map by the words "sanitary landfill" and the map symbol.

Included with these soils in mapping are a few areas in which the mixed material contains fragments of loamy soil material. A few small areas contain shell fragments. In some spots, the fill material is less than 20 inches thick.

The water table is at a depth of 10 to 40 inches for 2 to 6 months. In areas of sanitary landfill, the water table is controlled by perimeter drainage ditches or other water control measures. The available water capacity is low, and permeability is rapid. Natural fertility and the organic matter content are low.

The native vegetation includes waxmyrtle, inkberry, sawpalmetto, longleaf pine, and slash pine. The understory vegetation includes bluestem, panicum, and pineland threeawn.

These soils are generally not suited to vegetable crops because of the extreme variability of soil properties and the generally poor soil quality. Potential for this use is very low.

In some areas improved pasture grasses can be grown, but the potential is generally low. Deep-rooted varieties such as bahiagrass should be grown. A large amount of fertilizer must be applied.

The potential for pine trees is low. In many areas these soils are not suited to trees because of the wide range of soil properties.

The potential for community development is medium in the areas of Arents that were not used for sanitary landfills. The areas having less than 2 feet of fill may require additional elevation of sites for building foundations and subgrades for local roads and streets. In areas that have less than 3 feet of fill material, additional material may be needed to raise the septic tank absorption field. Areas of sanitary landfill have very low potential for community development. The differential settling of the buried refuse severely limits the building of dwellings without basements and local roads and streets on these areas. Areas of sanitary landfill are not suitable for septic tank absorption fields. Refuse cells would not provide necessary filtering of effluent. Differential settling would cause filter fields to cease functioning.

Arents are not assigned to a capability subclass or given a woodland ordination symbol.

57—Adamsville Variant fine sand. This somewhat poorly drained, nearly level soil is on low knolls adjacent to tidal marshes, streams, and estuaries, near the Atlantic coast and Atlantic Inland Waterway. Early settlers added large quantities of oyster shells to the soil as a soil amendment. Crop residue was added to the soil at regular periods, and the soil was tilled to a depth of about 10 to 15 inches. These practices have greatly increased the organic matter content and thickness of the surface layer. Areas are irregularly shaped and range from 10 to 60 acres. Slopes are less than 2 percent.

Typically, the surface layer, about 10 inches thick, is very dark grayish brown fine sand containing oyster shells 1/4 inch to 2 1/2 inches in diameter. Below this is pale brown, brown, light brownish gray, and light yellowish brown fine sand that extends to a depth of 80 inches or more.

Included in mapping are small areas of Immokolee, Myakka, and St. Johns soils. Also included is a soil that is similar to this Adamsville Variant soil, but it has a layer darkened by organic accumulations at a depth of 60 to 80 inches.

In most years the water table is at a depth of 20 to 40 inches for 2 to 6 months. It rises to within a depth of 10 to 20 inches for up to 2 weeks during the rainy season in some years. It is within a depth of 60 inches for more than 9 months in most years. Available water capacity is moderate in the surface layer and low in the underlying layers. Permeability is very rapid in the surface layer and the upper underlying layers and is rapid below. Natural fertility is medium. The organic matter content is moderate in the surface layer and low in the other layers.

The natural vegetation consists of live oak, laurel oak, cabbage palms, southern redcedar, yaupon holly, waxmyrtle, wild grape, blackberry, bluestem, and panicum.

This soil has medium potential for production of vegetable crops, but it is limited for this use because of its small total acreage. Some water control measures are needed to maintain the water table at the depth required by the crop being grown. Installation of water control systems that remove excess water during rainy seasons is feasible. This soil is droughty, and some provision must be made to irrigate crops grown during the dry seasons. For maximum yields, regular applications of fertilizers are required, but lime is not needed.

Potential for improved pasture is medium. Although this soil is not subject to long periods of wetness, simple water control measures may be needed to quickly remove excess surface water after periods of high rainfall. Adapted varieties such as bahiagrass and sweetclover grow well. Use of fertilizer is needed for high production. Grazing should be controlled to maintain healthy plants.

Potential for pine trees is moderately high. The total acreage is very small, however, and it is seldom used for this purpose. Limitations to the use of equipment, seedling mortality, and plant competition are the main management concerns.

Potential for community development is high. Some water control is needed to maintain the water table at a depth of at least 2 1/2 feet. Water outlets are usually available for area drainage. If water outlets are not available, building sites and roadbeds need to be elevated about 1 1/2 feet. Potential for septic tank absorption fields is high. About 2 feet of fill material is needed to raise the filter field above the high water table.

This Adamsville Variant soil is in capability subclass IIIw and woodland ordination group 3w.

58—EauGallie fine sand. This is a poorly drained, nearly level soil on low knolls and ridges, adjacent to depressions and drainageways in the flatwoods. Areas of this soil are irregular in shape and are 5 to 150 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is black fine sand, about 6 inches thick, that contains many uncoated sand grains. The subsurface layer, about 11 inches thick, consists of gray and light gray fine sand. The subsoil, in the upper 6 inches, is black and dark reddish brown fine sand, and in the next 9 inches, a yellowish brown fine sand. The material between depths of 32 and 45 inches is very pale brown fine sand, and it is underlain by 8 inches of gray loamy fine sand. The lower part of the subsoil, at a depth of 53 inches, is gray fine sandy loam about 5 inches thick. Below that, to a depth of 80 inches or more, is gray fine sand.

Included in mapping are small areas of Myakka, Pomona, Riviera, and Wabasso soils. Also included is a similar soil in which the upper part of the subsoil is at a depth of 30 to 40 inches. Other similar soils have a layer of mixed dark yellowish brown and yellowish brown fine sand above the loamy layers, and others are brown in the lower part of the subsoil. Total included areas in this map unit are less than 15 percent.

The water table is within 10 inches of the surface for a period of 1 to 4 months and within 40 inches for more than 6 months. Available water capacity is very low in the surface and subsurface layers, low in the upper part of the subsoil, very low in the next layer, and moderate in the lower part of the subsoil. Permeability is rapid in the surface and subsurface layers, slow to moderate in the upper and lower parts of the subsoil, and moderate to rapid in the other layers. Organic matter content and natural fertility are low.

The natural vegetation includes slash pine, cabbage palms, southern bayberry, pineland threeawn, and greenbrier. A few areas have been cleared and are used for improved pasture. Other areas are planted to slash pine.

This EauGallie soil has medium potential for cultivated crops. A seasonal high water table that is within 10 inches of the surface during wet seasons and low natural fertility are limitations that must be overcome if the maximum potential is to be achieved. An adequate water control system is needed to remove excess water in wet seasons and provide water through subsurface irrigation in dry seasons. Close-growing cover crops should be planted after cash crops are harvested. All crop residue should be returned to the soil. Good seedbed preparation includes bedding of the rows. Fertilizer and lime should be added according to the needs of the crop.

This EauGallie soil has high potential for pasture grasses. Bahiagrass and bermudagrass grow well under good management. Water control measures are needed to remove excess surface water after heavy rains. Regular applications of fertilizer and lime are also needed due to low natural fertility. Grazing should be controlled to maintain best yields.

This soil has moderately high potential for slash pine. Limitations to the use of equipment, seedling mortality, and plant competition are management concerns. A seasonal high water table during wet seasons restricts the use of equipment for site preparation, planting, and harvesting. Some water control is needed to remove excess surface water. Good site preparation includes bedding of the rows.

Potential for community development is medium. Wetness resulting from a seasonal high water table that is within 10 inches of the surface is the main limitation affecting the use of this soil. Water control measures are needed to lower the water table and quickly remove excess surface water after heavy rains. Elevating roadbeds for local roads and streets and foundation sites for dwellings without basements may require use of fill material. The effective depth to the water table should be no less than 2 1/2 feet. If this soil is used as a site for septic tank absorption fields, about 4 feet of fill material is needed to raise the field above the high water table.

This EauGallie soil is in capability subclass IVw and woodland ordination group 3w.

61—Riviera fine sand, depressional. This is a very poorly drained, nearly level soil in depressional areas and in the flatwoods. This soil is ponded for more than 6 months of the year. Areas of this soil are elongated to nearly circular and range from 4 to 200 acres. Slopes are less than 1 percent and are smooth to concave.

Typically, the surface layer consists of about 6 inches of dark gray fine sand. The subsurface layer is grayish brown fine sand, which extends to a depth of 25 inches. The subsoil, about 17 inches thick, is dark gray sandy clay loam and fine sandy loam that has pockets and tongues of fine sand in the upper 10 inches. Between depths of 42 and 55 inches is dark gray fine sandy loam. The substratum to a depth of 80 inches or more is grayish brown loamy fine sand.

Included in mapping are small areas of Bluff, Floridana, Manatee, and Winder soils and Riviera soils in frequently flooded areas. Also included are similar soils that have a subsurface layer darkened by organic accumulations, soils that have layers of yellowish brown to yellow fine sand or loamy fine sand above the subsoil, and soils having a sandy clay subsoil. The included soils make up less than 10 percent of any area mapped.

This soil is subject to ponding for long periods. The water table is above the surface for more than 6 months in most years. Permeability is rapid or very rapid in the surface and subsurface layers, slow or very slow in the subsoil, and moderate or moderately rapid in the substratum. Available water capacity is low or very low in the surface and subsurface layers and substratum and moderate in the subsoil. Organic matter content and natural fertility are low.

The native vegetation includes mostly juncus, flags, maidencane, and sawgrass and scattered cypress, cabbage palm, willow, bay, and waxmyrtle.

In its natural state, this Riviera soil is not suited to most agricultural uses. A water table that is above or within 10 inches of the surface for more than 6 months in most years severely restricts the use of the soil for crops. Potential for vegetable crops is very low because of ponding. Water stands above the soil surface for long periods during the growing season. Suitable drainage outlets are not available or are difficult to install and maintain. This soil is seldom used for growing vegetables because installing water control systems is difficult and expensive.

Potential for improved pasture grasses is very low. Water standing above the surface for long periods and the difficulty of installing adequate water control systems limit the use of this soil for improved pasture.

Potential for pine trees is low. The excessive wetness of this soil limits its capability to grow pine trees. Water control measures that remove excessive surface water are difficult to install because of lack of suitable outlets. Management concerns are equipment use limitations, seedling mortality, and plant competition. This soil is rarely used for commercial woodland because of cost of drainage.

Potential for community development is very low. Water stands above the surface of the soil for long periods of time during the wet season. Outlets which permit removal of the standing water and lowering the high water table are usually not available. This soil could be developed if water control measures were adequate; however, construction and maintenance of the water control system would be expensive and difficult. Large amounts of suitable fill material are needed to raise roadbeds for local roads and streets, foundations for houses, and septic tank absorption fields above the high water table.

This Riviera soil is in capability subclass VIIw. It is not assigned a woodland ordination symbol.

62—Floridana fine sand. This is a poorly drained, nearly level soil on low broad flats. Areas of this soil range from 60 to 1,200 acres. They are irregular in shape. Slope ranges from 0 to 2 percent.

Typically, the surface layer is black fine sand about 11 inches thick. The subsurface layer, which is about 19 inches thick, consists of light brownish gray and gray fine sand. The subsoil is gray sandy clay loam, which extends to a depth of 46 inches. Below that, to a depth of 80 inches or more, is gray fine sandy loam.

Included in mapping are small areas of soils that are similar to this Floridana soil, except that some have a subsoil within 20 inches of the surface; some have a surface layer more than 24 inches thick; some have a surface layer that is only 7 to 10 inches thick; and others are in depressions and are subject to ponding. The included soils in this map unit make up less than 15 percent of any area mapped.

In the soil's natural state, the seasonal high water table is within a depth of 10 inches for 4 to 6 months. Permeability is rapid in the surface and subsurface layers and very slow in the subsoil. Available water capacity is moderate in the surface layer and subsoil and low in the subsurface layer. Natural fertility is high, and the organic matter content is moderate.

The natural vegetation includes slash pine, cabbage palm, sweetgum, water oak, waxmyrtle, sawpalmetto, and various ferns. Most areas have been cleared and are used for cabbage and potato production.

This soil has high potential for growing specialized cultivated crops (fig. 9). It is severely limited by wetness. The root zone is limited by a seasonal high water table that is less than 10 inches below the surface. A water control system that removes excess surface water and internal water rapidly and provides subsurface irrigation is needed. Good soil management includes the use of crop rotations that keep the soil in close-growing cover crops when it is not being cultivated. The cover crop and all other crop residue should be returned to the soil. Bedding of rows is needed in seedbed preparation. Fertilizer should be applied according to the needs of the crop.

This Floridana soil has high potential for most pasture grasses. Water control systems designed to quickly remove excess surface water and regular applications of fertilizer are needed. This soil is well suited to bermudagrass, bahiagrass, and clover.

This soil has moderately high potential for slash pine under high-level management. A high water table during periods of higher rainfall limits this soil for this use. Equipment mobility during wet seasons, seedling mortality, and plant competition are management concerns. A simple water control system is needed to remove excess surface water. Timely scheduling of site preparation, planting, and harvesting is required. Site preparation should include bedding of the rows.

The potential for community development is medium. Excessive wetness is the main limitation for this use. A seasonal high water table is at or near the soil surface during times of high rainfall. For constructing houses, small commercial buildings, and local roads and streets, water control measures that increase the depth to the water table to 2.5 feet are needed. In many places water outlets are not available or are difficult to install. In these areas, construction sites and roadbeds should be elevated to increase the effective depth to the water table. The potential for use as a site for septic tank absorption fields is medium. If this soil is used as a site for absorption fields, about 4 feet of suitable fill material is needed to raise the field above the high water table.

This Floridana soil is in capability subclass IIIw and woodland ordination group 3w.

63—Placid fine sand. This is a very poorly drained, nearly level soil on broad, low, flat areas. Slopes range from 0 to 2 percent. Areas of this soil are irregular in shape and range from 60 to 500 acres.

Typically, the surface layer is black fine sand about 12 inches thick. The subsurface layer is fine sand, which extends to a depth of 51 inches. It is dark gray in the upper part and grayish brown, light gray, and dark grayish brown below. Below that is dark grayish brown loamy fine sand about 7 inches thick. Grayish brown fine sand extends to a depth of 80 inches or more.

Included in mapping are small areas of Ellzey, Floridana, Holopaw, and Tocoi soils. Also included are small areas of soils which are similar to this Placid soil, except some have a fine sandy loam or sandy clay loam subsoil, and others are more alkaline. The included soils make up about 15 percent of any area mapped.

This soil has a seasonal high water table within a depth of 10 inches for more than 6 months in most years. During extended dry periods, the water table may recede to a depth of more than 40 inches. In most areas, this soil has extensive water control systems installed, and it is cultivated.

Permeability is rapid throughout. Available water capacity is moderate in the surface layer and very low or low in the subsurface layer. Organic matter content and natural fertility are high.

The natural vegetation includes longleaf and slash pines, sweetgum, water oak, waxmyrtle, wild grape, smilax, and a few cypress. The native grasses include maidencane, bluestems, cinnamon fern, pineland threeawn, and lopsided indiangrass.

This soil has high potential for cultivated crops. Irish potatoes grow well on this soil. Response to fertilizer is rapid. A water control system is needed to remove

Figure 9.—Irrigated cabbage crop in area of Floridana fine sand.

excess water during rainy seasons and to provide irrigation during dry seasons. Close-growing cover crops should be planted when the soil is not used. All crop residue should be returned to the soil. Fertilizer and lime should be added according to the needs of the crop.

Under natural conditions, this soil is too wet for most improved pasture grasses and legumes to be grown. It has high potential for pasture, but use of surface ditches for removing excess water is needed to grow such plants as bahiagrass, bermudagrass, and clover. Proper fertilization and liming are needed.

Potential for pine trees is high. Limitations to the use of equipment and seedling mortality are management concerns. Timely scheduling of site preparation and planting operations is needed. Good site preparation should include bedding of the rows.

Potential for community development is medium; a high water table is the main limitation. Dwellings without basements and local roads and streets require special water control measures to remove excess surface water and lower the high water table. Adequate water outlets for drainage generally are available. Structures should be built on low mounds. Potential for septic tank absorption fields is medium. About 4 feet of suitable fill material is needed to raise the field above the high water table during wet seasons.

This Placid soil is in capability subclass IIIw and woodland ordination group 2w.

64—Ellzey fine sand. This is a nearly level, poorly drained soil that formed in thick sandy sediments of marine origin. This soil is on low broad flats in the cabbage and potato farming area of St. Johns County. Areas of this soil are irregular in shape and range from 20 to 1,200 acres. Slope ranges from 0 to 2 percent.

Typically, the surface layer is black fine sand about 12 inches thick. The subsurface layer, about 15 inches thick, is gray and light gray fine sand. The subsoil is brownish yellow fine sand in the upper 6 inches; yellowish brown fine sand in the next 4 inches; and yellowish brown and brown loamy fine sand to a depth of 58 inches. Below that, the subsoil is light brownish gray loamy fine sand about 6 inches thick. The substratum to a depth of 80 inches or more is gray fine sand.

Included in mapping are small areas of Anclote and Floridana soils. Also included are small areas of similar soils, some of which have a surface layer less than 10 inches thick, and others which have a gray subsoil. Total included soils make up about 15 percent of any area mapped.

This Ellzey soil has a water table at a depth of less than 10 inches for 2 to 4 months during most years. During extended periods of low rainfall, it may recede to a depth greater than 40 inches. Permeability is rapid in the surface and subsurface layers and substratum. It is moderate in the subsoil. Fertility is low. The organic matter content is moderate to high in the surface layer and low in the other layers. Available water capacity is very low or low in the surface and subsurface layers and moderate in the subsoil.

The natural vegetation consists of slash pine, sawpalmetto, inkberry, wild grape, and smilax and a few sweetgum, water oak, and cypress. Native grasses include pineland threeawn, lopsided indiangrass, chalky bluestem, and maidencane.

This Ellzey soil has high potential for cultivated crops. In its natural state, this soil has a root zone that is limited by a water table that is within 10 inches of the surface during wet seasons. A complete water control system would be needed to permit this soil to produce good yields. Good soil management includes growing a cover crop when the soil is not in use. All crop residue should be returned to the soil. Bedding of rows is needed in seedbed preparation. Fertilizer and lime should be applied as required by the needs of the crop.

The potential for pine trees is moderately high. Water control measures, which remove excess surface water, are needed to attain potential productivity. Limitations to the use of equipment and seedling mortality are the main management concerns.

Potential for improved pasture grasses and clover is high. In its natural state, this soil is too wet for those uses. Surface ditches, which quickly remove excess water, are needed to permit such crops as bahiagrass, bermudagrass, and clover to grow well. Regular applications of fertilizer and lime are needed for best yields.

Potential for community development is medium. Wetness caused by a water table that is within 10 inches of the surface during periods of high rainfall is the main limitation. Dwellings without basements and local roads and streets require special measures to remove excess surface water quickly and to increase the depth to the seasonal high water table. Potential for use as sites for septic tank absorption fields is medium. About 4 feet of suitable fill material is needed to raise the field above the high water table.

This soil is in capability subclass IIIw and woodland ordination group 3w.

65—Riviera fine sand. This is a poorly drained, nearly level soil in low, broad areas in the flatwoods. Individual areas are irregular in shape and range from 15 to 120 acres. Slopes are 0 to 2 percent.

Typically, the surface layer is black and dark grayish brown fine sand about 6 inches thick. The subsurface layer, to a depth of 28 inches, is grayish brown fine sand. The subsoil, which extends to a depth of 62 inches, is dark grayish brown and grayish brown sandy clay loam. The upper 12 inches of the subsoil contains pockets and tongues of fine sand. The substratum, to a depth of 80 inches or more, is gray loamy fine sand.

Included in mapping are small areas of Floridana, Holopaw, and Pompano soils. Also included are small areas of similar soils, some of which have a more acid subsoil; soils which have a loamy sand subsoil; and others that have layers of yellowish brown to yellow fine sand or loamy fine sand above the subsoil. The included soils make up less than 15 percent of any area mapped.

The seasonal high water table is within 10 inches of the surface for 2 to 4 months in most years. It is below 40 inches during long dry seasons. Available water capacity is low or very low in the surface and subsurface layers, moderate in the subsoil, and low in the substratum. Permeability is rapid or very rapid in the surface and subsurface layers, very slow or slow in the subsoil, and moderate or moderately rapid in the substratum. Organic matter content and natural fertility are low.

The natural vegetation includes slash and longleaf pines and a few scattered cabbage palm, sweetgum, blackgum, and maple. The understory vegetation is waxmyrtle, smilax, wild grape, pineland threeawn, lopsided indiangrass, and bluestems.

Because wetness is a severe limitation, this soil has medium potential for cultivated crops. The root zone is limited by a water table that is less than 10 inches below the surface. A complete water control system is needed in order to produce good yields of cabbage or potatoes. The water control system used must remove excess water rapidly and provide a means for subsurface irrigation during dry seasons. Cover crops should be grown when the soil is not being farmed. All cover crops and crop residue should be returned to the soil. Fertilizer and lime should be applied according to the needs of the crop.

Potential for improved pasture grasses and legumes is medium. A simple water control system is needed to quickly remove excess surface water. Bahiagrass, bermudagrass, and clovers grow well. Applications of fertilizer and lime are needed at regular intervals for vigorous plant growth.

Potential for pine trees is moderately high. Limitations to the use of equipment and high seedling mortality caused by excessive wetness are management concerns. Adequate control of surface water and bedding of rows are needed for low plant mortality.

Potential for community development is medium. A seasonal high water table that is at or near the surface during rainy seasons is a severe limitation for urban uses. Removal of excess surface water and lowering the water table are sometimes difficult because adequate water outlets generally are not available. Local roads and streets and dwellings without basements need adequate water control measures to lower the high water table to a depth of at least 2.5 feet. If adequate water control is not possible, roadbeds and building sites should be raised by the use of fill material to increase the depth to the water table. Potential for use as sites for septic tank absorption fields is medium. About 4 feet of suitable fill material is needed to raise the field above the high water table.

This soil is in capability subclass IIIw and woodland ordination group 3w.

66—Terra Ceia muck, frequently flooded. This is a very poorly drained, nearly level soil on narrow to broad flood plains along rivers and streams. It is primarily in the western part of the county along the St. Johns River and its tributaries. Areas of this soil are elongated or irregular in shape and range from 40 to 2,000 acres. Slopes are less than 1 percent.

Typically, the surface layer is dark reddish brown muck about 35 inches thick. The next layer is very dark gray muck that extends to a depth of 80 inches or more.

Included in mapping are small areas of Riviera, St. Johns, and Winder soils. Also included are small areas of soils that are similar to this Terra Ceia soil but have an organic layer less than 52 inches thick and are underlain by sandy or loamy material. The included soils make up less than 10 percent of any mapped area.

In most years under natural conditions, the seasonal high water table is at the surface, except during extended dry periods. Flooding can be expected after heavy rains. Permeability is rapid throughout, and available water capacity is very high. Natural fertility is medium, and the organic matter content is very high.

The natural vegetation includes sweetgum, blackgum, maple, bay, and waxmyrtle.

Under natural conditions, this soil is severely limited for cultivated crops by the frequent flooding and the high water table. If the soil is protected from flooding and water control is adequate, the potential is high for growing cabbage and most other vegetables. A well designed and maintained water control system should remove excess water during the growing season and keep the soil saturated at other times. Fertilizers containing phosphorus, potash, and minor elements are needed. All crop residue and cover crops should be returned to the soil to help maintain the thickness of the organic material.

Potential for improved pasture is high. In areas where water control is provided, improved pasture grasses and clovers grow well. The water table should be maintained near the surface to prevent excessive oxidation of the organic material. Regular applications of fertilizers and controlled grazing are required.

The potential of this soil for pine trees is very low. Limitations to the use of equipment, seedling mortality, and windthrow hazard limit the use of this soil for producing pine trees of commercial value.

Potential for community development is very low. The hazard of flooding, wetness, and low strength are severe limitations. Overcoming these limitations is generally impractical. Muck must be removed and large quantities of fill material spread before this soil can be used for building sites or local roads and streets. Potential for septic tank filter fields is very low because large quantities of fill material would be needed to raise the absorption field above the high water table.

This Terra Ceia soil is in capability subclass VIIw. It is not assigned a woodland ordination symbol.

67—Tisonia mucky peat, frequently flooded. This is a very poorly drained, nearly level soil that is in tidal marshes along the coastal area of the county. Areas of this soil are broad and elongated in shape and range from 80 to several hundred acres. Slopes are less than 1 percent.

Typically, the surface layer, about 18 inches thick, is very dark grayish brown mucky peat. The subsurface layer, to a depth of 65 inches, is dark gray clay. It has pockets and lenses of sandy loam and loamy sand in the lower 10 inches.

Included in mapping are small areas of Durbin and Pellicer soils. Also included are small areas of soils that are similar to this Tisonia soil, except some have organic material less than 16 inches thick, some have organic material that is more decomposed, and others have a thin subsoil underlain by sandy loam material. The included soils make up about 15 percent of any area mapped.

The seasonal high water table fluctuates with the tide. This soil is flooded twice daily by normal high tides. Permeability is rapid in the organic layer and very slow in the clay substratum. Available water capacity is very high in the organic layer and high in the clay substratum.

The natural vegetation includes seashore saltgrass, needlegrass rush, cattails, and marshhay cordgrass.

This mucky peat has severe limitations for cultivated crops, improved pasture, or trees. Potential for these uses is very low. Reclaiming this soil would require extensive water control if dikes and pumps were used. The high salt, sulfur, and clay content and low soil strength severely limit this soil for agricultural uses.

Potential for community development is very low. The hazard of flooding and limitations of excessive wetness and low soil strength make this soil poorly suited to the construction of buildings or local roads and streets. Overcoming these hazards and limitations is expensive and impractical.

Areas of this soil are an important wildlife habitat. The native vegetation and fauna provide important links in the food chain for many sport and commercial finfish and shellfish.

This Tisonia soil is in capability subclass VIIIw. It is not assigned a woodland ordination symbol.

68—Winder fine sand. This is a poorly drained, nearly level soil that formed in loamy marine sediments. It is in broad, low areas in the flatwoods. Areas of this soil are irregular in shape and range from 30 to 400 acres. Slopes range from 0 to 1 percent.

Typically, the surface layer consists of very dark gray fine sand about 3 inches thick. The subsurface layer is dark gray fine sand about 7 inches thick. In the upper 4 inches, the subsoil is gray fine sandy loam with intrusions of dark gray fine sand from the subsurface layer. The next 4 inches is light gray fine sandy loam, and the lower 38 inches is gray and light gray sandy clay loam. The substratum is at a depth of 56 inches. It is gray fine sandy loam in the upper 6 inches and contains a few hard calcium carbonate concretions. Below that, to a depth of more than 80 inches, is light olive gray fine sandy loam that contains a few soft calcium carbonate accumulations and shell fragments.

Included in mapping are small areas of Floridana, Holopaw, and Riviera soils. Also included are small areas of soils that are similar to this Winder soil. Some of these similar soils have a bright sandy subsoil; some have a more acid subsoil; some have a sandy clay subsoil; and some have a loamy fine sand surface layer. The included soils make up less than 20 percent of any area mapped.

The seasonal high water table is within a depth of 10 inches for 2 to 6 months during most years. Available water capacity is very low or low in the surface and subsurface layers, low in the upper part of the subsoil, and moderate in the lower part of the subsoil. It is low or moderate in the upper part of the substratum and very low or low in the lower part. Permeability is rapid in the surface and subsurface layers, moderately slow to very slow in the subsoil, slow in the upper part of the substratum, and rapid in the lower part. Organic matter content is very low to moderately low, and natural fertility is medium.

The native vegetation is dominantly slash pine, longleaf pine, and a few cabbage palms. Some areas have a few mixed hardwoods, cypress, and bay. The understory vegetation is sawpalmetto, waxmyrtle, pineland threeawn, maidencane, and bluestem.

Potential is medium for cultivated crops. The soil is severely limited because of wetness. The root zone is limited by a water table that is less than 10 inches below the surface much of the time. A complete water control system is needed in order to produce good yields of cabbage and other vegetables. The water control system must remove excess water rapidly and provide for a means of subsurface irrigation during periods of low rainfall. Bedding the rows is a good practice. Cover crops should be grown when the soil is not farmed. All crop residue should be returned to the soil. A good fertilizer program is needed for high yields.

Potential for improved pasture grasses and legumes is high. A simple water control system, which quickly removes surface water after heavy rainfall, is required. Bahiagrass, bermudagrass, and clovers grow well. Regular applications of fertilizer are needed for highest yields.

This Winder soil has high potential for pine trees. Limitations to the use of equipment during periods of high rainfall and seedling mortality are management concerns. Bedding of the rows lowers the effective seasonal high water table, decreases the seedling mortality rate, and promotes better tree growth.

Potential for community development is medium. Limitations are severe for urban uses because a seasonal high water table is at or near the surface during rainy seasons. Removal of excess surface water and increasing the depth to the water table are sometimes difficult because adequate water outlets generally are not available. Adequate water control systems, which lower the high water table to a depth of at least 2.5 feet, are needed for local roads and streets and dwellings without basements. If adequate water control is not possible, roadbeds and building sites should be elevated by the use of fill material to increase the effective depth to the water table. Potential for use as sites for septic tank absorption fields is medium. About 4 feet of suitable fill material is needed to raise the field above the high water table.

This soil is in capability subclass IIIw and woodland ordination group 2w.

69—Bakersville muck. This is a nearly level, very poorly drained soil in depressional areas of the flatwoods. Slopes are less than 2 percent. Areas range from 4 to 120 acres.

Typically, in undisturbed areas, a layer of black muck about 5 inches thick is on the surface. The surface layer is black and very dark grayish brown loamy fine sand, which extends to a depth of about 41 inches. The subsoil consists of fine sandy loam about 18 inches thick. It is very dark grayish brown in the upper 7 inches and dark brown in the lower 11 inches. Below that, the soil material is brown loamy fine sand about 4 inches thick over grayish brown loamy fine sand, which extends to a depth of 86 inches or more.

Included in mapping are small areas of soils similar to Bakersville muck, except that some have a gray or light gray sandy subsurface layer; some have a sandy clay subsoil; others have a fine sand surface layer; and others have a subsoil within a depth of 40 inches. The included soils make up about 20 percent of any mapped area.

The seasonal high water table is above the soil surface for 6 months or more in most years. Permeability is rapid in the surface layer and moderately rapid in the upper part of the subsoil. It is moderate in the lower part of the subsoil and rapid below. Available water capacity is very high in the organic layer, moderate to high in the surface layer and subsoil, and low to moderate below. Organic matter content is very high, and natural fertility is medium.

The natural vegetation consists of cypress, sweetgum, bay, and red maple with an understory of waxmyrtle, smilax, cinnamon fern, and brackenfern.

In its natural state, this soil is severely limited for growing vegetables, field crops, or pasture. It is covered with standing water much of the time during most years. The root zone is restricted by a high water table that is within a few inches of the surface in extremely dry periods. Adequate water outlets for removal of excess water generally are not available. Potential for crops and pastures is low.

Potential for pine trees is high only after drainage. Seedling mortality and limitations to the use of equipment are management concerns. Water control measures for removing excess surface water are needed. Bedding of the rows keeps seedling mortality at a minimum and aids tree growth. The areas are generally not used for commercial production.

Potential for community development is low; excessive wetness and ponding are the main limitations. Large amounts of fill material are needed to raise construction sites and roadbeds above the high water table. Adequate water outlets for removal of excess water generally are not available because this soil is in low positions. Potential for use as septic tank absorption fields is low. About 7 feet of suitable fill material is needed to elevate the field above the high water table.

This Bakersville soil is in capability subclass VIw and woodland ordination group 2w.

Use and Management of the Soils

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

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

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

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

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

Crops and Pasture

John Lawrence, agronomist, Soil Conservation Service, helped prepare this section.

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

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

More than 37,000 acres in St. Johns County is used for crops and pasture, according to the 1976 Census of Agriculture, estimates of St. Johns County Extension Service, and the Florida Agricultural Statistics, Florida Crop Reporting Service. Of this total, 12,000 acres is used for pasture, 5,000 acres is used for cabbage, and 15,000 acres is used for Irish potatoes. The rest is used mainly for vegetables, such as field peas, sweet corn, and onions. There are small acreages of cut flowers and nursery stock. About 200 acres of citrus is grown commercially in the areas southeast of Hastings, and about 2,000 acres of corn and grain sorghum is grown each year. These grain crops are usually planted following the harvest of cabbage or potatoes.

The potential of the soils in St. Johns County for increased production of food is high. About 175,000 acres of potentially good cropland is currently used as woodland, and about 10,000 acres is used as improved pasture. Food production could also be increased considerably 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.

In 1977, the Local Comprehensive Land Use Planning Agency estimated that 19,800 acres was used for urban development and predicted an increase of about 5 percent per year. The use of this soil survey in making land use decisions that will influence the future role of farming in the county is discussed under the heading "General Soil Map Units."

Water erosion is not a major problem in St. Johns County. The soils are sandy and mostly nearly level. Erosion from rapid runoff takes place only during heavy rains on bare soils that have short, steep slopes. Examples of these soils are the excessively drained

Astatula and Paola soils and the moderately well drained Tavares soils that have slopes of more than 2 percent.

Wind erosion is a major hazard on the sandy and organic soils. Wind erosion can damage soils and tender crops in a few hours in open, unprotected areas if the winds are strong and the soils are dry and bare of vegetation and surface mulch. Maintaining a plant or a surface mulch minimizes duststorms and improves air quality.

Field windbreaks of adapted trees and shrubs, such as Carolina cherry laurel, slash pine, southern redcedar, and Japanese privet, and strip crops of small grain are effective in reducing wind erosion and crop damage. Field windbreaks and strip crops are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The intervals depend on the erodibility of the soil and the susceptibility of the crop to damage from sand blowing.

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

Water control is a major management need on land used for crops. In this county, about 336,000 acres, or about 86 percent of the soils, is poorly drained or very poorly drained. These soils are too wet in their natural state during most years to grow crops commonly grown in the area. These sandy soils also have low water holding capacity and are droughty during dry periods. For most crops, water control systems that remove excess surface water and provide subsurface irrigation are needed on the poorly drained soils. Water control measures include bedding of the rows (fig. 10). The design of water control systems varies with the kind of soil and crop grown. More information about water control systems can be obtained from the local office of the Soil Conservation Service.

Soil fertility is naturally low in most of the sandy soils in the county. Most of the soils are strongly acid if they have not been limed. Soils such as Floridana, Parkwood, and Manatee have a thicker surface layer containing more organic matter. They have a higher soil reaction and are higher in natural fertility. Available phosphorous and potash levels are naturally low in most of these soils. On all soils, additions of lime and fertilizer should be based on the results of soil tests, on the needs of the crop, and on expected yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to apply.

Soil tilth is an important factor in the germination of seeds and infiltration of water into the soil. Soils that have good tilth are porous and granular. Most soils in St. Johns County have sandy surface layers with good tilth. The structure of the surface layer in most soils in the survey area generally is weak. Organic matter content is low to moderate in most areas. These soils can form slight crusts on the surface upon drying after heavy rains. Regular additions of organic matter from crop residue or other sources improve soil tilth, increase soil fertility, and reduce crust formation.

Field crops grown in the survey area include corn, grain sorghum, and a few acres of oats, wheat, and rye used for green chop feed for dairy cows. The corn and grain sorghum are usually grown in rotation after potatoes or cabbage has been harvested. Close-growing cover crops of sorghum or sorghum-sudangrass are usually grown when the land is idle. Sunflowers, sugarcane, and cotton could be grown if economics permit. Indigo was once a major crop.

Specialty crops grown commercially in the survey area include Irish potatoes, cabbage, and a few acres of cut flowers, field peas, sweet corn, okra, turnips, mustard, citrus, and ornamental nursery stock. If water control is adequate, most of the soils in the flatwoods can be used for vegetable crops. The poorly drained Holopaw, Immokalee, Myakka, Pomona, Pompano, Riviera, and Winder soils are sandy soils that have good internal drainage and are well suited to cabbage or Irish potatoes. The water control systems should provide water for subsurface irrigation during dry seasons.

Pastures in the survey area are used to produce forage for beef and dairy cattle. The sale of beef cattle in cow-calf operations is the major livestock enterprise. Bahiagrass and Coastal bermudagrass are the main pasture plants grown in the county. Excess grass is harvested as hay for winter feed or sold at the farm. Pastures in many parts of the county are depleted due to overgrazing and undermanagement. Differences in pasture yields are related closely to the kind of soil. Management of pasture is based on the relationship between soils, pasture plants, lime, fertilizer, and grazing systems. Yields can be increased under management that includes lime, fertilizer, and grass-legume mixtures.

If surface ditches are used, the poorly drained soils in flatwoods are well suited to improved pasture grasses. Unless artificially drained, some of the poorly drained soils are wet enough to cause some damage to pasture grasses during wet seasons.

There are no areas of prime farmland in St. Johns 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 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

Figure 10.—Areas of Ona fine sand are being prepared for growing Irish potatoes. Bedding of the rows is a common agronomic practice used in water control.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

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

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

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

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

Woodland Management and Productivity

Hal Brockman, forester, Soil Conservation Service, helped prepare this section.

Approximately 293,000 acres, or 75 percent of the survey area, is woodland. The soils and climate of St. Johns County are suitable for growing timber. Most of the forest land is Myakka, Immokalee, Holopaw, Riviera, Pompano, and Pomona soils. Except for the vegetable farms in the southwest and central parts of the county, woodland resources are well distributed throughout the county. Large wood-using industries own or lease most of the woodland. A small part is owned and managed by private individuals.

The predominant commercial species in St. Johns County is slash pine. It grows well on the poorly drained flatwood sites. Longleaf pine was once the dominant species before intensive harvesting and management began. Some sand pine grows on the small knolls and ridges, where Astatula, Pomello, and Paola soils are extensive. Sand pine is generally not harvested commercially. Red maple, black gum, and cypress grow on the wetter soils in depressions and drainageways. These trees have some commercial value. Large water oak, live oak, and laurel oak grow on the hammocks bordering wet soils. Tavares, Sparr, and Adamsville soils support a growth of mostly live oak, laurel oak, turkey oak, and scattered longleaf pine. These trees currently have little commercial value.

Timber management consists mostly of simple water control, prescribed burning, clearcutting, site preparation, and replanting with seedlings. Some selective cutting and thinning are done by smaller timber companies and private owners. Fire is a useful tool in that it reduces the "rough" and exposes the mineral soil as a seedbed for natural reproduction. Fire also encourages grasses and forbs that help support various wildlife species, such as deer, turkey, and quail. By reducing the underbrush, prescribed burning also reduces the hazard of wildfire.

Markets are plentiful for wood produced in St. Johns County (fig. 11). Pulpwood mills are near Palatka and Fernadina Beach. The two small sawmills in St. Johns County cut mostly cypress lumber.

More detailed information on woodland and woodland management is available from the local offices of the Soil Conservation Service, the Florida Division of Forestry, and the Florida Cooperative Extension Service.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops.

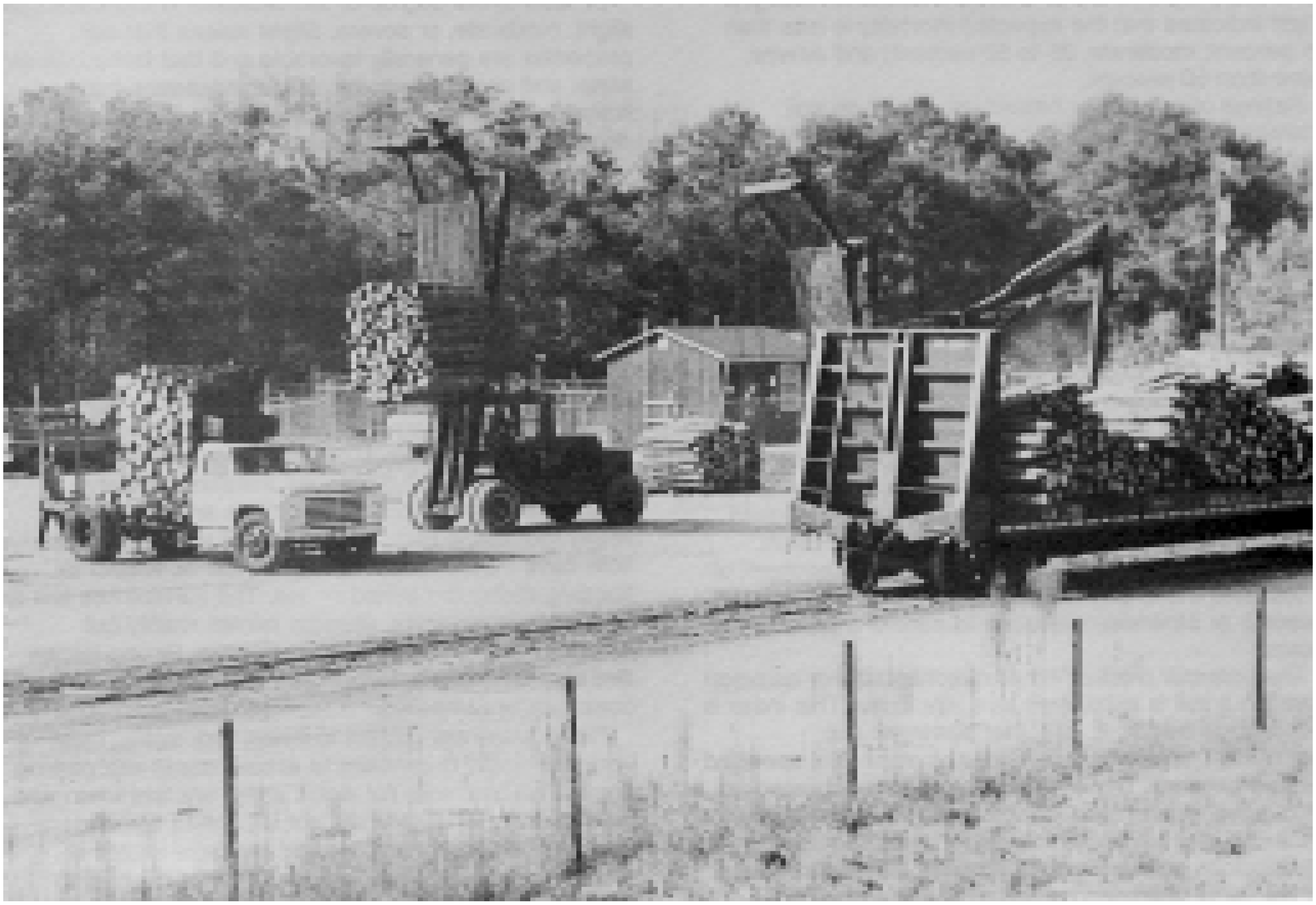


Figure 11.—Production of pulpwood is a major business in St. Johns County. Here, slash pine is loaded at a woodyard on Adamsville fine sand and Sparr fine sand, 0 to 5 percent slopes.

Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *w* indicates that there is excessive water in or on the soil, and *s* indicates sandy texture. If a soil has more than one limitation, the priority is as follows: w and s.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *windthrow hazard* are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that few trees may be blown down by strong winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade where there are openings in the tree canopy. The invading plants compete with native plants or planted seedlings. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* indicates that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed to control undesirable plants.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

Recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 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 costly 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 mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

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

Wildlife is a valuable resource of St. Johns County. Urban development, especially in the coastal areas, and intensive agricultural development in the Hastings area have been detrimental to wildlife habitat, but less developed areas still support a large variety and number of wildlife species.

Game species include white-tailed deer, squirrel, turkey, feral hogs, bobwhite quail, rail, and waterfowl. Nongame species include raccoon, rabbit, armadillo, opossum, skunk, bobcat, gray and red foxes, otter, and a variety of songbirds, wading birds, shore birds, woodpeckers, reptiles, and amphibians. A wide variety of fish species, both freshwater and saltwater, provide good fishing, especially in the ocean and the St. Johns River.

An area especially important to wildlife is the Guano Wildlife Management Area—10,000 acres administered by the Florida Game and Freshwater Fish Commission. Guano Lake, a 2,200-acre impoundment, and associated marshes provide an excellent waterfowl habitat and support good duck hunting. The other salt marshes of the county are of particular value as a part of the marine ecosystem.

Numerous endangered or threatened species are found in St. Johns County, ranging from the rare red-cockaded woodpecker and indigo snake to more commonly known species, such as the alligator and pelican. A complete list of such species, with detailed information on range and habitat, can be obtained from the local Soil Conservation District conservationist.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 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, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, browntop millet, and grain sorghum.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are bahiagrass, lovegrass, Florida beggarweed, clover, and sesbania.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, partridgepea, and bristlegrass.

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, cherry, sweetgum, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are firethorn, wild plum, and crabapple.

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, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas in St. Johns County 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, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

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 otter.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

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

Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

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

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

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to 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, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 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 large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 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 rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for embankments, dikes, and levees and for aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

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

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

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

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

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

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 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 GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested 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.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

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

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

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

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

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

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops

can be grown if intensive measures to control wind erosion are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to wind erosion.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 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 not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

Some soils in table 16 are assigned to two hydrologic soil groups. The dual grouping is used for soils that have a seasonal high water table but can be drained. The first letter applies to the drained condition of the soil and the second letter to the undrained condition.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

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

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 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. An *artesian* water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Fluctuations in depth to the water table of selected soils in St. Johns County are shown in table 17. The data resulted from a study of water tables performed over a period of about 3 years.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Table 16 shows subsidence that results from desiccation and shrinkage and oxidation of organic material following drainage. The table shows the expected initial subsidence and total subsidence, which is initial subsidence plus the slow sinking that occurs over a period of several years as a result of oxidation.

Not shown in the table is subsidence caused by an imposed surface load or by the withdrawal of ground water throughout an extensive area as a result of lowering the water table.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Physical, Chemical, and Mineralogical Analyses of Selected Soils

By Drs. V.W. Carlisle and R.E. Caldwell, Soil Science Department, University of Florida Agricultural Experiment Stations.

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

Typifying pedons were sampled from pits at carefully selected locations. Samples were air-dried, crushed, and sieved through a 2-millimeter screen. Most analytical methods used are in Soil Survey Investigations Report No. 1 (*18*).

Particle-size distribution was determined by using a modified pipette method with sodium hexametaphosphate as the dispersant. 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. The 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 oven-dried and ground to pass a 2-millimeter sieve, and then 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 ammonium acetate buffered at pH 7.0. Sodium and potassium in the extract were determined by flame emission, and calcium and magnesium by atomic absorption spectrophotometry. Extractable acidity was determined by the barium chloridetriethanolamine method at pH 8.2. Cation-exchange capacity was calculated by summation of extractable bases and extractable acidity. Base saturation is the percentage ratio of extractable bases to cation-exchange capacity.

The pH measurements were made with a glass electrode using a soil-to-water ratio of 1:1; a 0.01 molar calcium chloride solution in a 1:2 soil-to-solution ratio; and potassium chloride solution in a 1:1 soil-to-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 probably spodic horizons with 0.1 molar sodium pyrophosphate. Determination of aluminum and iron was by atomic absorption and extracted carbon by the Walkley-Black wet combustion method.

Mineralogy of the clay less than 2 micrometers fraction 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. The absolute percentage would require additional knowledge of particle size, crystallinity, unit structure substitution, and matrix problems.

Most soils in St. Johns County are inherently sandy (table 18). All minerals soils sampled, except for Bluff and Pellicer soils, had at least one horizon containing more than 90 percent sand. The entire pedons of Adamsville, Adamsville Variant, Astatula, Fripp, Immokalee, Moultrie, Narcoossee, Orsino, Palm Beach, Paola, Pomello, Pompano, Pottsburg, Satellite, Tavares, and Zolfo soils contained more than 90 percent sand to a depth of 2 meters or more. Bluff and Pellicer soils contained more than 25 percent silt and 25 percent clay, the most fine-textured materials. Silt content of other soils sampled was generally less than 3 percent, but in one or more horizons of the Cassia, Manatee, Parkwood, Riviera, and Tomoka series, it exceeded 10 percent. Argillic horizons in the EauGallie, Ellzey, Holopaw, Manatee, Parkwood, Riviera, Sparr, and Tocoi soils had a clay content ranging from 11.3 to 23.3 percent. With the exception of three horizons in the Palm Beach pedon, fine sand dominated the sand fractions of all soils. In the Adamsville, Adamsville Variant, EauGallie, Ellzey, Fripp, Holopaw, Immokalee, Jonathan, Manatee, Moultrie, Myakka, Narcoossee, Paola, Parkwood, Placid, Pomello, Pompano, Pottsburg, Satellite, Smyrna, Sparr, St. Augustine, St. Johns, Tocoi, and Zolfo soils, the horizons contained 85 percent or more fine sand. Droughtiness is a common characteristic of sandy soil material, particularly in those soils that are moderately well drained, well drained, and excessively drained.

In table 18, very high hydraulic conductivity values were recorded for the Astatula, Narcoossee, Orsino, Palm Beach, Paola, and Tavares soils. These soils are sandy throughout and are moderately well drained to excessively drained. In addition, the Narcoossee and Palm Beach soils contained many coarse shell fragments. Bluff, EauGallie, Ellzey, Holopaw, Manatee, Parkwood, Riviera, Sparr, and Tocoi soils contained horizons in which enhanced amounts of clay occurred at varying depths. In these horizons, the hydraulic conductivity was generally very low, approaching zero. Cassia, Immokalee, Jonathan, Myakka, Smyrna, St. Johns, and Zolfo soils contained well-developed spodic horizons that have very low hydraulic conductivity values. The very low hydraulic conductivity values for the soils containing large amounts of clay and well-developed spodic horizons may or may not coincide with the estimated permeability values in table 15. The undisturbed soil cores in only a small part of the pedon are in only a single sample. In these soils, the very low values may not represent true field conditions. Available water capacity can be estimated from bulk density and water content data. Generally, sandy soils containing 95 percent or more sand and low amounts of organic matter retain low amounts of available water. Astatula, Fripp, Jonathan, Orsino, Palm Beach, Paola, Pomello, Satellite, Tavares, and Zolfo soils retain very low amounts of available water to a depth of more than 1 meter. Organic horizons of Bluff and Hontoon soils and surface mineral horizons of Manatee and Parkwood soils retain large amounts of available water.

Chemical soil properties (table 19) show that, with the exception of Bluff, Durbin, Hontoon, Manatee, Moultrie, Parkwood, Pellicer, and Tomoka soils, most soils contained a low amount of extractable bases. However, extractable calcium was high in at least one horizon of the Myakka, Palm Beach, Pompano, Riviera, Satellite, and St. Augustine soils. Durbin and Pellicer soils contained more than 50 milliequivalents per 100 grams magnesium in some horizons. Durbin, Moultrie, and Pellicer soils contained large amounts of sodium. In Bluff and Manatee soils, at least one horizon had high sodium values. High potassium values were found only in the Durbin and Pellicer soils. Cation-exchange capacity values exceeded 10 milliequivalents per 100 grams in the surface horizons of Bluff, Durbin, EauGallie, Ellzey, Fripp, Holopaw, Hontoon, Immokalee, Manatee, Moultrie, Myakka, Narcoossee, Palm Beach, Parkwood, Pellicer, Pompano, Satellite, Smyrna, Sparr, St. Augustine, St. Johns, Tocoi, and Tomoka soils. Cation-exchange capacity exceeded 10 milliequivalents per 100 grams in the Bh horizons of the Cassia, EauGallie, Immokalee, Jonathan, Moultrie, Myakka, Pomello, Pottsburg, Smyrna, St. Johns, Tocoi, and Zolfo soils. Soils containing larger amounts of clay and having a cation-exchange capacity in excess of 10 milliequivalents per 100 grams include Bluff, EauGallie, Holopaw, Manatee, Parkwood, Pellicer, and Riviera soils.

The surface horizons of such soils as Cassia, Jonathan, Paola, and Zolfo have low cation-exchange capacity and require only small amounts of lime to significantly alter both the base status and soil reaction in the upper horizons. In these soils, successful crop production generally requires small but frequent fertilizer applications.

Bluff, Durbin, Hontoon, Moultrie, Pellicer, and Tomoka are the only soils sampled that had cation-exchange values in excess of 10 milliequivalents per 100 grams throughout. Generally, soils having low inherent fertility are associated with low values for extractable bases and cation-exchange capacity, and fertile soils have high values for extractable bases, high cation-exchange capacity, and high base saturation.

Organic carbon content in the surface horizons of Adamsville, Astatula, Cassia, EauGallie, Ellzey, Jonathan, Moultrie, Narcoossee, Orsino, Palm Beach, Paola, Placid, Pomello, Riviera, Sparr, Tavares, and Zolfo soils was less than 1.5 percent. More than 5 percent organic carbon occurred in the surface horizons of the Bluff, Durbin, Holopaw, Hontoon, Manatee, Myakka, Parkwood, Pellicer, St. Johns, and Tomoka soils. Organic surface horizons occurred only in the Durbin, Holopaw, Hontoon, and Tomoka soils. Organic carbon content decreased rapidly as depth increased in all mineral pedons, except in Cassia, EauGallie, Immokalee, Jonathan, Myakka, Pomello, Pottsburg, Smyrna, St. Johns, Tocoi, and Zolfo soils. These soils have Bh horizons at various depths that contain enhanced amounts of organic carbon. The largest amount of organic carbon was found in the Oa horizons of Durbin, Hontoon, and Tomoka mucks. On these soils, management practices that conserve and maintain organic carbon are highly desirable because the organic carbon content is directly related to soil nutrients and water retention.

Electrical conductivity values were generally low but exceeded 3 millimhos per centimeter in some horizons of the Bluff, Durbin, Manatee, Moultrie, Pellicer, and Pompano soils. Growth of salt-sensitive plants may be detrimentally affected by the soluble salt content of these soils. The extractable sodium content is considerably higher in soil horizons containing higher electrical conductivity values.

Soil reaction in water generally ranged between pH 4.0 and 6.5; however, reaction exceeded pH 7.0 in at least one horizon of the Adamsville, Bluff, Manatee, Moultrie, Narcoossee, Palm Beach, Parkwood, Pellicer, Riviera, and St. Augustine soils. Soil reaction was generally 0.5 to 1.5 units lower in calcium chloride and potassium chloride solutions than in water. Generally, the maximum plant nutrients are available when soil reaction is between pH 6.5 and 7.5.

Sodium pyrophosphate extractable iron was 0.15 percent or less in selected Bh horizons of Spodosols. The ratio of pyrophosphate extractable carbon and aluminum to clay in Cassia, EauGallie, Immokalee, Jonathan, Moultrie, Myakka, Narcoossee, Pomello, Pottsburg, Smyrna, St. Johns, Tocoi, and Zolfo soils was sufficient to meet the chemical criteria for spodic horizons. With the exception of the Ellzey soil, citrate-dithionite extractable iron was less than 0.26 percent, and all aluminum values were less than 0.56 percent. The soils in St. Johns County contain insufficient iron and aluminum to deterimentally affect the availability of phosphorus.

The sand fraction (2 millimeters to 0.05 millimeter) was siliceous, and quartz was overwhelmingly dominant in all pedons. Small amounts of heavy minerals, mostly ilmenite, occurred in most horizons; the largest concentration was in the very fine sand fraction. Crystalline mineral components of the clay fraction (less than 0.002 millimeter) are reported in table 20 for selected horizons of specific pedons. The clay mineralogical suite was composed of montmorillonite, a 14 angstrom intergrade, kaolinite, gibbsite, and quartz. With the exception of the Adamsville, Astatula, Immokalee, Myakka, Pomello, Pottsburg, Sparr, and Zolfo soils, montmorillonite occurred in all pedons sampled. With the exception of Bluff, EauGallie, Hontoon, Immokalee, Manatee, Moultrie, Myakka, Parkwood, Pellicer, Pottsburg, Riviera, Satellite, and St. Augustine soils, the 14 angstrom intergrade mineral occurred in one or more horizons of all pedons. Kaolinite was found in all but the Immokalee and Myakka soils. Gibbsite occurred only in the Adamsville, Astatula, Sparr, and Zolfo soils. Quartz occurred in all pedons.

Montmorillonite, which is probably the least stable of the mineral components in the present acidic environment of the Cassia, Durbin, Ellzey, Fripp, Holopaw, Hontoon, Jonathan, Orsino, Paola, Smyrna, St. Johns, Tavares, Tocoi, and Tomoka soils, was not readily apparent; however, it appears that montmorillonite was inherited by these soils. In Bluff, EauGallie, Hontoon, Manatee, Parkwood, Pellicer, Riviera, Satellite, and St. Augustine soils, montmorillonite heavily dominated the clay fraction, kaolinite occurred in very low amounts, and the 14 angstrom intergrade and gibbsite were not detectable. Considerable volume changes could result from shrinkage upon drying and swelling upon wetting of Bluff, Manatee, Parkwood, Pellicer, and Riviera soils, which contain appreciable amounts of montmorillonitic clay. The general tendency for 14 angstrom intergrade to decrease with increasing depth suggests that the 14 angstrom intergrade is one of the most stable species in this weathering environment. Soils dominated by kaolinite and quartz have a lower cation-exchange capacity and retain less plant nutrients than soils dominated by 14 angstrom intergrade minerals and montmorillonite.

Engineering Index Test Data

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

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

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of the soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semisolid to a plastic state.

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

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

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*19*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. 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 Spodosol.

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

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquods (*Hapl*, meaning minimal horizonation, plus *aquod*, the suborder of the Spodosols that have an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplaquods.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is sandy, siliceous, hyperthermic Typic Haplaquods.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*17*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*19*). 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 nearly level, somewhat poorly drained soils formed in thick beds of sandy marine sediments. These soils are on low, broad flats. The water table is at a depth of 20 to 40 inches for 2 to 6 months during most years. It is at a depth of 10 to 20 inches for periods of about 2 weeks in some years. It is within a depth of 60 inches for more than 9 months in most years. Slopes are less than 2 percent. These soils are hyperthermic, uncoated Aquic Quartzipsamments.

Adamsville soils are closely associated with Immokalee, Myakka, and Tavares soils. Adamsville soils are distinguished from Immokalee and Myakka soils by lacking a spodic horizon. In contrast to Tavares soils, Adamsville soils are somewhat poorly drained, whereas Tavares soils are moderately well drained.

Typical pedon of Adamsville fine sand, in a planted pine area on a 1 percent slope, 3,900 feet northwest of U.S. Highway 1 and I-95 intersection and 50 feet northeast of I-95, NW1/4NE1/4 sec. 5, T. 10 S., R. 30 E.

Ap—0 to 8 inches; gray (10YR 5/1) fine sand; few medium distinct very dark grayish brown (10YR 3/2) mottles; weak medium granular structure; friable; many fine, medium, and coarse roots; many uncoated sand grains; strongly acid; clear wavy boundary.

C1—8 to 19 inches; pale brown (10YR 6/3) fine sand; common medium distinct light gray (10YR 7/1, 7/2) mottles; single grained; loose; few fine, medium, and coarse roots; strongly acid; gradual smooth boundary.

C2—19 to 30 inches; light gray (10YR 7/2) fine sand; common coarse distinct very pale brown (10YR 7/3) and few fine faint dark grayish brown mottles; single grained; loose; few fine and medium roots; strongly acid; gradual smooth boundary.

C3—30 to 44 inches; white (10YR 8/1) fine sand; common medium distinct very pale brown (10YR 7/3) mottles; single grained; loose; few fine and medium roots; strongly acid; gradual smooth boundary.

C4—44 to 53 inches; light gray (10YR 7/2) fine sand; few fine faint white mottles; single grained; loose; very strongly acid; gradual smooth boundary.

C5—53 to 80 inches; white (10YR 8/1) fine sand; few coarse distinct pinkish gray (7.5YR 6/2) mottles; single grained; loose; very strongly acid.

Soil reaction ranges from very strongly acid to mildly alkaline.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. It ranges in thickness from 5 to 18 inches.

The C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 4. It extends to a depth of 80 inches or more. Mottles in shades of gray, brown, and yellow are in the horizon.

Adamsville Variant

Adamsville Variant soils are somewhat poorly drained, nearly level soils that formed in deep marine sandy sediments. Early settlers added large quantities of oyster shells to these soils as a soil amendment. Shells and crop residue have been mixed in the surface layer to a depth of 10 to 15 inches. These soils are on low knolls and slopes adjacent to tidal marshes, streams, and estuaries near the Atlantic coast. The water table is at a depth of 20 to 40 inches for 2 to 6 months during most years. It rises to a depth of 10 to 20 inches for up to 2 weeks during the rainy season in some years and is within a depth of 60 inches for more than 9 months in most years. Slopes range from 0 to 2 percent. These soils are hyperthermic, uncoated Aquic Quartzipsamments.

Adamsville Variant soils are closely associated with Adamsville, Cassia, Immokalee, Myakka, and St. Johns soils. Adamsville and Cassia soils occupy similar positions. Adamsville soils have a dark surface layer that is less than 10 inches thick and lacks oyster shells. Cassia soils have spodic horizons. Immokalee, Myakka, and St. Johns soils occupy lower positions and have spodic horizons.

Typical pedon of Adamsville Variant fine sand on a 1 percent slope, in a wooded area 2,900 feet east of intersection of Dixie Highway (U.S. Highway 1) and North Boulevard and 500 feet southeast of North Boulevard, Land Grant 54, T. 6 S., R. 29 E.

A1—0 to 10 inches; very dark grayish brown (10YR 3/2) fine sand; weak fine granular structure; friable; many fine, medium and few coarse roots; about 280 p.p.m. phosphorus pentoxide soluble in citric acid; common to many white oyster shells 1/4 inch to 2 1/2 inches in diameter; few tongues of very dark grayish brown (10YR 3/2) fine sand less than 4 inches long and less than 3 inches wide; mildly alkaline; clear irregular boundary.

C1—10 to 23 inches; pale brown (10YR 6/3) fine sand; loose; few medium distinct very dark brown (10YR 2/2) stains along root channels; few white oyster shell fragments 1/8 to 1/2 inch in diameter; few fine, medium, and coarse roots; mildly alkaline; clear smooth boundary.

C2—23 to 35 inches; brown (10YR 5/3) fine sand; single grained; loose; few fine, medium, and coarse roots; mildly alkaline; clear smooth boundary.

C3—35 to 46 inches; brown (10YR 5/3) fine sand; common coarse distinct brownish yellow (10YR 6/6, 6/8) and common fine distinct reddish yellow (7.5YR 7/8) and light brownish gray (10YR 6/2) mottles; single grained; loose; very dark grayish brown (10YR 3/2) stains along root channels; few calcium carbonate nodules 1/4 inch in diameter; mildly alkaline; clear smooth boundary.

C4—46 to 67 inches; light brownish gray (10YR 6/2) fine sand; common medium distinct dark grayish brown (10YR 4/2) mottles; single grained; loose; mildly alkaline; gradual smooth boundary.

C5—67 to 80 inches; light yellowish brown (10YR 6/4) fine sand; single grained; loose; very dark grayish brown (10YR 3/2) stains along root channels; mildly alkaline.

Soil reaction ranges from slightly acid to moderately alkaline to a depth of about 40 inches and neutral to moderately alkaline below.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The content of oyster shells ranges from about 10 to 65 percent. The content of phosphorus pentoxide soluble in citric acid is more than 250 p/m. Thickness ranges from about 10 to 15 inches.

The C1 horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4, or value of 6 or 7 and chroma of 3. Colors that have chroma of 2 are the colors of uncoated sand grains and do not indicate wetness. Mottles in shades of brown and yellow are in this horizon in some pedons. Thickness ranges from 10 to 18 inches.

The C2 through C5 horizons have hue of 10YR, value of 5 to 7, and chroma of 1 to 4. In some pedons, mottles in shades of gray, brown, and yellow are in these horizons.

Astatula Series

The Astatula series consists of excessively drained, nearly level to sloping soils that formed in thick sandy marine sediments. These soils are on broad ridges and knolls. The water table is at a depth of more than 72 inches during most years under natural conditions. Slopes range from 0 to 8 percent. These soils are hyperthermic, uncoated Typic Quartzipsamments.

Astatula soils are closely associated with Adamsville, Orsino, Paola, Tavares, and Zolfo soils. Astatula soils differ from Adamsville, Orsino, Tavares, and Zolfo soils by not having a water table within a depth of 72 inches. Paola soils have an A2 horizon, and Zolfo soils have a spodic horizon.

Typical pedon of Astatula fine sand, on a 2 percent slope, on a sand pine ridge, 2,200 feet south of U.S. Highway 1 and State Road 312 intersection and 400 feet west of U.S. Highway 1, Land Grant 36, T. 7 S., R. 30 E.

A1—0 to 5 inches; light brownish gray (10YR 6/2) fine sand; few fine faint light yellowish brown mottles; weak fine granular structure; very friable; few fine, medium, and coarse roots; few fine black organic matter particles; medium acid; clear irregular boundary.

C1—5 to 14 inches; light yellowish brown (10YR 6/4) fine sand; few medium distinct very dark brown (10YR 2/2) and few fine faint light brownish gray mottles; single grained; loose; few fine, medium, and coarse roots; few very dark brown (10YR 2/2) pockets of organic matter approximately 1 inch in diameter; medium acid; gradual smooth boundary.

C2—14 to 31 inches; yellow (10YR 7/6) fine sand; single grained; loose; few fine, medium, and coarse roots; strongly acid; gradual smooth boundary.

C3—31 to 80 inches; brownish yellow (10YR 6/6) fine sand; single grained; loose; few fine, medium, and coarse roots; strongly acid.

Soil reaction ranges from strongly acid to slightly acid.

The A horizon has hue of 10YR, value of 4 through 6, and chroma of 1 or 2. Thickness ranges from 2 to 5 inches. An AC horizon, if present, has mixed colors of hue of 10YR, value of 6 or 7, and chroma of 2 through 4. Colors that have chroma of 2 are those of uncoated sand grains and do not indicate wetness. Thickness ranges from 0 to 4 inches.

The C horizon has hue of 10YR, value of 5 through 8, and chroma of 3 through 6. Some pedons are mottled with white or light gray, uncoated sand grains. The C horizon extends to a depth of 80 inches or more.

Bakersville Series

The Bakersville series consists of very poorly drained, nearly level soils that formed in thick beds of sandy and loamy marine sediments. These soils occur in depressions in the flatwoods. The water table is above the surface for 6 months or more in most years. Slopes are less than 1 percent. These soils are sandy, siliceous, hyperthermic Cumulic Humaquepts.

Bakersville soils are closely associated with Ellzey, Myakka, Pomona, Tocoi, and Tomoka soils. Except for Tomoka soils, all the associated soils are on higher positions in the landscape and have argillic horizons at a depth of 20 inches or more. Additionally, Ellzey soils have a Bir horizon, and Myakka, Pomona, and Tocoi soils have a spodic horizon. Tomoka soils are organic.

Typical pedon of Bakersville muck in a wooded depression, about 0.9 mile east of intersection of Nine Mile Road and State Road 13 and 800 feet south, Land Grant 37, T. 6 S., R. 28 E.

O2—0 to 5 inches; black (10YR 2/1) muck; moderate medium granular structure; slightly sticky; few fine, many medium and coarse roots; very strongly acid; clear smooth boundary.

A11—5 to 20 inches; black (10YR 2/1) loamy fine sand; moderate medium granular structure; slightly sticky; few medium and coarse roots; very strongly acid; gradual smooth boundary.

A12—20 to 41 inches; very dark grayish brown (10YR 3/2) rubbed, loamy fine sand; moderate medium granular structure; slightly sticky; few medium and coarse roots; common coarse lenses and pockets of grayish brown (10YR 5/2) fine sand; very strongly acid; clear irregular boundary.

B21—41 to 52 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak medium granular structure; slightly sticky; few coarse roots; few thin lenses of grayish brown (10YR 5/2) fine sand between peds; very strongly acid; gradual smooth boundary.

B22—52 to 59 inches; dark brown (7.5YR 3/2) fine sandy loam; moderate medium subangular blocky structure; slightly sticky; few thin lenses of grayish brown (10YR 5/2) loamy fine sand between peds; very strongly acid; gradual smooth boundary.

B3g—59 to 63 inches; brown (7.5YR 4/2) loamy fine sand; weak coarse granular structure; slightly sticky; common coarse pockets of gray (10YR 5/1) fine sand; very strongly acid; gradual smooth boundary.

Cg—63 to 86 inches; grayish brown (2.5Y 5/2) loamy fine sand; single grained; very strongly acid.

Solum thickness is less than 70 inches. Soil reaction is very strongly acid or strongly acid throughout.

The Oa horizon has 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; or no hue and value of 2. Thickness ranges from 3 to 8 inches.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2, or it has no hue and value of 2. Thickness ranges from 20 to 40 inches.

The B2t horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2; or hue of 7.5YR, value of 3 to 5, and chroma of 2; or no hue and value of 4 or 5. It has mottles of brown and yellow in some pedons. Texture is fine sandy loam or sandy loam. Thin pockets or lenses of finer or coarser material are in this horizon in some pedons. Thickness ranges from 20 to 36 inches.

The B3g horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2; or hue of 7.5YR, value of 4 or 5, and chroma of 2; or hue of 5YR, value of 5 to 6, and chroma of 1. Texture is loamy sand or loamy fine sand with or without pockets of sand. Thickness ranges from 0 to 18 inches. Some pedons have no B3g horizon.

The Cg horizon has hue of 10YR or 5Y, value of 4 to 7, and chroma of 1 or 2; or hue of 2.5YR, value of 4 to 7, and chroma of 2; or no hue and value of 4 to 7. Texture is sand, fine sand, or loamy fine sand.

Bluff Series

The Bluff series consists of very poorly drained, nearly level soils that formed in thick beds of alkaline loamy and clayey marine sediments. These soils are in drainageways and on flood plains. The water table is at a depth of less than 10 inches or is above the surface for 6 or more months and seldom recedes to a depth of more than 20 inches. These soils are subject to frequent flooding for long durations. Slopes are less than 1 percent. These soils are fine-loamy, siliceous, hyperthermic Typic Haplaquolls.

The Bluff soils are associated with Floridana, Manatee, Parkwood, and Riviera soils. All the associated soils have an argillic horizon.

Typical pedon of Bluff sandy clay loam under mixed hardwoods, in a swamp, about 0.2 percent slope, approximately 4,000 feet south of Nine Mile Road and 2 miles west of U.S. Highway 1, Land Grant 63, T. 6 S., R. 29 E.

Oa—0 to 3 inches; black (5YR 2/1) rubbed muck, 50 percent fiber, 8 percent rubbed; moderate medium granular structure; friable; many fine and common medium roots; few uncoated sand grains; mineral content 15 percent; sodium pyrophosphate extract pale brown (10YR 6/3); medium acid (pH 5.9 in 0.01 molar calcium chloride); clear smooth boundary.

A1—3 to 9 inches; very dark gray (10YR 3/1) sandy clay loam; many fine distinct brown (10YR 5/3) mottles; massive; few fine roots; sticky; few fine white (10YR 8/1) calcium carbonate accumulations in lower 3 inches; slightly acid; gradual wavy boundary.

B21ca—9 to 16 inches; very dark gray (10YR 3/1) sandy clay loam; common medium faint dark yellowish brown (10YR 4/4) mottles; massive; sticky; many fine and medium white (10YR 8/1) calcium carbonate accumulations; mildly alkaline; gradual wavy boundary.

B22gca—16 to 25 inches; gray (10YR 6/1) sandy clay loam; few fine distinct yellowish red (5YR 4/6) and common medium distinct dark gray (10YR 4/1) and gray (10YR 5/1) mottles; moderate medium subangular blocky structure; sticky; common fine and medium white (10YR 8/1) calcium carbonate accumulations; moderately alkaline; gradual wavy boundary.

B3gca—25 to 53 inches; light gray (10YR 7/1) loam; common medium distinct dark gray (10YR 4/1), gray (10YR 5/1), brownish yellow (10YR 6/6), and yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; slightly sticky; common fine and medium white (10YR 8/1) calcium carbonate accumulations; moderately alkaline; gradual wavy boundary.

Cg—53 to 80 inches; greenish gray (5GY 6/1) loamy fine sand; weak medium subangular blocky structure; slightly sticky; common medium and coarse pockets of dark gray (5Y 6/1) sand; neutral.

The solum thickness is 50 inches or more. Fine to coarse calcium carbonate accumulations or nodules in the upper 20 inches of the B2 horizon range from few to many. Soil reaction ranges from extremely acid to medium acid in the Oa horizon. The A horizon is slightly acid to mildly alkaline. All other horizons are mildly or moderately alkaline.

The Oa horizon has hue of 5YR or 10YR, value of 2, and chroma of 1. It ranges in thickness from 3 to 5 inches.

The A1 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; or no hue and value of 2. Distinct or prominent mottles of grayish brown or brown are in this horizon in some pedons. The A1 horizon ranges in thickness from 3 to 15 inches. Where the thickness of the A1 horizon is less than 10 inches, the B21 horizon has color value of 3. Where color value of the B21 horizon is 3, combined thickness of the A1 and B21 horizons ranges from 11 to 24 inches.

The B21 horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2; or no hue and value of 4. Distinct or prominent mottles of gray, brown, grayish brown, dark yellowish brown, yellowish brown, brownish yellow, or yellow range from none to common. Texture is sandy clay loam or sandy clay. Thickness ranges from 7 to 17 inches.

The B22 horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2; or hue of 5YR, value of 6, and chroma of 1; or no hue and value of 5. The range of texture is from sandy clay loam to sandy clay. The B22 horizon ranges in thickness from 5 to 30 inches.

The B3 horizon has hue of 10YR, value of 5 or 6, and chroma of 1; or hue of 5Y, value of 4 to 6, and chroma of 1. Texture is sandy clay loam, loam, or sandy clay. The B3 horizon ranges in thickness from 8 to 25 inches. By weighted average, the clay content of the 10- to 40-inch control section is 25 to 35 percent. The silt content is less than 30 percent.

The C horizon has hue of 5Y, value of 4 or 5, and chroma of 1; or hue of 5GY, value of 4 to 6, and chroma of 1. Texture ranges from loamy fine sand to sandy clay loam or is a mixture. Some pedons have a IICg horizon. This horizon has hue of 10YR, value of 7, and chroma of 1 or hue of 5Y or 5GY, value of 5, and chroma of 1. Texture is fine sand, sand, or a mixture of sand and shell fragments. The C horizon extends to a depth of 80 inches or more.

Cassia Series

The Cassia series consists of somewhat poorly drained soils that formed in thick sandy deposits on marine terraces. These nearly level soils occur on landscapes and low ridges that are slightly higher than the adjacent flatwoods. The water table is at a depth of 15 to 40 inches for about 6 months during most years under natural conditions. During dry seasons the water table is at a depth below 40 inches. Slopes range from 0 to 2 percent. These soils are sandy, siliceous, hyperthermic typic Haplohumods.

Cassia soils are closely associated with Immokalee, Myakka, Paola, and Pomello soils. Cassia soils differ from the Immokalee and Myakka soils by being better drained and by having a thinner, lighter colored A1 horizon. Paola soils are better drained and lack a spodic horizon. In addition, the moderately sloping Paola soils are on higher positions in the landscape. Pomello soils differ by having an A horizon 30 to 50 inches thick and are better drained.

Typical pedon of Cassia fine sand in a sparsely wooded area, 0.45 mile east of U.S. Highway 1, 700 feet north of Stokes Road, Land Grant 95, T. 6 S., R. 29 E.

A1—0 to 3 inches; gray (10YR 5/1) fine sand; weak medium granular structure; very friable; common fine and few medium roots; common fine particles of black organic matter; very strongly acid; gradual smooth boundary.

A2'2—3 to 18 inches; white (10YR 8/1) fine sand; few medium distinct very dark grayish brown (10YR 3/2) mottles; single grained; loose; common fine and few medium roots; common grayish brown (10YR 5/2) stains along root channels; very strongly acid; abrupt wavy boundary.

B21h—18 to 28 inches; very dark gray (10YR 3/1) fine sand; weak medium granular structure; friable; noncemented; few fine and medium roots; sand grains coated with organic matter; few uncoated light gray sand grains; many pockets and intrusions from A2 horizon of white (10YR 8/2) fine sand; common grayish brown (10YR 5/2) stains along root channels; very strongly acid; gradual wavy boundary.

B22h—28 to 32 inches; dark brown (10YR 4/3) fine sand; common coarse distinct very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) and few medium distinct dark reddish brown (5YR 3/3) and black (5YR 2/1) mottles; moderate medium subangular blocky structure; friable; noncemented; few fine and medium roots; sand grains well coated with organic matter; very strongly acid; gradual wavy boundary.

A'2—32 to 75 inches; light yellowish brown (10YR 6/4) fine sand; few coarse distinct dark yellowish brown (10YR 4/4, 4/6) mottles; single grained; loose; few fine and medium roots; few fine distinct dark reddish brown (5YR 3/3, 3/4) stains along root channels; very strongly acid; clear wavy boundary.

B'2h—75 to 80 inches; very dark gray (5YR 3/1) fine sand; moderate medium subangular blocky structure; friable; noncemented; common medium distinct pockets of dark grayish brown (10YR 4/2) fine sand; sand grains are well coated with organic matter; very strongly acid.

Soil reaction ranges from very strongly acid to medium acid.

The A1 horizon has hue of 10YR, value of 5 or 6, and chroma of 1. It is 2 to 5 inches thick. The A2 horizon has hue of 10YR, value of 7 or 8, and chroma of 1 or 2. Thickness ranges from 14 to 28 inches.

The B2h horizon has hue of 5YR or 7.5YR, value of 2 or 3, and chroma of 2; or hue of 5YR and chroma of 3 or 4; or hue of 10YR, value of 2 or 3, and chroma of 1 or 2. Thickness ranges from 12 to 16 inches.

Some pedons have B3 horizons beneath the B2h horizon. The B3 horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4, and it ranges to 15 inches in thickness.

The A'2 horizon, as described in Cassia fine sand, does not occur in all pedons. It has hue of 10YR, value of 6 or 7, and chroma of 3 or 4, and it ranges to 42 inches in thickness.

The B'2h horizon has no hue and value of 2 or 3; or hue of 10YR, value of 2 or 3, and chroma of 1 through 4. It extends to a depth of 80 inches or more.

Durbin Series

The Durbin series consists of very poorly drained, nearly level soils that formed in thick beds of hydrophytic nonwoody plant remains. These soils are in narrow tidal marsh estuaries and tidal basins near the Atlantic coast. They are flooded twice daily by normal high tides. Slopes are less than 1 percent. These soils are euic, hyperthermic Typic Sulfihemists.

Durbin soils are closely associated with Adamsville, Adamsville Variant, Immokalee, Moultrie, Myakka, Pellicer, and Tisonia soils. Adamsville, Myakka, and Immokalee soils and the Adamsville Variant are mineral, are better drained, and are on higher positions in the landscape bordering tidal basins. Moultrie soils are poorly drained sandy soils on slightly higher positions along the margins of tidal basins. Pellicer and Tisonia soils are in the same positions as are the Durbin soils. Additionally, Pellicer soils are clayey and have high *n* value, and Tisonia soils have organic layers less than 52 inches thick.

Typical pedon of Durbin muck, frequently flooded, on a 0.5 percent slope, in a narrow tidal marsh estuary on the west side of Tolomato River, about 3,500 feet east of U.S. Highway 1 north and 50 feet north of private road along north boundary of St. Augustine Airport, Land Grant 50, T. 6 S., R. 29 E.

Oa1—0 to 6 inches; very dark grayish brown (10YR 3/2) muck; 40 percent fiber, 16 percent rubbed; massive; slightly sticky; many fine and medium roots; 1.27 percent sulfur; 192.0 millimhos per centimeter conductivity; extremely acid; gradual smooth boundary.

Oa2—6 to 25 inches; very dark gray (10YR 3/1) muck; 16 percent fiber, 4 percent rubbed; massive; slightly sticky; common fine and medium roots; 1.67 percent sulfur; 96.2 millimhos per centimeter conductivity; very strongly acid; gradual wavy boundary.

Oa3—25 to 59 inches; black (10YR 2/1) muck; 16 percent fiber, 2 percent rubbed; massive; slightly sticky; few dark grayish brown (10YR 4/2) fine sand pockets; many fine and medium roots; 2.77 percent sulfur; 51.2 millimhos per centimeter conductivity; very strongly acid; gradual smooth boundary.

IIC—59 to 80 inches; dark grayish brown (10YR 4/2) fine sand; common coarse distinct very dark gray (10YR 3/1) mottles; single grained; loose; very strongly acid.

The Oa horizon ranges from extremely acid to neutral in 0.01 molar calcium chloride in its natural state. The pH in air-dry soil ranges from 6.0 to less than 4.5 in 0.01 molar calcium chloride. The IIC horizon ranges from extremely acid to moderately alkaline. The estimated sulfur content ranges from 0.75 to 3.25 percent in the upper 40 inches of the organic layers.

The Oa horizon has hue of 10YR or 5YR, value of 2 or 3, and chroma of 1 or 2; hue of 7.5YR, value of 3, and chroma of 2; or it has no hue and value of 2 or 3. Fiber content ranges from 16 to 48 percent, unrubbed, and from 2 to 18 percent, rubbed. Thickness ranges from 55 to 70 inches.

The IIC horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2; or it has hue of 5Y, value of 4 or 5, and chroma of 1 or 2. Black, very dark gray, and gray mottles range from few to common in abundance and medium to coarse in size. Texture is sand or fine sand. This horizon extends to a depth of 80 inches or more.

EauGallie Series

The EauGallie series consists of poorly drained, nearly level soils in the flatwoods. These soils formed in sandy and loamy marine sediments. The water table is within a depth of 10 inches for 1 to 4 months and within 40 inches for more than 6 months. Slopes range from 0 to 2 percent. These soils are sandy, siliceous, hyperthermic Alfic Haplaquods.

EauGallie soils are closely associated with Holopaw, Myakka, Parkwood, Riviera, and St. Johns soils. Holopaw, Parkwood, and Riviera soils lack a spodic horizon. Myakka and St. Johns soils lack an argillic horizon. Additionally, Parkwood and Riviera soils occupy a lower position in the landscape.

Typical pedon of EauGallie fine sand, in a wooded area, on a 1 percent slope, 1,500 feet east of U.S. Highway 1 south on Forestry Road No. 38, International Telephone and Telegraph Company Rayionier property and 200 feet south of Godwin Ranch south boundary, SW1/4NE1/4 sec. 17, T. 9 S., R. 30 E.

A1—0 to 6 inches; black (10YR 2/1) fine sand; weak fine granular structure; friable; many fine and medium, and few coarse roots; many uncoated sand grains; very strongly acid; gradual smooth boundary.

A21—6 to 10 inches; gray (10YR 5/1) fine sand; common coarse distinct very dark gray (10YR 3/1) and common fine faint dark gray mottles; single grained; loose; common fine and medium roots; very strongly acid; gradual wavy boundary.

A22—10 to 17 inches; light gray (10YR 6/1) fine sand; common fine faint dark gray mottles; single grained; loose; few fine roots; very strongly acid; abrupt wavy boundary.

B21h—17 to 20 inches; black (N 2/0) loamy fine sand; weak fine subangular blocky structure; friable; common fine roots; few uncoated sand grains; very strongly acid; gradual smooth boundary.

B22h—20 to 23 inches; dark reddish brown (5YR 3/2) fine sand; common fine faint black and common fine distinct brown (10YR 5/3) mottles; weak fine subangular blocky structure; friable; few fine roots; very strongly acid; gradual smooth boundary.

B3—23 to 32 inches; yellowish brown (10YR 5/4) fine sand; common fine distinct pale brown (10YR 6/3) mottles; moderate medium granular structure; friable; few fine and medium roots; few dark reddish brown (5YR 2/2) spodic fragments 1/8 inch to 1-1/2 inches in diameter; few dark brown (10YR 3/3) stains along root channels; medium acid; gradual wavy boundary.

A'2—32 to 45 inches; very pale brown (10YR 7/3) fine sand; common fine distinct brown (7.5YR 4/2) mottles; single grained; loose; medium acid; abrupt wavy boundary.

B1g—45 to 53 inches; gray (5Y 6/1) loamy fine sand; many coarse prominent strong brown (7.5YR 5/6, 5/8) mottles; weak medium subangular blocky structure; friable; few medium roots; common fine light gray (10YR 7/1) pockets of fine sand; neutral; clear wavy boundary.

B2tg—53 to 58 inches; gray (5Y 6/1) fine sandy loam; many coarse prominent reddish yellow (7.5YR 5/6, 5/8) and common fine distinct light greenish gray (5G 7/1) mottles; moderate medium subangular blocky structure; friable; few medium roots; sand grains coated and bridged with clay; neutral; gradual wavy boundary.

Cg—58 to 80 inches; mixed lenses and pockets of gray (5Y 6/1) fine sand and fine sandy loam; average texture is fine sand; massive; loose to firm; neutral; clear wavy boundary.

Soil reaction is very strongly acid or strongly acid in the A horizon. The Bh horizon is very strongly acid to slightly acid. The other horizons are strongly acid to neutral.

The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1. It ranges in thickness from 4 to 8 inches.

The A2 horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Thickness ranges from 10 to 17 inches. Total thickness of the A horizon is 16 to 21 inches.

The Bh horizon has hue of 10YR, value of 2 or 3, and chroma of 2, or value of 3 and chroma of 3; or hue of 5YR, value of 2, and chroma of 1 or 2, or value of 3 and chroma of 2 or 3; or no hue and value of 2. Texture is fine sand or loamy fine sand. Thickness ranges from 6 to 18 inches.

The B3 horizon has hue of 10YR, value of 4, and chroma of 3, or value of 5 or 6 and chroma of 4. It ranges to as much as 15 inches in thickness. Some pedons have no B3 horizon.

The A'2 horizon has hue of 10YR, value of 6 or 7, and chroma of 2, or value of 7 or 8 and chroma of 3. It ranges to as much as 15 inches in thickness. Some pedons have no A'2 horizon.

The B1g horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2; or hue of 5Y, value of 6, and chroma of 1. It ranges in thickness from 8 to 12 inches. The B2tg horizon has the same colors as in the B1 horizon and has texture of fine sandy loam or sandy clay loam. Thickness ranges from 5 to 15 inches.

The Cg horizon has hue of 10YR or 5Y, value of 5 or 6, and chroma of 1 or 2. Texture is loamy fine sand or fine sand. This horizon extends to a depth of 80 inches or more.

Ellzey Series

The Ellzey series consists of nearly level, poorly drained soils that formed in sandy and loamy marine sediments. These soils are on broad flats in the cultivated area in the west-central and southwestern parts of the county. The water table is within 10 inches of the surface for 1 to 6 months in most years. Slopes are less than 2 percent. These soils are sandy, siliceous, hyperthermic Arenic Ochraqualfs.

Ellzey soils are closely associated with Floridana, Placid, Holopaw, and Tocoi soils. All these soils do not have a Bir horizon. Tocoi soils have a Bh horizon.

Typical pedon of Ellzey fine sand, in a cultivated potato field, 700 feet east of intersection of St. Ambrose Road and Scoville Road and 60 feet north of St. Ambrose Road, SW1/4SE1/4 sec. 23, T. 8 S., R. 28 E.

Ap—0 to 12 inches; black (10YR 2/1) fine sand; few medium faint very dark grayish brown (10YR 3/2) mottles; moderate medium granular structure; very friable; many uncoated light gray sand grains; slightly acid; clear smooth boundary.

A21—12 to 19 inches; gray (10YR 5/1) fine sand; many fine and medium distinct dark gray (10YR 4/1), few fine distinct very dark gray (10YR 3/1), and few medium prominent strong brown (7.5YR 5/8) mottles; single grained; loose; slightly acid; clear smooth boundary.

A22—19 to 27 inches; light gray (10YR 7/2) fine sand; common coarse prominent yellowish brown (10YR 5/8) mottles; single grained; loose; medium acid; gradual smooth boundary.

B11ir—27 to 30 inches; brownish yellow (10YR 6/6) fine sand; single grained; loose; upper boundary stained with brown (7.5YR 5/2) accumulation about 1/4 inch thick; medium acid; clear wavy boundary.

B12ir—30 to 33 inches; brownish yellow (10YR 6/8) fine sand; moderate medium granular structure; friable; strongly acid; clear wavy boundary.

B13ir—33 to 37 inches; yellowish brown (10YR 5/6) fine sand; moderate medium granular structure; friable; sand grains are well coated; strongly acid; clear wavy boundary.

B21t—37 to 41 inches; yellowish brown (10YR 5/6) loamy fine sand; few coarse distinct dark grayish brown (10YR 4/2), few fine faint brown, and few fine distinct red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; friable; sand grains are lightly coated and bridged with clay; very strongly acid; clear wavy boundary.

B22t—41 to 58 inches; brown (7.5YR 5/2) loamy fine sand; few medium distinct gray (10YR 6/1) mottles; few fine pockets of white (10YR 8/1) fine sand; weak medium subangular blocky structure; friable; sand grains are lightly coated and bridged with clay; very strongly acid; gradual wavy boundary.

B3—58 to 64 inches; light brownish gray (10YR 6/2) loamy fine sand; common coarse distinct brown (7.5YR 5/2) mottles; single grained; loose; few medium pockets of gray (10YR 6/1) fine sandy loam; friable; strongly acid; gradual wavy boundary.

C—64 to 80 inches; gray (5Y 6/1) fine sand; common medium pockets of white (10YR 8/1) fine sand; weak medium granular structure; friable; strongly acid.

Reaction ranges from neutral to medium acid in the A horizon and from neutral to very strongly acid in the other horizons. Base saturation is less than 50 percent in some parts of the argillic horizon.

The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1, or value of 3 and chroma of 2. This horizon is bedded for cultivation. Average thickness ranges from 10 to 14 inches.

The A2 horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 3. This horizon has mottles of gray, brown, or yellow in some pedons.

The Bir horizon has hue of 10YR, value of 5 to 7, and chroma of 4 to 8; or hue of 7.5YR, value of 5 or 6, and chroma of 8; or hue of 2.5Y, value of 6, and chroma of 8. Texture is sand or fine sand. The combined thickness of the A and Bir horizons ranges from 30 to 38 inches.

The Bt horizon has hue of 10YR, value of 4 to 6, and chroma of 4 to 8; or hue of 7.5YR, value of 5 to 7, and chroma of 2 or 4. Mottles in shades of gray, brown, yellow, or red are in this horizon in some pedons. Texture is loamy fine sand or loamy sand.

The B3 horizon has hue of 10YR or 7.5YR, value of 4 to 7, and chroma of 2. In some pedons, this horizon extends to a depth of 80 inches or more.

The C horizon is absent in some pedons. This horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2; or it has hue of 5Y or 5GY, value of 5, and chroma of 1.

Floridana Series

The Floridana series consists of very poorly drained, nearly level soils formed in thick beds of sandy and loamy marine sediments. These soils are on low broad flats, on flood plains, and in narrow to broad, elongated drainageways. The water table is within 10 inches of the surface for 4 to 6 months. The soils that occur on flood plains and in drainageways are flooded for very long periods during wet seasons. Slopes range from 0 to 2 percent. These soils are loamy, siliceous, hyperthermic Arenic Argiaquolls.

Floridana soils are closely associated with Holopaw, Parkwood, Riviera, and Winder soils. All the associated soils lack a mollic epipedon. Additionally, Holopaw soils have an argillic horizon below a depth of 40 inches, and Parkwood and Winder soils have an argillic horizon at a depth of less than 20 inches.

Typical pedon of Floridana fine sand, in a cultivated field, approximately 4,000 feet south of State Road 207, 1,800 feet north of State Route 13, and 2,000 feet east of Hastings Boulevard, SE1/4NW1/4 sec. 20, T. 9 S., R. 28 E.

Ap—0 to 11 inches; black (10YR 2/1) fine sand; weak medium granular structure; very friable; few fine and medium roots; medium acid; clear wavy boundary.

A21—11 to 21 inches; light brownish gray (10YR 6/2) fine sand; many coarse distinct yellowish brown (10YR 5/6) mottles; single grained; loose; medium acid; gradual wavy boundary.

A22—21 to 30 inches; gray (10YR 5/1) fine sand; many coarse distinct yellowish brown (10YR 5/6) mottles; single grained; loose; common fine dark gray (10YR 4/1) sandy loam pockets; strongly acid; abrupt wavy boundary.

B2tg—30 to 46 inches; gray (10YR 5/1) sandy clay loam; many coarse prominent light olive brown (2.5Y 5/6) and brownish yellow (10YR 6/8) mottles; moderate coarse subangular blocky structure; slightly sticky; sand grains are coated and bridged with clay; few tubular intrusions of gray (10YR 5/1) and light brownish gray (10YR 6/2) loamy fine sand formed by filling of burrows made by crayfish; very strongly acid; clear wavy boundary.

B31g—46 to 60 inches; gray (5Y 5/1) fine sandy loam; many coarse prominent light olive brown (2.5Y 5/4) mottles; moderate medium subangular blocky structure; friable; few medium pockets of gray (10YR 5/1) sandy loam and few coarse pockets of white (10YR 8/1) fine sand; strongly acid; gradual wavy boundary.

B32g—60 to 80 inches; gray (5Y 5/1) fine sandy loam; moderate medium subangular blocky structure; friable; strongly acid.

Soil reaction ranges from very strongly acid to moderately alkaline throughout.

The Ap or A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It ranges in thickness from 10 to 18 inches. The A2 horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. It ranges from 8 to 18 inches in thickness. Total thickness of the A1 and A2 horizons combined ranges from 20 to 36 inches.

The B2tg and Bg horizons have hue of 10YR, value of 4, and chroma of 1, or value of 5 or 6 and chroma of 1 or 2; or hue of 7.5YR or 5Y, value of 5 to 7, and chroma of 1 or 2; or no hue and value of 4 to 6; or hue of 2.5Y, value of 5 or 6, and chroma of 2. Mottles in shades of gray, brown, and yellow are in these horizons in some pedons. Texture is fine sandy loam or sandy clay loam.

A Cg horizon occurs in some pedons. This horizon has hue of 5Y or 2.5Y, value of 5 to 7, and chroma of 1. Texture is fine sand or loamy fine sand.

Fripp Series

The Fripp series consists of deep, excessively drained, rolling or hilly soils that formed in thick sandy sediments. These soils are in dunelike areas adjoining beaches and waterways along the Atlantic coast and on relict beach sand dunes up to 1 mile inland from the Atlantic coast. The water table is at a depth of more than 80 inches during most years. Slopes are dominantly 8 to 15 percent and are mostly complex. These soils are thermic, uncoated Typic Quartzipsamments.

Fripp soils are closely associated with Astatula, Orsino, Paola, Pomello, and Satellite soils. Except for Astatula and Paola soils, all the associated soils are more poorly drained and are on lower positions.

Typical pedon of Fripp fine sand, 8 to 15 percent slopes, in an area of Fripp-Satellite complex, under scrub live oaks in a relict sand dune area, about 300 feet east of the intersection of Florida Highway A1A and Owens Road and 10 feet south of Owens Road, Land Grant 9, T. 8 S., R. 30 E.

A11—0 to 1 inch; gray (10YR 5/1) fine sand; many medium black (10YR 2/1) particles of organic matter; weak fine granular structure; very friable; many fine and medium roots; medium acid; clear wavy boundary.

A12—1 to 4 inches; gray (10YR 5/1) fine sand; single grained; loose; common fine and medium roots; medium acid; clear wavy boundary.

C1—4 to 9 inches; pale brown (10YR 6/3) fine sand; common fine faint grayish brown (10YR 5/2) mottles; single grained; loose; common fine, medium, and coarse roots; many black sand-sized grains of heavy minerals; few medium brown (10YR 5/3) stains along old root channels; medium acid; gradual smooth boundary.

C2—9 to 48 inches; very pale brown (10YR 7/3) fine sand; few fine faint white mottles; single grained; loose; common fine and medium and few coarse roots; many black sand-sized grains of heavy minerals; common medium brown (10YR 5/3) stains along root channels; slightly acid; gradual smooth boundary.

C3—48 to 80 inches; white (10YR 8/2) fine sand; single grained; loose; few medium and coarse roots; many black sand-sized grains of heavy minerals; few medium brown (10YR 5/3) stains along old root channels; slightly acid.

Soil reaction ranges from medium acid to neutral in the A horizon and slightly acid to moderately alkaline in the C horizon.

The A horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2 and is 1 to 5 inches thick.

The C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 4. Low-chroma colors are due to uncoated sand grains and do not indicate wetness. Heavy minerals range from none to common in this horizon. Shell fragments range from none to common. This horizon extends to a depth of 80 inches or more.

Holopaw Series

The Holopaw series consists of nearly level, poorly drained soils formed in thick beds of sandy over loamy marine sediments. These soils are on broad low flatlands and in well defined drainageways. The water table is at a depth of less than 10 inches for 2 to 6 months, but recedes to a depth of 10 to 40 inches for 3 to 4 months during most years. Drainageways are flooded for more than 1 month in most years. During extended dry seasons, the water table recedes to a depth of more than 40 inches. Slopes range from 0 to 2 percent. These soils are loamy, siliceous, hyperthermic Grossarenic Ochraqualfs.

Holopaw soils are closely associated with Ellzey, Floridana, Myakka, Riviera, St. Johns, and Winder soils. Ellzey soils have a Bir horizon. Floridana soils have a mollic epipedon, and they have an argillic horizon with high base saturation. Myakka and St. Johns soils have a spodic horizon and are on somewhat higher positions in the landscape. Riviera and Winder soils have an argillic horizon at a depth of less than 40 inches.

Typical pedon of Holopaw fine sand, in a wooded area, 2 miles south of Florida Highway 214, 3.25 miles west of I-95 on trail north of Moody Shanty Road, NW1/4NW1/4 sec. 12, T. 8 S., R. 29 E.

Oa—1 inch to 0; black (N 2/0) partially decomposed leaves, roots, and twigs; weak medium granular structure; friable; extremely acid; abrupt wavy boundary.

A11—0 to 7 inches; mixed very dark gray (10YR 3/1) and grayish brown (10YR 5/2) unrubbed, fine sand; weak fine granular structure; friable; few medium and fine roots; strongly acid; gradual smooth boundary.

A12—7 to 13 inches; dark gray (10YR 4/1) fine sand; common fine distinct very dark gray (10YR 3/1) mottles; weak fine granular structure; friable; few medium and fine roots; strongly acid; gradual wavy boundary.

A21g—13 to 27 inches; light gray (10YR 7/2) fine sand; common coarse distinct gray (10YR 5/1), grayish brown (10YR 5/2), and pale brown (10YR 6/3) mottles; single grained; loose; slightly acid; abrupt wavy boundary.

A22g—27 to 42 inches; light brownish gray (10YR 6/2) fine sand; few coarse prominent yellowish brown (10YR 5/4, 5/6) and light olive brown (2.5Y 5/4) mottles; single grained; friable; medium acid; gradual smooth boundary.

A23g—42 to 53 inches; gray (10YR 5/1) fine sand; many fine faint dark gray and few medium faint light gray (10YR 6/1) mottles; weak medium subangular blocky structure; friable; medium acid; gradual wavy boundary.

B2tg—53 to 72 inches; dark gray (10YR 4/1) fine sandy loam; common coarse gray (10YR 5/1) loamy sand pockets; common coarse gray (5Y 5/1) sandy clay loam pockets 1/4 inch to 4 inches in diameter; moderate medium subangular blocky structure; slightly sticky; strongly acid; gradual wavy boundary.

Cg—72 to 80 inches; greenish gray (5GY 5/1) fine sand; common fine faint gray and few fine distinct grayish brown mottles; common fine greenish gray (5G 5/1) sandy loam pockets; weak medium granular structure; friable; very strongly acid.

Soil reaction ranges from strongly acid to slightly acid in the A horizon. It ranges from strongly acid to moderately alkaline in the B2tg and Cg horizons.

The Oa horizon has hue of 5YR or 10YR, value of 2 or 3, and chroma of 1 or 2; or it has no hue and value of 2. The Oa horizon ranges to 2 inches in thickness. Some pedons have no Oa horizon.

The A1 horizon has hue of 10YR, value of 2 through 4, and chroma of 1 or 2 and is 2 to 13 inches thick. Where color value is 3.5 or less, thickness is less than 7 inches. The A2 horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. Some pedons have hue of 10YR, value of 6, and chroma of 3 at a depth of less than 30 inches. Thickness ranges from 34 to 66 inches. Total thickness of the A horizon is more than 40 inches.

The B2tg horizon has hue of 5Y, value of 4 to 6, and chroma of 1; or hue of 10YR, value of 4 or 5, and chroma of 1 or 2. Texture is sandy loam, fine sandy loam, or sandy clay loam. Depth to the B2tg horizon ranges from 40 to 60 inches.

Some pedons have a B3g horizon. This horizon has about the same colors as the B2tg horizon. It ranges from 3 to 8 inches in thickness. Texture is sandy loam or fine sandy loam.

The Cg horizon has hue of 10YR, 5Y, or 5GY, value of 5 or 6, and chroma of 1; or it has hue of 10YR, value of 6, and chroma of 6; or hue of 2.5Y, value of 5, and chroma of 2. It is fine sand or loamy fine sand. The Cg horizon extends to a depth of 80 inches or more.

Hontoon Series

The Hontoon series consists of very poorly drained, deep organic soils that formed in thick beds of hydrophytic nonwoody plant remains. These soils are in depressional areas. The water table is at or above the surface of the soil most of the time, under natural conditions. Slopes are less than 2 percent. These soils are dysic, hyperthermic Typic Medisaprists.

Hontoon soils are closely associated with Immokalee, St. Johns, Samsula, and Wesconnett soils. Immokalee and St. Johns soils are better drained and have a spodic horizon. Samsula soils have organic layers less than 51 inches thick. Wesconnett soils are sandy throughout.

Typical pedon of Hontoon muck under mixed hardwoods, on a 1 percent concave slope, in a depression 8,200 feet south of Tillman Ridge and State Road 214 intersection and 150 feet east of Tillman Road, NE1/4NE1/4 sec. 5, T. 8 S., R. 29 E.

Oa1—0 to 7 inches; black (5YR 2/1) muck; 50 percent fiber, 11 percent rubbed; weak fine granular structure; friable; many fine, medium and few coarse roots; sodium pyrophosphate extract color light yellowish brown (10YR 6/4); (pH 2.8 in 0.01 molar calcium chloride) extremely acid; gradual smooth boundary.

Oa2—7 to 16 inches; dark reddish brown (5YR 2/2) muck, common coarse distinct black (N 2/0) mottles; 25 percent fiber, 6 percent rubbed; moderate medium granular structure; friable; few fine, medium, and coarse roots; sodium pyrophosphate extract color yellowish brown (10YR 5/4); (pH 2.8 in 0.01 molar calcium chloride) extremely acid; gradual wavy boundary.

Oa3—16 to 24 inches; black (5YR 2/1) muck; 24 percent fiber, 4 percent rubbed; moderate medium subangular blocky structure; friable; few fine, medium, and coarse roots; sodium pyrophosphate extract color dark yellowish brown (10YR 4/4); (pH 2.8 in 0.01 molar calcium chloride) extremely acid; gradual wavy boundary.

Oa4—24 to 55 inches; dark reddish brown (5YR 2/2) muck; 20 percent fiber, 4 percent rubbed; weak medium granular structure; friable; few fine, medium, and coarse roots; sodium pyrophosphate extract color light yellowish brown (10YR 6/4); about 15 percent coarse woody fragments in upper part; (pH 2.8 in 0.01 molar calcium chloride) extremely acid; gradual wavy boundary.

IIC1—55 to 70 inches; black (10YR 2/1) mucky fine sand; massive; slightly sticky; extremely acid; gradual smooth boundary.

IIC2—70 to 80 inches; very dark gray (10YR 3/1) fine sand; common medium distinct black (10YR 2/1) and dark gray (10YR 4/1) mottles; moderate medium granular structure; friable; extremely acid.

Soil reaction ranges from 2.8 to 4.5 in 0.01 molar calcium chloride and from 4.5 to 5.5 by the Hellige-Truog method. The estimated content of sand in the Oa horizon ranges from 5 to 40 percent.

The Oa horizons have hue of 5YR, value of 2 or 3, and chroma of 1 or 2; or they have hue of 10YR, value of 2, and chroma of 1; or no hue and value of 2 and are 52 to 80 inches or more thick.

The fiber content ranges from 8 to 55 percent, unrubbed, and 2 to 16 percent, rubbed. The sodium pyrophosphate extract color has hue of 10YR, value of 5, and chroma of 2 to 4; or value of 6 and chroma of 3 or 4.

Some pedons have a IIC horizon, as described in Hontoon muck. This horizon is at a depth greater than 51 inches. It has hue of 5YR, value of 2.5 or 3, and chroma of 1; or hue of 10YR, value of 2 to 5, and chroma of 1 or 2; or no hue and value of 2. Texture ranges from fine sand to sandy clay. The IIC horizon extends to a depth of 80 inches or more.

Immokalee Series

The Immokalee series consists of poorly drained, nearly level soils that formed in sandy marine sediments. These soils occur on broad flats and low knolls in the flatwoods. In most years the water table is at a depth of less than 10 inches for 2 to 4 months and recedes to a depth of 10 to 40 inches for 6 months or more. Slopes range from 0 to 2 percent. These soils are sandy, siliceous, hyperthermic Arenic Haplaquods.

Immokalee soils are closely associated with Myakka, Ona, Pottsburg, St. Johns, and Smyrna soils. Immokalee soils differ from Myakka, Ona, St. Johns, and Smyrna soils by having a spodic horizon below a depth of 30 inches. They differ from Pottsburg soils by having a spodic horizon at a depth of less than 50 inches.

Typical pedon of Immokalee fine sand, in a sparsely wooded area, on a 1 percent slope, 500 feet northeast of intersection of State Road 207 and Lightsey Road and 600 feet south of State Road 207, Land Grant 48, T. 7 S., R. 29 E.

A1—0 to 8 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; many fine and medium and few coarse roots; many uncoated white sand grains; extremely acid; gradual smooth boundary.

A21—8 to 15 inches; light gray (10YR 6/1) fine sand; common fine faint gray mottles; single grained; loose; few fine distinct dark gray (10YR 4/1) stains along root channels; few fine and medium roots; very strongly acid; gradual smooth boundary.

A22—15 to 40 inches; white (10YR 8/1) fine sand; common medium and coarse distinct dark gray (10YR 4/1), dark grayish brown (10YR 4/2), and dark brown (10YR 3/3) stains along root channels; single grained; loose; very strongly acid; abrupt irregular boundary.

B2h—40 to 64 inches; very dark gray (10YR 3/1) fine sand; weak fine subangular blocky structure; friable; noncemented; few uncoated white sand grains; extremely acid; gradual smooth boundary.

B3—64 to 80 inches; brown (10YR 4/3) fine sand; common fine distinct black (10YR 2/1) mottles; moderate medium subangular blocky structure; noncemented; friable; few pockets of very dark grayish brown (10YR 3/2) fine sand; extremely acid.

Soil reaction ranges from extremely acid to medium acid in all horizons. Texture of the Bh horizon is fine sand or loamy fine sand.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2; or no hue and value of 2. Thickness ranges from 4 to 12 inches. Where the color value is less than 3.5, the A1 horizon is less than 10 inches thick.

The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2, or value of 8 and chroma of 1. Very dark gray, dark gray, very dark grayish brown, gray, and light gray mottles are in this horizon in some pedons. Thickness ranges from 23 to 38 inches. Total thickness of the A horizon ranges from 30 to 50 inches.

The Bh horizon has hue of 10YR or 5YR, value of 2 or 3, and chroma of 1 or 2; or hue of 7.5YR, value of 3, and chroma of 2. Black and very dark brown mottles and pockets and lenses of very dark gray, dark gray, and gray fine sand are in this horizon in some pedons. Some pedons have a second sequum of A'2 and B'h horizons. In those pedons, colors in the A'2 horizon are similar to those in the A2 horizon, and the B'h horizon has colors similar to those of the Bh horizon.

The B3 horizon has hue of 10YR, value of 4 or 5, and chroma of 3.

Some pedons have a C horizon. It has hue of 10YR, value of 4 or 5, and chroma of 2.

Jonathan Series

The Jonathan series consists of moderately well drained, nearly level soils that formed in thick deposits of marine sands. These soils occur on slightly elevated broad ridges and knolls in the flatwoods. The water table is 30 to 40 inches below the surface for 4 to 6 months during periods of high rainfall. It may rise to a depth of 24 to 30 inches for brief periods. It is below 40 inches during long periods of low rainfall. Slopes are 0 to 2 percent. These soils are sandy, siliceous, hyperthermic, ortstein Typic Haplohumods.

Jonathan soils are closely associated with Cassia, Immokalee, Myakka, and Pomello soils. Cassia and Pomello soils occupy similar positions in the landscape. Additionally, Cassia soils have an A horizon less than 20 inches thick and are wetter. Pomello soils have an A horizon 30 to 50 inches thick. Myakka and Immokalee soils are on lower positions in the landscape and are wetter.

Typical pedon of Jonathan fine sand under sand pines in a wooded area, on a 1 percent slope, 5,500 feet south of intersection of Dobbs Road and Florida State Road 207, 400 feet west of Dobbs Road, SW1/4NE1/4 sec. 36, T. 7 S., R. 30 E.

A1—0 to 4 inches; gray (10YR 6/1) fine sand; single grained; loose; common fine, medium and few coarse roots; strongly acid; clear smooth boundary.

A21—4 to 9 inches; light gray (10YR 7/1) fine sand; single grained; loose; few fine, medium, and coarse roots; strongly acid; gradual smooth boundary.

A22—9 to 39 inches; white (10YR 8/1) fine sand; single grained; loose; few fine, medium, and coarse roots; common medium distinct grayish brown (10YR 5/2) and brown (10YR 5/3) stains along root channels; very strongly acid; gradual wavy boundary.

A23—39 to 71 inches; light gray (10YR 7/2) fine sand; many medium and coarse very dark grayish brown (10YR 3/2) mottles and stains along root channels; single grained; loose; few fine and medium roots; strongly acid; abrupt wavy boundary.

B2hm—71 to 80 inches; black (5YR 2/1) fine sand; strong medium subangular blocky structure; firm; cemented in 60 percent of horizon; few fine and medium roots; extremely acid.

Soil reaction ranges from very strongly acid to medium acid in the A horizon and from very strongly acid to extremely acid in the Bh horizon. Solum thickness ranges from 74 to more than 80 inches. The A1 horizon has hue of 10YR, value of 4 through 6, and chroma of 1 or 2. Thickness ranges from 3 to 5 inches. The A2 horizon has hue of 10YR, value of 5 through 7, and chroma of 1 or 2. Thickness ranges from 35 to 67 inches. The combined thickness of the A1 and A2 horizons is 50 to 70 inches.

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; no hue and value of 1; or hue of 5YR, value of 2, and chroma of 1. In some pedons, this horizon is within a depth of 80 inches. In those pedons, a B3 is present. It has hue of 10YR, value of 3 or 4, and chroma of 4. Texture is sand or fine sand, which extends to 80 inches or more.

Manatee Series

The Manatee series consists of very poorly drained, nearly level soils that formed in thick beds of loamy materials. These soils are on flood plains and in poorly defined drainageways. The water table is within 10 inches of the surface for more than 2 to 4 months during most years. During seasons of high rainfall, these soils are flooded. Slopes are less than 2 percent. These soils are coarse-loamy, siliceous, hyperthermic Typic Argiaquolls.

Manatee soils are closely associated with Bluff, Floridana, Myakka, Parkwood, Riviera, St. Johns, and Tocoi soils. Bluff soils lack an argillic horizon and have heavy textures throughout. Parkwood soils lack a mollic epipedon and have carbonate accumulations in the upper 20 inches of the Bt horizon. Myakka, Riviera, and St. Johns soils are on higher positions in the landscape and are better drained. In addition, Myakka, Tocoi, and St. Johns soils have a Bh horizon. Floridana soils have a Bt horizon between depths of 20 and 40 inches.

Typical pedon of Manatee fine sandy loam, frequently flooded, in a wooded drainageway, on a 0.5 percent slope, 1 1/4 miles north of intersection of U.S. Highway 1 and Porter Road, 500 feet west of U.S. Highway 1 and 75 feet north of unpaved road, Land Grant 52, T. 6 S., R. 29 E.

A11—0 to 8 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; friable; many fine roots; common large and medium roots; strongly acid; abrupt wavy boundary.

A12—8 to 13 inches; black (10YR 2/1) fine sandy loam; moderate medium granular structure; friable; common fine and medium roots; slightly acid; gradual wavy boundary.

B21t—13 to 25 inches; very dark gray (10YR 3/1) fine sandy loam; weak fine subangular blocky structure; friable; sand grains are bridged and coated with clay; neutral; gradual wavy boundary.

B22tg—25 to 34 inches; dark gray (5Y 4/1) sandy clay loam; weak medium subangular blocky structure; slightly sticky; few coarse faint dark grayish brown (10YR 4/2) sandy loam vertical pockets; sand grains are bridged and coated with clay; neutral; gradual wavy boundary.

B3g—34 to 52 inches; dark gray (10YR 4/1) loamy fine sand; common medium prominent yellowish red (5YR 5/6) mottles in lower part; weak fine subangular blocky structure; slightly sticky; common coarse faint grayish brown (10YR 5/2) loamy sand pockets; neutral; gradual wavy boundary.

Cg—52 to 80 inches; dark gray (10YR 4/1) fine sand; few fine prominent yellowish red (5YR 5/6) mottles; many medium faint gray sand pockets; weak medium granular structure; friable; neutral.

Soil reaction ranges from strongly acid to mildly alkaline in the A horizon and from neutral to moderately alkaline in the B2tg and Cg horizons.

The A1 horizon has no hue and value of 2 or hue of 10YR, value of 2 or 3, and chroma of 1. Thickness is 12 to 22 inches.

The B2t horizon has hue of 10YR, value of 2 to 4, and chroma of 1; no hue and value of 2; or hue of 5Y, value of 4, and chroma of 1. It is 16 to 40 inches thick. It is sandy loam or fine sandy loam in the upper part and sandy clay loam in the lower part. This horizon has pockets of fine sand or loamy fine sand. The B3 horizon, as described in the Manatee soil, does not occur in all pedons. It has hue of 10YR, value of 4, and chroma of 1 or 2 and is as much as 14 inches thick. It is loamy fine sand or loamy sand.

Some pedons have a B3ca horizon. It has the same colors and texture as the B3 horizon and contains soft, white calcium carbonate accumulations.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 1. It extends to a depth of 80 inches or more. This horizon is loamy sand or fine sand.

Moultrie Series

The Moultrie series consists of very poorly drained, nearly level soils that formed in thick beds of marine sands. These soils are along the margins of tidal marshes and on small, slightly elevated islands in the salt marshes. The water table is within 10 inches of the surface most of the time and is affected by tidal fluctuations. These soils are flooded periodically by storm tides and by abnormally high tides under other conditions. Slopes are less than 1 percent. These soils are siliceous, hyperthermic Spodic Psammaquents.

Moultrie soils are closely associated with Adamsville, Durbin, Fripp, Myakka, Pellicer, St. Augustine, and Tisonia soils. Pellicer, Durbin, and Tisonia soils occupy lower positions and are flooded twice daily by normal high tides. Additionally, Pellicer soils are clayey and have high *n* values, and Durbin and Tisonia soils are organic. All the other soils are on higher positions in the landscape and are better drained.

Typical pedon of Moultrie fine sand, frequently flooded, in a tidal marsh, on a 0.5 percent slope, 3,700 feet due east of the northwest end of runway 31, St. Augustine Airport, Land Grant 43, T. 6 S., R. 29 E.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) fine sand; common medium and coarse, distinct to prominent olive (5Y 4/4), dark greenish gray (5G 4/1), and light gray (10YR 7/1) mottles; weak fine granular structure; friable; common fine and few medium roots; 19 millimhos per centimeter conductivity; mildly alkaline; clear wavy boundary.

A21—2 to 8 inches; light gray (10YR 7/1) fine sand; few coarse distinct black (10YR 2/1) and common coarse distinct dark gray (10YR 4/1) and gray (10YR 5/1) mottles; few fine distinct dark grayish brown (10YR 4/2) and very dark grayish brown (10YR 3/2) mottles and stains along root channels; single grained; loose; common fine and medium roots and few coarse roots; 25 millimhos per centimeter conductivity; neutral; clear wavy boundary.

A22—8 to 22 inches; grayish brown (10YR 5/2) fine sand; common medium distinct dark gray (10YR 4/1) and dark grayish brown (10YR 4/2) mottles and stains along root channels; single grained; loose; few fine and medium roots; 21 millimhos per centimeter conductivity; slightly acid; clear wavy boundary.

B21h—22 to 26 inches; very dark gray (10YR 3/1) fine sand; common coarse distinct grayish brown (10YR 5/2), brown (10YR 5/3), dark grayish brown (10YR 4/2), and dark gray (10YR 4/1) mottles; weak medium granular structure; friable; sand grains are thinly coated with organic matter; many uncoated sand grains; 26 millimhos per centimeter conductivity; strongly acid; clear wavy boundary.

B22h—26 to 29 inches; very dark brown (10YR 2/2) fine sand; common coarse distinct grayish brown (10YR 5/2), common fine faint dark brown, and few fine distinct black (10YR 2/1) mottles; weak medium granular structure; friable; sand grains are thinly coated with organic matter; many uncoated sand grains; 23 millimhos per centimeter conductivity; very strongly acid; gradual wavy boundary.

B3—29 to 47 inches; brown (10YR 4/3) fine sand; single grained; loose; 18 millimhos per centimeter conductivity; strongly acid; gradual smooth boundary.

C—47 to 80 inches; grayish brown (2.5Y 5/2) fine sand; single grained; loose; strongly acid.

Soil reaction ranges from slightly acid to moderately alkaline in the A horizon and from very strongly acid to slightly acid in the Bh and B3 horizons. Sulfur content is less than 0.75 percent throughout the soil. Conductivity of the saturation extract ranges from about 16 to 35 millimhos per centimeter throughout the soil.

The A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2 or value of 5 and chroma of 1; hue of 2.5Y, value of 3 or 4, and chroma of 2; or no hue and value of 3. Where value is 3 or less, thickness is less than 6 inches. Thickness ranges from 2 to 8 inches. The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Mottles of black, light gray, gray, dark gray, dark grayish brown, grayish brown, olive, and dark greenish gray are in the A horizon in some pedons. Texture is sand or fine sand. Total thickness of the A1 and A2 horizons combined is 12 to 30 inches.

The Bh horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2; or hue of 7.5YR, value of 3 or 4, and chroma of 2; or hue of 5YR, value of 3, and chroma of 3 or 4. This horizon has few to many uncoated sand grains. Colors of pockets of A2 material and of mottles similar to those of the A2 horizon range from few to many. Texture is sand, fine sand, or loamy fine sand. Thickness ranges from 6 to 14 inches.

The B3 horizon has hue of 10YR, value of 4, and chroma of 3 or 4; or hue of 7.5YR, value of 4, and chroma of 4. Texture is sand or fine sand.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2; hue of 2.5Y, value of 5 to 7, and chroma of 2; or no hue and value of 5 to 7. Texture is sand or fine sand.

Myakka Series

The Myakka series consists of nearly level, poorly drained and very poorly drained sandy soils that are in the flatwoods. These soils formed in marine deposits of sandy material. The water table is at a depth of less than 10 inches for 1 to 4 months in most years and recedes to a depth of more than 40 inches during long dry periods. The depressions are flooded for more than 6 months in most years. Slopes range from 0 to 2 percent. These soils are sandy, siliceous, hyperthermic Aeric Haplaquods.

Myakka soils are closely associated with Cassia, Immokalee, Ona, and Smyrna soils. Myakka soils differ from Cassia soils by being poorly drained and by lacking a gray or light gray A1 horizon. Myakka soils have an A horizon 20 to 30 inches thick, whereas Immokalee soils have an A horizon more than 30 inches thick. Ona soils lack an A2 horizon. Smyrna soils have an A horizon less than 20 inches thick.

Typical pedon of Myakka fine sand, in a flatwoods area, 3,200 feet south of State Road 16 and 25 feet east of Green Acres Road, NW1/4NW1/4SE1/4 sec. 8, T. 7 S., R. 29 E.

A11—0 to 4 inches; black (10YR 2/1 crushed) fine sand; weak medium granular structure; very friable; few medium and coarse roots; many uncoated light gray sand grains; very strongly acid; clear smooth boundary.

A12—4 to 8 inches; dark gray (10YR 4/1) fine sand; common medium faint very dark gray (10YR 3/1) mottles; single grained; loose; common fine and medium roots; very strongly acid; gradual smooth boundary.

A21—8 to 14 inches; gray (10YR 5/1) fine sand; single grained; loose; common fine and medium roots; common fine distinct black (10YR 2/1) stains along root channels; very strongly acid; gradual smooth boundary.

A22—14 to 23 inches; light gray (10YR 7/1) fine sand; common medium faint dark gray (10YR 4/1) mottles; single grained; loose; common fine and medium roots; common fine distinct black (10YR 2/1) stains along root channels; very strongly acid; abrupt smooth boundary.

B21h—23 to 30 inches; black (N 2/0) fine sand; strong medium subangular blocky structure; friable; common fine roots; pockets and tongues of gray (10YR 5/1) and light gray (10YR 6/1, 7/1) fine sand; very strongly acid; gradual wavy boundary.

B22h—30 to 53 inches; very dark brown (10YR 2/2) fine sand; many medium faint black (10YR 2/1) and common fine distinct dark brown (10YR 3/3) mottles; moderate medium subangular blocky structure; friable; common fine roots; very strongly acid; gradual smooth boundary.

B3&Bh—53 to 80 inches; dark brown (10YR 3/3) fine sand; common fine faint very dark gray (10YR 3/1) mottles; weak medium granular structure; very friable; few fine roots; common coarse distinct pockets of black (10YR 2/1) fine sand; many uncoated sand grains; very strongly acid.

Soil reaction is very strongly acid to slightly acid in all horizons.

The A1 or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or less. Uncrushed colors have salt-and-pepper appearance. Thickness ranges from 4 to 8 inches.

The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. In some pedons, this horizon has gray, brown, or light yellowish brown mottles. Thickness is 15 to 19 inches.

The B2h horizon has hue of 10YR or 5YR, value of 2 or 3, and chroma of 1 to 3; or it has no hue and value of 2 or 3. Thickness ranges from 6 to 30 inches.

The B3&Bh horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 3; or it has hue of 5YR, value of 4 or 5, and chroma of 3 or 4. This horizon has common to many uncoated sand grains where value and chroma are 3. It has black, very dark brown, dark reddish brown, very dark gray, or very dark grayish brown, noncemented bodies or pockets of fine sand. Some pedons have a B3 horizon. The B3 horizon has colors similar to those of the B3&Bh horizon, but does not have dark bodies or pockets of fine sand.

Some pedons have A'2 and B'2h horizons below the B3&Bh or B3 horizon. The A'2 horizon has hue of 10YR, value of 4 to 6, and chroma of 2. The B'2h horizon has hue of 10YR or 5YR, value of 2, and chroma of 1; or it has no hue and value of 1.

Narcoossee Series

The Narcoossee series consists of somewhat poorly drained, nearly level soils formed in sandy marine sediments mixed with marine shells and shell fragments. These soils are on narrow flats and low knolls adjacent to relict beach dunes and tidal salt marshes. The water table is within a depth of 20 to 40 inches for 4 to 6 months in most years. During times of heavy rainfall, it rises to a depth of 10 to 20 inches for brief periods. During extended dry periods, the water table recedes to a depth greater than 40 inches. Slopes are less than 2 percent. These soils are sandy, siliceous, hyperthermic Entic Haplohumods.

Narcoossee soils are closely associated with the Adamsville Variant and Cassia, Pomello, Fripp, and Pompano soils. Cassia and Pomello soils do not have shell fragments. In addition, Cassia soils have Bh horizons, which are continuous in 90 percent of each pedon. Pomello soils have dark gray to light gray A horizons that are 30 to 50 inches thick. The Adamsville Variant and Fripp soils do not have a Bh horizon, and Fripp soils are better drained. The poorly drained Pompano soils do not have a Bh horizon, and they are on lower positions in the landscape.

Typical pedon of Narcoossee fine sand, shelly substratum, in a wooded area, 1.8 miles north and 1,100 feet west of State Highway A1A on Vilano Beach, SW1/4SW1/4 sec. 32, T. 6 S., R. 30 E.

A1—0 to 3 inches; black (10YR 2/1) fine sand; single grained; friable; many very fine, fine, medium and few coarse roots; extremely acid; clear wavy boundary.

A2—3 to 11 inches; gray (10YR 6/1) fine sand; many fine faint black (10YR 2/1) sand grains; single grained; loose; medium and coarse roots; strongly acid; abrupt wavy boundary.

B21h—11 to 12 inches; dark reddish brown (5YR 2/2) fine sand; weak medium granular structure; friable; few medium and coarse roots; many uncoated sand grains; few shells and shell fragments sand sized to 1/4 inch in diameter; slightly acid; clear wavy boundary.

B22h—12 to 14 inches; dark reddish brown (5YR 3/2) fine sand; common medium faint dark reddish brown (5YR 2/2) mottles; weak medium granular structure; friable; few medium and coarse roots; few shells and shell fragments sand sized to 1/4 inch in diameter; slightly acid; gradual smooth boundary.

B3—14 to 20 inches; yellowish brown (10YR 5/4) fine sand; common coarse distinct grayish brown (10YR 5/2), light brownish gray (10YR 6/2), and light gray (10YR 7/2) mottles and few fine distinct dark yellowish brown (10YR 4/6) mottles; weak fine granular structure; friable; few medium and coarse roots; few shell fragments sand sized to 1/4 inch in diameter; mildly alkaline; gradual smooth boundary.

C1—20 to 25 inches; very pale brown (10YR 7/3) fine sand; common coarse prominent strong brown (10YR 5/6, 5/8) mottles and common fine prominent brownish yellow (10YR 6/6) mottles; single grained; loose; many medium and coarse roots; many black and brown heavy minerals; moderately alkaline; gradual smooth boundary.

C2—25 to 30 inches; light gray (10YR 7/2) fine sand; common coarse prominent yellowish brown (10YR 5/4, 5/6) and brownish yellow (10YR 6/6, 6/8) mottles; single grained; loose; common medium, coarse and few fine roots; few 1/4-inch, strong brown (7.5YR 5/6) bodies of noncemented loamy fine sand; about 5 percent by volume shell fragments 3/8 inch to 1 inch in diameter; moderately alkaline; gradual smooth boundary.

C3—30 to 80 inches; gray (5Y 6/1) fine sand; common medium prominent dark grayish brown (2.5Y 4/2) and olive brown (2.5Y 4/4) mottles; single grained; loose; about 25 percent by volume shell fragments sand sized to 1/2 inch in diameter to a depth of 43 inches; mildly alkaline.

Soil reaction ranges from extremely acid to medium acid in the A horizon, strongly acid to slightly acid in the Bh horizon, and neutral to moderately alkaline in the C horizon.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1. It ranges in thickness from 2 to 7 inches. The A2 horizon has hue of 10YR, value of 6 to 8, and chroma of 1 or 2. It ranges in thickness from 8 to 23 inches. The combined thickness of the A1 and A2 horizons ranges from 11 to 25 inches.

The Bh horizon has hue of 10YR, value of 2, and chroma of 1, or value of 3 and chroma of 2 or 3; or hue of 5YR, value of 2, and chroma of 1 or 2, or value of 3 and chroma of 1 to 4. Thickness ranges from 2 to 4 inches and is discontinuous. Texture is fine sand or sand. The content of shells and shell fragments ranges from 0 to 15 percent.

The B3 horizon has hue of 10YR, value of 5, and chroma of 2 to 4. It ranges in thickness from 5 to 11 inches. The content of shell fragments ranges from 5 to 20 percent.

The C horizon has hue of 10YR, value of 6 or 7, and chroma of 2 or 3; hue of 5Y, value of 6, and chroma of 1; or hue of 5GY, value of 7, and chroma of 1. Texture is fine sand or sand mixed with shells and shell fragments. The content of shells and shell fragments ranges from 15 to 50 percent. By weighted average, shell content in the 10- to 40-inch control section is less than 40 percent. This horizon extends to a depth of 80 inches or more.

Ona Series

The Ona series consists of nearly level, poorly drained soils formed in sandy marine sediments. These soils occur in flatwood areas. The water table is at a depth of 10 to 40 inches for periods of 4 to 6 months during most years. It recedes to a depth of more than 40 inches during very dry seasons. Slopes range from 0 to 2 percent. These soils are sandy, siliceous, hyperthermic Typic Haplaquods.

Ona soils are closely associated with Immokalee, Myakka, St. Johns, and Tocoi soils. All the associated soils except Tocoi soils have an A2 horizon. Tocoi soils have an argillic horizon at a depth of more than 40 inches.

Typical pedon of Ona fine sand, in a cultivated field, 600 feet south of intersection of County Road C-13 and Don Manuel Road, 100 feet west of County Road C-13, NW1/4NW1/4 sec. 33, T. 8 S., R. 28 E.

A1—0 to 8 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; neutral; gradual wavy boundary.
B21h—8 to 12 inches; black (5YR 2/1) fine sand; weak fine subangular blocky structure; friable; medium acid; gradual wavy boundary.
B22h—12 to 16 inches; dark reddish brown (5YR 3/2) fine sand; weak fine granular structure; very friable; medium acid; gradual wavy boundary.
B3&Bh—16 to 25 inches; reddish brown (5YR 4/4) fine sand; single grained; loose; few medium distinct dark reddish brown (5YR 3/2) Bh bodies; medium acid; gradual wavy boundary.
B3—25 to 34 inches; brown (10YR 5/3) fine sand; single grained; loose; very strongly acid; clear wavy boundary.
C1—34 to 65 inches; light gray (10YR 7/2) fine sand; single grained; loose; very strongly acid; clear smooth boundary.
C2—65 to 80 inches; grayish brown (10YR 5/2) fine sand; common medium distinct dark gray (10YR 4/1) mottles; single grained; loose; very strongly acid.

Soil reaction ranges from medium acid to very strongly acid in all horizons except in limed areas.

The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1. Thickness ranges from 4 to 8 inches.

The B2h horizon has hue of 10YR or 5YR, value of 2 or 3, and chroma of 1 or 2; or it has hue of 7.5YR, value of 3, and chroma of 2; or it has no hue and value of 2. Thickness ranges from 6 to 28 inches.

The B3&Bh horizon has the same colors as those in the B3 horizon and contains few Bh bodies. Texture is sand or fine sand. The B3&Bh ranges up to 12 inches in thickness. Some pedons have no B3&Bh horizon.

Some pedons have A'2 and B'h horizons below the Bh horizon. The A'2 horizon has hue of 10YR, value of 5 or 6, and chroma of 2 or 3; or hue of 2.5Y, value of 5 or 6, and chroma of 2. Thickness ranges from 0 to 19 inches. The B'2h horizon has hue of 7.5YR or 5YR, value of 3, and chroma of 2. It ranges up to 25 inches in thickness.

The B3 horizon, as described in Ona fine sand, does not occur in some pedons. It has hue of 10YR, value of 3 or 4, and chroma of 3 or 4; or hue of 5YR, value of 4, and chroma of 4. It is sand or fine sand, and it is as much as 15 inches thick.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 3. It is sand or fine sand and extends to a depth of more than 80 inches.

Orsino Series

The Orsino series consists of moderately well drained, nearly level to gently sloping soils formed in sandy marine deposits. These soils are on low ridges and knolls in the flatwoods and on slopes adjacent to soils on higher positions. The water table is at a depth of 40 to 60 inches for more than 6 months during most years, but recedes to a depth greater than 60 inches during periods of lower rainfall. Slopes range from 0 to 5 percent. These soils are hyperthermic, uncoated Spodic Quartzipsamments.

Orsino soils are closely associated with Cassia, Paola, Pomello, and Tavares soil. Cassia and Pomello soils have a spodic horizon. Orsino soils are moderately well drained, whereas Paola soils are excessively drained. Additionally, Paola soils are on higher positions in the landscape. Tavares soils do not have a discontinuous Bh horizon.

Typical pedon of Orsino fine sand, 0 to 5 percent slopes, on a 2 percent slope, in a wooded area, 4,200 feet east of U.S. Highway 1 and 250 feet north of Shannon Road, Land Grant 53, T. 5 S., R. 29 E.

A1—0 to 4 inches; gray (10YR 5/1) fine sand; weak fine granular structure; very friable; common fine and medium and few coarse roots; extremely acid; clear smooth boundary.
A2—4 to 18 inches; white (10YR 8/1) fine sand; few fine distinct brownish yellow (10YR 6/6) mottles; single grained; loose; few fine, medium, and coarse roots; very strongly acid; abrupt irregular boundary.
B21&Bh—18 to 29 inches; brownish yellow (10YR 6/8) fine sand; weak medium granular structure; very friable; few medium roots; few dark reddish brown (5YR 3/4) discontinuous noncemented bodies 0.5 to 0.75 inch in diameter are concentrated along the exterior of few white (10YR 8/1) tongues, which extend from the A2 horizon; tongues are 10 inches long and 2 inches across; strongly acid; gradual smooth boundary.
B22&Bh—29 to 44 inches; brownish yellow (10YR 6/6) fine sand; common fine faint light yellowish brown and few medium faint reddish yellow (7.5YR 6/8) mottles; moderate medium granular structure; friable; few fine, medium, and coarse roots; few bodies of dark reddish brown (5YR 3/4), noncemented fine sand about 2 inches in diameter; strongly acid; clear smooth boundary.
B3—44 to 59 inches; yellow (10YR 7/6) fine sand; few coarse faint brownish yellow (10YR 6/6, 6/8) and many coarse distinct very pale brown (10YR 7/4) mottles, lower 3 inches has common coarse distinct dark gray (10YR 4/1) mottles; single grained; loose; few medium and coarse roots; strongly acid; clear wavy boundary.
C—59 to 80 inches; white (10YR 8/1) fine sand; few medium distinct red (2.5YR 5/8) mottles; single grained; loose; medium acid.

Soil reaction ranges from extremely acid to very strongly acid in the A1 horizon and from very strongly acid to medium acid in the other horizons. Texture is sand or fine sand throughout.

The A1 horizon has hue of 10YR, value of 4, and chroma of 2, or value of 5 or 6 and chroma of 1. Thickness ranges from 2 to 5 inches. The A2 horizon has hue of 10YR, value of 6, and chroma of 1, or value of 7 or 8 and chroma of 1 or 2. It is 5 to 26 inches thick. The combined thickness of the A1 and A2 horizons is 10 to 28 inches.

The B part of the B2&Bh horizon has hue of 10YR and value of 5 or 6 and chroma of 4 to 8, or value of 7 and chroma of 6 or 8; or hue of 7.5YR, value of 5, and chroma of 7. Tongues of the A2 horizon extending into the B horizon have hue of 10YR, value of 7 or 8, and chroma of 1 or 2. The Bh part of this horizon has discontinuous, noncemented pockets, or coarse mottles, 1/2 inch to 2 inches in diameter that have hue of 5YR, value of 3, and chroma of 3 or 4; or hue of 10YR, value of 3, and chroma of 1. In most pedons, the Bh part is at the upper contact of the B horizon, but in some, it extends throughout the horizon as small bodies of noncemented fine sand. The B2&Bh horizon is 18 to 43 inches thick.

The B3 horizon has colors similar to those in the B2 part of the B2&Bh horizon, but it lacks the Bh bodies present in the B2&Bh horizon. Thickness ranges from 12 to 28 inches.

The C horizon has hue of 10YR, value of 6 or 7, and chroma of 3 or 4, or value of 8 and chroma of 1. It extends to a depth of 80 inches or more.

Palm Beach Series

The Palm Beach series consists of well drained to excessively drained, nearly level to gently sloping soils on dunelike ridges parallel to the Atlantic coast. These soils formed in marine deposits of thick beds of sand and shell fragments. The water table is at a depth of more than 80 inches during most years. Slopes are 0 to 5 percent. These soils are hyperthermic, uncoated Typic Quartzipsamments.

Palm Beach soils are closely associated with the Adamsville Variant and Astatula, Fripp, and Paola soils. Fripp soils have only a few or no sand-sized shell fragments within the profile. Paola soils have a thick A2 horizon and a high-chroma B horizon, and the Adamsville Variant soil has poorer drainage and is on lower positions.

Typical pedon of Palm Beach sand, 0 to 5 percent slopes, on a 5 percent slope, on dunelike ridges parallel to the Atlantic coast, 4,500 feet north of intersection of Third Street and State Road A1A and 200 feet west of State Road A1A along survey line, SW1/4SW1/4 sec. 20, T. 6 S., R. 30 E.

O1—2 inches to 0; discontinuous root mat; partially decomposed organic material, leaves, and stems.

A1—0 to 3 inches; grayish brown (10YR 5/2) sand; weak fine granular structure; friable; common fine and medium and a few coarse roots; about 5 percent by volume sand sized to 5 millimeters in diameter shell fragments; calcareous; clear wavy boundary.

C11—3 to 10 inches; light brownish gray (10YR 6/2) sand; single grained; loose; few fine, medium, and coarse roots; about 10 percent by volume shell fragments sand sized to 5 millimeters in diameter; calcareous; clear wavy boundary.

C12—10 to 28 inches; light gray (10YR 7/2) sand; single grained; loose; few fine, medium, and coarse roots; about 10 percent by volume shell fragments sand sized to 5 millimeters in diameter; calcareous; abrupt wavy boundary.

C2—28 to 80 inches; multicolored shell fragments mixed with white (10YR 8/1) coarse sand; single grained; loose; about 70 percent by volume shell fragments sand sized to 2.5 centimeters in diameter; calcareous.

This soil is mildly alkaline to calcareous throughout.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. The volume of sand-sized to 5-millimeter shell fragments ranges from 5 to 30 percent. The A horizon is 2 to 8 inches thick.

The C1 horizon has hue of 10YR, value of 6 or 7, and chroma of 2 or 3. The C2 horizon is a mixture of sand and shell fragments. The color of the horizon depends largely upon the color of the shells. Shells and shell fragments range from sand sized to 1 inch in diameter and from 20 to 75 percent by volume in the C horizon. By weighted shell content, the control section is less than 40 percent. The C horizon extends to a depth of 80 inches or more.

Paola Series

The Paola series consists of excessively drained, nearly level to sloping soils that formed in thick sandy marine sediments. These soils are on high ridges and hillsides leading to tidal marshes and drainageways. The water table is at a depth greater than 72 inches. Slopes range from 0 to 8 percent. These soils are hyperthermic, uncoated Spodic Quartzipsamments.

Paola soils are closely associated with Astatula, Cassia, Orsino, and Pomello soils. Paola soils differ from Astatula soils by having a B horizon and an A2 horizon. Paola soils occupy higher positions in the landscape and are excessively drained; whereas Orsino and Pomello soils are moderately well drained, and Cassia soils are somewhat poorly drained. In addition, Pomello and Cassia soils have a spodic horizon.

Typical pedon of Paola fine sand, 0 to 8 percent slopes, on a gently sloping sand pine ridge, 500 feet west of U.S. Highway 1 and 10 feet north of State Road 5A, SE1/4SW1/4 sec. 6, T. 8 S., R. 30 E.

O1—2 inches to 0; partially decomposed organic material; leaves and stems.

A1—0 to 4 inches; gray (10YR 5/1 rubbed) fine sand; unrubbed color is a mixture of light gray (10YR 7/1), uncoated sand grains and black sand-sized organic matter particles; weak fine granular structure; very friable; common fine and medium roots; extremely acid; clear smooth boundary.

A2—4 to 17 inches; white (10YR 8/1) fine sand; common coarse distinct light yellowish brown (10YR 6/4) and common medium faint light gray (10YR 7/1) mottles; single grained; loose; few fine, medium, and coarse roots; very strongly acid; abrupt wavy boundary.

B&A—17 to 32 inches; brownish yellow (10YR 6/8) fine sand; single grained; loose; common fine, medium, and coarse roots; common bodies of dark reddish brown (5YR 3/4) fine sand; few tongues of white (10YR 8/1) fine sand 2 to 3 inches wide extend to a depth of 12 inches below the A2; outer edges of tongues are stained with dark reddish brown (5YR 3/4) organic accumulations; very strongly acid; gradual smooth boundary.

C—32 to 80 inches; very pale brown (10YR 7/4) fine sand; single grained; loose; few fine and medium roots; strongly acid.

Soil reaction ranges from extremely acid to strongly acid.

The A1 horizon has hue of 10YR, value of 5 or 6, and chroma of 1. Thickness ranges from 2 to 4 inches. The A2 horizon has hue of 10YR, value of 7 or 8, and chroma of 1 or 2 and is 13 to 39 inches thick. Total thickness of the A1 and A2 horizons ranges from 17 to 42 inches.

The B&A horizon has hue of 7.5YR, value of 5, and chroma of 6 or 8; or hue of 10YR, value of 5, and chroma of 3 to 8, or value of 6 or 7 and chroma of 6 or 8. Bodies of fine sand stained with organic matter are in this horizon. They have hue of 5YR, value of 3, and chroma of 2 through 4; or they have hue of 7.5YR, value of 3, and chroma of 2. Thickness of the B&A horizon ranges from 8 to 30 inches.

The C horizon has hue of 10YR, value of 6 to 8, and chroma of 3 or 4 and extends to a depth of 80 inches or more.

Parkwood Series

The Parkwood series consists of poorly drained, nearly level soils that formed in loamy marine sediments. These soils are on flood plains and in poorly defined drainageways. The water table is within 10 inches of the surface for 2 to 4 months during most years. It recedes to a depth below 30 inches during extended dry periods. Slopes are less than 2 percent. These soils are coarse-loamy, siliceous, hyperthermic Mollic Ochraqualfs.

Parkwood soils are closely associated with Bluff, Manatee, St. Johns, Riviera, and Floridana soils. Bluff soils lack argillic horizons. Manatee soils have mollic epipedons. St. Johns soils have Bh horizons. In Riviera soils, the A horizons are more than 20 inches thick. Floridana soils have mollic epipedons and Bt horizons at a depth greater than 20 inches.

Typical pedon of Parkwood fine sandy loam, frequently flooded, in a wooded drainageway, on a 0.5 percent slope, 3/4 mile northwest of intersection of Porter Road and D Street and 200 feet east of D Street in Oak Grove Subdivision, Land Grant 53, T. 6 S., R. 29 E.

A1—0 to 7 inches; black (N 2/0) fine sandy loam; weak medium granular structure; friable; many fine roots; common medium and large roots; neutral; abrupt smooth boundary.

A2—7 to 10 inches; grayish brown (10YR 5/2) fine sand; common medium distinct very dark grayish brown (10YR 3/2) mottles; single grained; loose; mildly alkaline; clear wavy boundary.

B21tca—10 to 18 inches; dark gray (10YR 4/1) fine sandy loam; few fine prominent light olive brown (2.5Y 5/6) mottles in the lower part; weak fine subangular blocky structure; friable; sand grains are coated and bridged with clay; many fine carbonates; moderately alkaline; abrupt wavy boundary.

B22tca—18 to 39 inches; white (10YR 8/2) fine sandy loam; weak medium subangular blocky structure; friable; sand grains are coated and bridged with clay; common coarse grayish brown (2.5Y 5/2) loamy sand pockets along root channels; many fine to medium semihard carbonate nodules; moderately alkaline; gradual wavy boundary.

B23tca—39 to 55 inches; light gray (2.5Y 7/2) sandy clay loam; few medium distinct olive yellow (2.5Y 6/6) and greenish gray (5GY 5/1) mottles; moderate medium subangular blocky structure; friable; sand grains are coated and bridged with clay; many fine to medium semihard carbonate nodules; few medium grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2) loamy sand pockets along old root channels; moderately alkaline; gradual wavy boundary.

Cg—55 to 80 inches; greenish gray (5GY 6/1) loamy fine sand; common fine distinct dark greenish gray (5G 4/1) and greenish gray (5G 6/1, 5/1) mottles; moderate medium subangular blocky structure; friable; moderately alkaline.

Soil reaction ranges from neutral to mildly alkaline in the A horizon and from mildly alkaline to strongly alkaline in the B and C horizons.

The A1 horizon has no hue and value of 2; or hue of 5YR, value of 2, and chroma of 1; or hue of 10YR, value of 2 or 3, and chroma of 1. Thickness ranges from 6 to 10 inches. The A2 horizon has hue of 10YR, value of 4 through 7, and chroma of 1 or 2. This horizon has grayish brown or pale brown mottles in some pedons. Texture is fine sand or loamy fine sand. Thickness ranges from 0 to 4 inches. The A2 horizon is discontinuous in 40 percent of the pedon.

The B2t horizon has hue of 10YR, value of 4 to 8, and chroma of 1 or 2; hue of 2.5Y, value of 5 to 7, and chroma of 2; or hue of 5Y, value of 5 or 6, and chroma of 1 or 2. Texture is fine sandy loam, sandy loam, or sandy clay loam. The sandy clay loam texture occurs only in the lower part of the B2t horizon. The calcareous materials in this horizon have hue of 10YR, value of 6 to 8, and chroma of 3 or less. The size of shell fragments and calcium carbonate accumulations ranges from 1/8 to 1/2 inch in diameter. Thickness of this horizon is 19 to 47 inches.

Some pedons have a B3ca horizon. It has hue of 10YR, value of 7, and chroma of 1 or 2; or hue of 5Y, value of 5 to 7, and chroma of 1; or hue of 2.5Y, value of 5 to 7, and chroma of 2. Texture is fine sandy loam or loamy fine sand. Thickness ranges from 0 to 22 inches.

The Cg horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2; or hue of 5GY, value of 5 or 6, and chroma of 1; or hue of 5Y, value of 4 to 7, and chroma of 1 or 2. Texture is loamy fine sand, fine sand, or sand. This horizon extends to a depth of 80 inches or more.

Pellicer Series

The Pellicer series consists of very poorly drained, nearly level soils that formed in clayey tidal sediments more than 40 inches thick. These soils are along streams and estuaries and in tidal basins near the Atlantic coast. They are flooded daily by high tides. These soils are fine, montmorillonitic, nonacid, hyperthermic Typic Sulfaquents.

Pellicer soils are closely associated with the Adamsville Variant and Adamsville, Durbin, Immokalee, Moultrie, Myakka, and Pomello soils. Adamsville, Immokalee, Myakka, and Pomello soils occupy higher positions adjacent to tidal marshes and have sandy particle-size class. Moultrie soils are on slightly higher positions along the margin of tidal marshes, have sandy particle-size class, and have a Bh horizon at a depth of less than 30 inches. Durbin soils are in similar positions to Pellicer soils on the landscape and are organic.

Typical pedon of Pellicer silty clay loam, frequently flooded, in a tidal marsh, 500 feet east of the west bank of the Matanzas River tidal marsh and 500 feet south of the west end of Mickler Bridge, Land Grant 41, T. 7 S., R. 30 E.

A1—0 to 10 inches; very dark grayish brown (10YR 3/2) silty clay loam; massive; slightly sticky; many fine and few medium and coarse roots; 1.15 percent sulfur, 118 millimhos per centimeter conductivity; few medium pockets of very dark gray (5Y 3/1) clay; sulfur odor is strong; moderately alkaline; extremely acid after drying; gradual smooth boundary.

C1g—10 to 55 inches; dark greenish gray (5GY 4/1) clay loam; massive; very sticky; few very fine, medium, and coarse roots in upper 5 inches; moderately alkaline; extremely acid after drying; gradual wavy boundary.

C2g—55 to 70 inches; dark greenish gray (5GY 4/1) sandy clay; massive; very sticky; few fine lenses of light gray fine sand, loamy fine sand, and fine sandy loam; moderately alkaline; extremely acid after drying; gradual wavy boundary.

C3g—70 to 80 inches; dark greenish gray (5GY 4/1) sandy clay loam; massive; slightly sticky; common coarse pockets of fine sand, loamy fine sand, and sandy clay; moderately alkaline.

The reaction of the soil is mildly alkaline or moderately alkaline in its natural state and extremely acid or very strongly acid after the soil is air dried. Sulfur content ranges from about 1.0 to 4.0 percent within a depth of 20 inches.

The A horizon has color in hue of 10YR, value of 3, and chroma of 2; or hue of 2.5Y, value of 4, and chroma of 2; or hue of 5Y, value of 3 or 4, and chroma of 1 or 2.

The C1g horizon has hue of 5Y, value of 4, and chroma of 1; or hue of 5GY, value of 4, and chroma of 1. Texture is sandy clay or clay loam. Thickness ranges from 45 to 66 inches.

The C2g horizon has hue of 5Y, value of 4 or 5, and chroma of 1; or hue of 5GY, value of 4, and chroma of 1. Lenses of sandy and loamy material are present in most pedons. Texture is sandy clay or clay.

The C3g horizon has hue of 5Y, value of 4 or 5, and chroma of 1; or hue of 5GY, value of 4 to 6, and chroma of 1. Texture is sandy clay loam, fine sandy loam, or coarser. Shells or shell fragments are present in some pedons. This horizon extends to a depth of 80 inches or more.

Placid Series

The Placid series consists of very poorly drained, nearly level soils that formed in thick beds of sandy marine sediments. These soils are in broad, low, flat areas, primarily in the farmland in the southwestern and west-central parts of St. Johns County. The water table is at a depth of less than 10 inches for more than 6 months in most years, but recedes to a depth of more than 40 inches during extended dry seasons. Slopes range from 0 to 2 percent. These soils are sandy, siliceous, hyperthermic Typic Humaquepts.

The Placid soils are closely associated with Ellzey, Floridana, Holopaw, and Tocoi soils. Floridana soils have an argillic horizon at a depth of less than 40 inches. Holopaw soils have an A1 or Ap horizon less than 10 inches thick and have an argillic horizon at a depth greater than 40 inches. Ellzey soils have a Bir horizon and an argillic horizon at a depth of less than 40 inches. Tocoi soils have a Bh horizon. All these soils are on similar positions in the landscape.

Typical pedon of Placid fine sand, 1.1 miles north of intersection of State Road 13A and County Road C-305 and 110 feet east of State Road 13A, NW1/4NW1/4 sec. 16, T. 8 S., R. 28 E.

Ap—0 to 12 inches; black (10YR 2/1) fine sand; weak medium granular structure; many uncoated light gray sand grains; slightly acid; clear wavy boundary.

C1—12 to 20 inches; dark grayish brown (10YR 4/2) fine sand; many medium distinct very dark gray (10YR 3/1) and light gray (10YR 6/1) mottles; weak medium granular structure; friable; strongly acid; clear smooth boundary.

C2—20 to 26 inches; grayish brown (10YR 5/2) fine sand; common medium distinct very dark gray (10YR 3/1) and dark grayish brown (10YR 4/2) and few fine distinct light olive brown (2.5Y 5/6) mottles; single grained; loose; strongly acid; gradual smooth boundary.

C3—26 to 33 inches; light gray (10YR 6/1) fine sand; few medium distinct very dark gray (10YR 3/1) and yellowish brown (10YR 5/6) mottles; single grained; loose; strongly acid; gradual smooth boundary.

C4—33 to 42 inches; grayish brown (10YR 5/2) fine sand; few medium faint light gray (10YR 6/1) mottles; single grained; strongly acid; gradual smooth boundary.

C5—42 to 51 inches; dark grayish brown (10YR 4/2) fine sand; few medium faint gray (10YR 5/1) mottles; weak medium granular structure; friable; medium acid; gradual smooth boundary.

C6—51 to 58 inches; dark grayish brown (10YR 4/2) loamy fine sand; common medium distinct pinkish gray (7.5YR 6/2) mottles; weak medium granular structure; friable; slightly acid; gradual smooth boundary.

C7—58 to 80 inches; grayish brown (10YR 5/2) fine sand; many coarse prominent greenish gray (5GY 6/1) mottles; weak medium granular structure; friable; few greenish gray pockets of sandy clay loam; slightly acid.

Soil reaction ranges from strongly acid to slightly acid in all horizons.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1, or value of 3 and chroma of 2; or it has no hue and value of 2. Thickness ranges from 12 to 16 inches.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2, or value of 4 and chroma of 2; or hue of 5Y, value of 5, and chroma of 1. The mottles are gray, brown, or yellow. Some pedons that have a matrix color of chroma 1 may not contain mottles. Texture is fine sand or loamy fine sand.

Pomello Series

The Pomello series consists of moderately well drained, nearly level to gently sloping soils that formed in marine sandy materials. These soils are on slightly higher ridges and knolls in the flatwoods. The water table is at a depth of 24 to 40 inches for 1 to 4 months during the normal rainy season. During the drier seasons, depth to the water table ranges from 40 to 60 inches in most years. Slopes range from 0 to 5 percent. These soils are sandy, siliceous, hyperthermic Arenic Haplohumods.

Pomello soils are closely associated with Cassia, Myakka, and Smyrna soils. All the associated soils occupy lower positions in the landscape. Except for Cassia soils, they have darker A horizons and have poorer drainage than Pomello soils. Myakka and Cassia soils have A horizons less than 30 inches thick. Smyrna soils have A horizons less than 20 inches thick.

Typical pedon of Pomello fine sand, 0 to 5 percent slopes, in a wooded area, on a 2 percent slope; approximately 4,500 feet north of State Road 208, 200 feet west of I-95, and 1.2 miles northwest of I-95 and State Road 16, NE1/4SW1/4 sec. 31, T. 6 S., R. 29 E.

A1—0 to 4 inches; gray (10YR 5/1) fine sand; weak medium granular structure; very friable; many fine, medium and few coarse roots; very strongly acid; clear smooth boundary.

A21—4 to 19 inches; light gray (10YR 7/1) fine sand; common coarse distinct gray (10YR 6/1) mottles; single grained; loose; few fine, medium, and coarse roots; very strongly acid; gradual smooth boundary.

A22—19 to 35 inches; white (10YR 8/1) fine sand; common distinct very dark grayish brown (10YR 3/2) and light brownish gray (10YR 6/2) stains along root channels; single grained; loose; strongly acid; gradual smooth boundary.

A23—35 to 40 inches; gray (10YR 6/1) fine sand; common coarse distinct dark grayish brown (10YR 4/2), gray (10YR 5/1), and grayish brown (10YR 5/2) mottles; single grained; loose; strongly acid; gradual wavy boundary.

B1—40 to 45 inches; dark gray (10YR 4/1) fine sand; common coarse distinct gray (10YR 6/1) mottles; single grained; loose; few medium and coarse roots; very strongly acid; abrupt wavy boundary.

B21h—45 to 51 inches; black (10YR 2/1) fine sand; moderate medium subangular blocky structure; friable; few medium and coarse roots; very strongly acid; gradual smooth boundary.

B22h—51 to 57 inches; dark reddish brown (5YR 2/2) fine sand; common coarse faint black (5YR 2/1) mottles; moderate medium subangular blocky structure; friable; few fine and medium roots; very strongly acid; gradual smooth boundary.

B3&Bh—57 to 80 inches; dark reddish brown (5YR 3/4) fine sand; common coarse distinct black (5YR 2/1) Bh fragments; moderate medium subangular blocky structure; friable; few fine and medium roots; very strongly acid.

Soil reaction ranges from very strongly acid to medium acid throughout.

The A1 horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. It ranges in thickness from 3 to 5 inches. The A2 horizon has hue of 10YR, value of 6 to 8, and chroma of 1 or 2. Thickness ranges from 27 to 42 inches. Total thickness of the A horizon ranges from 32 to 47 inches.

The B1 horizon that is described in Pomello fine sand does not occur in all pedons. It is a transitional layer between the A2 horizon and the B2h horizon. It has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. It ranges up to 5 inches in thickness.

The B2h horizon has hue of 7.5YR, value of 3, and chroma of 2; or hue of 5YR, value of 2 or 3, and chroma of 1 to 3; or hue of 10YR, value of 2, and chroma of 1. It ranges in thickness from 6 to 16 inches. Some pedons have a B3 horizon. It has hue of 7.5YR, value of 3 or 4, and chroma of 2; or hue of 5YR, value of 3, and chroma of 4; or hue of 10YR, value of 3 or 4, and chroma of 3. In most pedons, the B2h horizon ranges from 17 to 38 inches in thickness, but in some pedons, it extends to a depth of 80 inches or more. The B3&Bh horizon, as described, does not occur in all pedons. It has hue of 10YR, value of 3 or 4, and chroma of 3; or hue of 5YR, value of 3, and chroma of 4. Thickness ranges mostly from 9 to 12 inches, but in some pedons, this horizon extends to a depth of 80 inches or more.

Some pedons have an A'2 horizon. In those pedons, it has hue of 10YR, value of 4, and chroma of 4; or value of 5 to 7 and chroma of 1 to 3. Thickness ranges from 9 to 25 inches.

Some pedons have a B'2h horizon. It has no hue and value of 2; or hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or hue of 5YR, value of 2 or 3, and chroma of 1 to 3. This horizon extends to a depth of more than 80 inches.

Pomona Series

The Pomona series consists of poorly drained, nearly level soils formed in sandy and loamy marine sediments. These soils are in broad, flat areas and on low knolls in the flatwoods. The water table is within 10 inches of the surface for 1 to 3 months and is at a depth of 10 to 40 inches for 6 months or more. Slopes range from 0 to 2 percent. These soils are sandy, siliceous, hyperthermic Ultic Haplaquods.

Pomona soils are closely associated with Immokalee, Myakka, St. Johns, and Wesconnett soils. All these soils lack an argillic horizon and, except for Wesconnett soils, occupy similar positions in the landscape. Wesconnett soils are in lower drainageways.

Typical pedon of Pomona fine sand, in a wooded area, 1 mile north of intersection of County Roads 305 and 13A, 2,700 feet west of County Road 305, NE1/4SW1/4 sec. 16, T. 8 S., R. 28 E.

A11—0 to 4 inches; black (10YR 2/1) fine sand; weak fine and medium granular structure; very friable; many fine and medium roots; many white uncoated sand grains; strongly acid; clear wavy boundary.

A12—4 to 6 inches; very dark gray (10YR 3/1) fine sand; weak fine and medium granular structure; very friable; few medium and fine roots; few white uncoated sand grains; strongly acid; clear wavy boundary.

A21—6 to 12 inches; gray (10YR 5/1) fine sand; single grained; loose; strongly acid; clear wavy boundary.

A22—12 to 21 inches; light gray (10YR 6/1) fine sand; single grained; loose; strongly acid; abrupt irregular boundary.

B21h—21 to 25 inches; black (5YR 2/1) fine sand; weak fine and medium granular structure; friable; sand grains well coated with organic matter; strongly acid; clear wavy boundary.

B22h—25 to 31 inches; dark brown (7.5YR 3/2) fine sand; massive; fine and medium granular structure; friable; sand grains coated with organic matter; strongly acid; clear wavy boundary.

A'21—31 to 35 inches; pale brown (10YR 6/3) fine sand; single grained; loose; strongly acid; clear wavy boundary.

A'22—35 to 47 inches; light gray (10YR 7/2) fine sand; single grained; loose; strongly acid; clear wavy boundary.

B'21tg—47 to 50 inches; light brownish gray (10YR 6/2) fine sandy loam; common medium distinct brownish yellow (10YR 6/6, 6/8) and yellowish brown (10YR 5/6, 5/8) and few fine distinct strong brown (7.5YR 5/6, 5/8) mottles; moderate fine and medium subangular blocky structure; friable; thin patchy clay films on faces of peds; very strongly acid; clear wavy boundary.

B'22tg—50 to 56 inches; light brownish gray (10YR 6/2) sandy clay loam; common medium distinct brownish yellow (10YR 6/6, 6/8) and yellowish brown (10YR 5/6, 5/8) and few fine distinct strong brown (7.5YR 5/6, 5/8) mottles; moderate fine and medium subangular blocky structure; friable; few clay films on faces of peds; very strongly acid; clear wavy boundary.

B'3g—56 to 63 inches; light gray (10YR 7/2) fine sandy loam; common medium distinct brownish yellow (10YR 6/6, 6/8), yellowish brown (10YR 5/6, 5/8), and pinkish gray (7.5YR 6/2) and few medium distinct strong brown (7.5YR 5/6, 5/8) mottles;

weak medium granular structure; friable; very strongly acid; clear wavy boundary.

Cg—63 to 80 inches; light brownish gray (10YR 6/2) fine sand; few medium faint brownish yellow and yellow mottles; single grained; loose; very strongly acid.

Solum thickness ranges from 63 to 80 inches or more. Soil reaction is extremely acid to strongly acid in the A and Bh horizons and is very strongly acid or strongly acid in the B3, A'2, Btg, and C horizons.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1. Thickness ranges from 4 to 6 inches. The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Thickness ranges from 15 to 24 inches. Total thickness of the A horizon is 20 to 30 inches.

The B2h horizon has hue of 10YR, value of 2, and chroma of 1; or hue of 5YR, value of 2 or 3, and chroma of 1 or 2, or value of 3 and chroma of 4; or hue of 7.5YR, value of 3, and chroma of 2; or it has no hue and value of 2. Thickness ranges from 8 to 18 inches.

The A'2 horizon, as described in Pomona fine sand, does not occur in all pedons. It has hue of 10YR, value of 5 to 7, and chroma of 1 to 3. The A'2 horizon ranges to 21 inches in thickness.

The B'2tg horizon has hue of 10YR, value of 5 to 6, and chroma of 1 or 2. Texture is fine sandy loam or sandy clay loam. Thickness ranges from 4 to more than 16 inches. In some pedons, this horizon extends to a depth of 80 inches or more.

The B'3g horizon, as described, does not occur in all pedons. It has hue of 10YR, value of 6 or 7, and chroma of 1 or 2. Texture is fine sandy loam or sandy loam. The B'3g horizon ranges to 15 or more inches thick. In some pedons, this horizon extends to a depth of 80 inches or more.

The C horizon, as described, does not occur in all pedons. It has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. Texture is fine sand, loamy fine sand, or loamy sand, which extends to a depth of 80 inches or more.

Pompano Series

The Pompano series consists of poorly drained, nearly level soils that formed in thick deposits of marine sandy sediments mixed with shell. These soils are in areas bordering poorly defined to well defined drainageways and broad low flats. The water table is at a depth of less than 10 inches for 2 to 6 months and within a depth of 30 inches for more than 9 months in most years. Slopes range from 0 to 2 percent. These soils are siliceous, hyperthermic Typic Psammaquents.

Pompano soils are closely associated with Adamsville, Holopaw, Placid, and Riviera soils. Adamsville soils are on higher positions in the landscape and are better drained. Holopaw and Riviera soils have an argillic horizon. Placid soils have an umbric epipedon.

Typical pedon of Pompano fine sand, on a 0.5 percent slope, in a wooded area, 500 feet west of intersection of State Road A1A and Pope Road, 25 feet north of Pope Road, SW1/4SW1/4 sec. 27, T. 7 S., R. 30 E.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) rubbed, fine sand; color is a combination of black organic matter and light gray uncoated sand grains; weak fine granular structure; very friable; common fine and medium and few coarse roots; medium acid; clear smooth boundary.

C1—4 to 28 inches; white (10YR 8/2) fine sand; common medium faint brownish yellow mottles; single grained; loose; few medium and coarse roots; many black and few brown fine sand-sized heavy mineral grains; neutral; clear smooth boundary.

C2—28 to 32 inches; light gray (10YR 7/2) fine sand; few coarse distinct dark grayish brown (10YR 4/2) mottles and stains along old root channels; single grained; loose; about 5 percent by volume sand-sized white and brown shell fragments; many black and few brown fine sand-sized heavy mineral grains; neutral; clear smooth boundary.

C3—32 to 80 inches; light olive gray (5Y 6/2) fine sand; single grained; loose; about 5 percent by volume sand-sized shell fragments; many black and few brown fine sand-sized grains; few fine mica flakes; neutral.

Soil reaction ranges from strongly acid to mildly alkaline.

The A horizon has hue of 10YR, value of 2 through 4, and chroma of 1 or 2; or no hue and value of 2. It ranges in thickness from 3 to 13 inches. Its thickness is less than 8 inches where value is 3 or less.

The C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2; or no hue and value of 5 or 6; or hue of 5Y, value of 5 or 6, and chroma of 1. The content of sand-sized shell fragments ranges from 0 to 5 percent.

Pottsburg Series

The Pottsburg series consists of poorly drained, nearly level soils that formed in thick beds of marine sands. These soils are in the flatwoods. The water table is within 10 inches of the surface for 2 to 4 months in most years during the wet season. It recedes to a depth of more than 40 inches for 2 to 4 months during the dry season. Slopes are less than 2 percent. These soils are sandy, siliceous, thermic Grossarenic Haplaquods.

Pottsburg soils are closely associated with Immokalee, Myakka, St. Johns, and Wesconnett soils. All the associated soils have an A horizon less than 50 inches thick. Additionally, Wesconnett soils lack an A2 horizon and are more poorly drained.

Typical pedon of Pottsburg fine sand, in a wooded area, 1,000 feet south of intersection of Lightsey Road and State Road 207 and 1,000 feet east, Land Grant 48, T. 7 S., R. 29 E.

A1—0 to 5 inches; black (10YR 2/1) fine sand; moderate medium granular structure; friable; common fine, medium, and coarse roots; few uncoated light gray sand grains; very strongly acid, clear smooth boundary.

A21—5 to 12 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; few medium and coarse roots; common medium distinct very dark gray (10YR 3/1) stains along root channels; very strongly acid; clear smooth boundary.

A22—12 to 31 inches; light gray (10YR 6/1) fine sand; single grained; loose; many medium and coarse roots; common medium distinct very dark grayish brown (10YR 4/2) stains along root channels; very strongly acid; clear smooth boundary.

A23—31 to 60 inches; white (10YR 8/2) fine sand; common coarse distinct very dark gray (10YR 3/1) and very dark brown (10YR 3/2) mottles; common fine distinct dark gray (10YR 4/1) stains along root channels; single grained; loose; few medium and coarse roots; strongly acid; gradual smooth boundary.

B21h—60 to 65 inches; very dark grayish brown (10YR 3/2) fine sand; common coarse distinct gray (10YR 5/1, 6/1), grayish brown (10YR 5/2), and very dark gray (10YR 3/1) mottles; weak medium granular structure; friable; strongly acid; gradual irregular boundary.

B22h—65 to 80 inches; black (10YR 2/1) fine sand with common coarse pockets of very dark gray (10YR 3/1) and dark gray (10YR 4/1) fine sand; weak fine granular structure; friable; many uncoated light gray sand grains; very strongly acid.

Soil reaction ranges from very strongly acid to slightly acid in the A horizon and from very strongly acid to medium acid in the Bh horizon.

The A1 horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or value of 3 and chroma of 2. Thickness ranges from 3 to 8 inches. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. Mottles and stains along root channels of very dark gray, gray, dark gray, dark grayish brown, and light gray are in this horizon in most pedons. The combined thickness of the A1 and A2 horizons ranges from 52 to 65 inches.

The B2h horizon has hue of 10YR, value of 2, and chroma of 1, or value of 3 and chroma of 2 or 3; or hue of 7.5YR, value of 3, and chroma of 2, or value of 4 and chroma of 4; or hue of 5YR, value of 3, and chroma of 3; or value of 4 and chroma of 1. In some pedons, it has no hue and value of 2. Common to many pockets of lighter colored fine sand are in most pedons.

Riviera Series

The Riviera series consists of poorly drained and very poorly drained, nearly level soils that formed in stratified marine sands and loamy material. These soils are in broad, poorly defined drainageways, on flood plains, in depressions, and in broad flatwood areas. The water table is within 10 inches of the surface for 2 to 4 months in most years and 10 to 30 inches the remainder of the year. It is below 40 inches for short periods in drier seasons. Depressional areas are ponded for 6 to 12 months of the year. Some areas are subject to flooding for 1 to 3 months during rainy seasons. Slope gradients are less than 2 percent. These soils are loamy, siliceous, hyperthermic Arenic Glossaqualfs.

Riviera soils are associated with Holopaw, Immokalee, Myakka, Pompano, and Winder soils. Holopaw soils have an argillic horizon at a depth of more than 40 inches. Immokalee and Myakka soils have a spodic horizon and lack an argillic horizon. Pompano soils are sandy throughout. Winder soils have an argillic horizon at a depth of less than 20 inches.

Typical pedon of Riviera fine sand, frequently flooded, in a wooded area approximately 1.25 miles east of I-95 and 3,000 feet west of Tocoi Junction and 300 feet north of State Road 214, SE1/4SE1/4NE1/4 sec. 28, T. 7 S., R. 29 E.

Ap—0 to 10 inches; gray (10YR 5/1) fine sand; common coarse distinct very dark gray (10YR 3/1) and dark gray (10YR 4/1) mottles; weak medium granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

A21—10 to 15 inches; light gray (10YR 7/1) fine sand; common medium distinct very dark gray (10YR 3/1), dark gray (10YR 4/1), and grayish brown (10YR 5/2) mottles; single grained; loose; few medium and coarse roots; strongly acid; clear wavy boundary.

A22—15 to 23 inches; light gray (10YR 7/2) fine sand; few medium distinct dark gray (10YR 4/1) and few fine distinct yellow mottles; single grained; loose; slightly acid; abrupt irregular boundary.

Bt&A—23 to 28 inches; gray (10YR 5/1) fine sandy loam; common medium distinct red (2.5YR 5/6) and strong brown (7.5YR 5/8) mottles; few pockets and tongues of gray (10YR 5/1) fine sand, tongues extend from A2 horizon; weak fine subangular blocky structure; slightly sticky; neutral; gradual wavy boundary.

B2tg—28 to 34 inches; gray (10YR 5/1) fine sandy loam; common fine distinct red (2.5YR 5/6), strong brown (7.5YR 5/8), and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; slightly sticky; few pockets of light gray (10YR 7/2) fine sand 1 to 2 inches in diameter; grains are coated and bridged with clay; mildly alkaline; gradual smooth boundary.

B3g—34 to 55 inches; light gray (10YR 6/1) fine sandy loam; common fine and coarse distinct red (2.5YR 5/6) and strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; mildly alkaline; gradual smooth boundary.

IIC1g—55 to 71 inches; light gray (10YR 7/1) fine sandy loam; common coarse distinct yellow (10YR 8/8) mottles; moderate medium granular structure; friable; many white (10YR 8/1) calcium carbonate accumulations; about 55 percent by volume shells and shell fragments; moderately alkaline; gradual smooth boundary.

IIC2g—71 to 80 inches; light gray (10YR 6/1) fine sand and shell fragments; single grained; loose; moderately alkaline.

Soil reaction ranges from strongly acid to slightly acid in the A horizons and neutral to moderately alkaline in all other horizons.

The A1 horizon has hue of 10YR, value of 2 to 5, and chroma of 1, or value of 4 and chroma of 2. The A1 horizon ranges from 3 to 10 inches in thickness. Where the value is 3 or less, it is less than 6 inches thick. The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2; or hue of 2.5Y, value of 7, and chroma of 2. The combined thickness of the A1 and A2 horizons ranges from 21 to 38 inches.

The Bt&A horizon has, in the B part, hue of 10YR, value of 3 to 5, and chroma of 1, or value of 4 or 5 and chroma of 2. The A part has hue of 10YR, value of 5 to 7, and chroma of 2. Texture of the A part is fine sand or sand. Texture of the B part is sandy loam, fine sandy loam, or sandy clay loam. Intrusions of fine sand extend vertically into the Bt&A horizon from the A2 horizon above. Intrusions range in size from 1/8 inch to 2 inches across and 2 to 6 inches long. Thickness ranges from 5 to 23 inches.

The B2t horizon has hue of 10YR, value of 4, and chroma of 1 or 2, or value of 5 and chroma of 1 or 2, or value of 6 and chroma of 1; or hue of 5Y, value of 3 or 5, and chroma of 1. Texture is sandy loam, fine sandy loam, or sandy clay loam. The B2t horizon ranges in thickness from 6 to 12 inches.

The B3g horizon, as described in Riviera fine sand, frequently flooded, does not occur in every pedon. It has hue of 10YR, value of 4 to 6, and chroma of 1; or value of 4 or 5 and chroma of 2. Thickness ranges to 21 inches.

The IIC horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2; or hue of 5Y, value of 5 to 7, and chroma of 1; or hue of 2.5Y, value of 4, and chroma of 2. Texture is fine sand, loamy fine sand, or fine sandy loam, with or without shells or shell fragments. Shells and shell fragments range from sand sized to one-half inch in diameter. This horizon extends to a depth of 80 inches or more.

Samsula Series

The Samsula series consists of very poorly drained, nearly level soils that formed in moderately thick beds of hydrophytic nonwoody plant remains. These soils are in swamps, depressions, and narrow to broad, low flat areas. The water table is at or above the soil surface except during extended dry seasons. Slopes are less than 1 percent. These soils are sandy or sandy-skeletal, siliceous, dysic, hyperthermic Terric Medisaprists.

Samsula soils are closely associated with Hontoon, Myakka, St. Johns, and Wesconnett soils. Samsula soils and Hontoon soils are organic soils, whereas Myakka, St. Johns, and Wesconnett soils are mineral soils. Hontoon soils have organic materials more than 52 inches thick.

Typical pedon of Samsula muck in a wooded swamp, 0.9 mile west of I-95, 100 feet south of County Road 214, NW1/4NW1/4 sec. 32, T. 7 S., R. 29 E.

Oa1—0 to 10 inches; black (N 2/0) muck; about 40 percent fiber, 10 percent rubbed; moderate medium granular structure; friable; many fine and medium roots; about 5 percent fine sand grains; sodium pyrophosphate extract color is yellowish brown (10YR 5/4); extremely acid; gradual wavy boundary.

Oa2—10 to 31 inches; black (10YR 2/1) muck; about 35 percent fiber, 5 percent rubbed; moderate medium granular structure; friable; common fine roots; about 15 percent fine sand grains; sodium pyrophosphate color is yellowish brown (10YR 5/4); extremely acid; abrupt wavy boundary.

IIA1b—31 to 49 inches; very dark grayish brown (10YR 3/2) fine sand; weak medium granular structure; friable; extremely acid; gradual wavy boundary.

IIC1—49 to 60 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; extremely acid; abrupt wavy boundary.

IIC2—60 to 80 inches; gray (10YR 5/1) fine sand; single grained; loose; extremely acid.

Soil reaction of the organic material is less than 4.5 in 0.01 molar calcium chloride and ranges from extremely acid to strongly acid by the Hellige-Truog method. The mineral layers are extremely acid to medium acid. Thickness of the organic material ranges from 22 to 40 inches.

The Oa horizon has no hue and value of 2; or it has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or it has hue of 5YR, value of 2, and chroma of 1; or value of 3 and chroma of 2. The fiber content ranges from 34 to 44 percent, unrubbed, and from 10 to 19 percent, rubbed. The sodium pyrophosphate extract is in hue of 10YR, value of 4 to 6, and chroma of 4, or in value of 6 and chroma of 3.

The IIAb horizon has hue of 10YR, value of 2 or 3, and chroma of 1; or value of 3 or 4 and chroma of 2. It is 11 to 18 inches thick. Texture is sand or fine sand.

If present, the IICb horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Texture is sand or fine sand.

Satellite Series

The Satellite series consists of somewhat poorly drained, nearly level soils that formed in thick deposits of marine sandy sediments. These soils are in narrow to broad swales between higher relict beach sand dunes, on low knolls and oak hammocks adjacent to drainageways, in tidal marshes near the Atlantic coast, and on slight ridges in the flatwoods. The water table is at a depth of 10 to 40 inches for periods of 2 to 6 months or more during most years. During dry seasons, it is within a depth of 60 inches. Slopes range from 0 to 2 percent. These soils are hyperthermic, uncoated Aquic Quartzipsamments.

Satellite soils are closely associated with Fripp and Pompano soils. Fripp soils are on higher landscapes than Satellite soils and are better drained. Pompano soils are in lower positions and are not as well drained.

Typical pedon of Satellite fine sand, in a wooded area, 2,500 feet west of State Road A1A and 11th Street intersection and 250 feet south of 11th Street in St. Augustine Beach, NW1/4SW1/4 sec. 34, T. 7 S., R. 30 E.

A1—0 to 6 inches; very dark gray (10YR 3/1) fine sand, rubbed; weak fine granular structure; very friable; common fine and medium and few large roots; many uncoated light gray sand grains and black organic matter particles; medium acid; gradual smooth boundary.

C1—6 to 33 inches; white (10YR 8/2) fine sand; common medium to coarse brownish yellow (10YR 6/6) mottles; single grained; loose; many sand-sized black and few brown grains of heavy minerals, concentrations of heavy minerals are stratified in horizontal bands up to 1/8 inch thick; few fine and medium roots; slightly acid; gradual smooth boundary.

C2—33 to 41 inches; light gray (10YR 7/2) fine sand; single grained; loose; few sand-sized shell fragments; many black and few, brown, sand-sized grains of heavy minerals; few horizontal bands of heavy minerals up to 1/8 inch thick; neutral; abrupt wavy boundary.

C3—41 to 80 inches; light brownish gray (2.5Y 6/2) fine sand; single grained; loose; few sand-sized shell fragments; many black sand-sized grains of heavy minerals; neutral.

Soil reaction ranges from medium acid to neutral.

The A1 horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2; or no hue and value of 3 to 5. Thickness ranges from 3 to 6 inches.

The C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2; or hue of 2.5Y, value of 5 or 6, and chroma of 2; or no hue and value of 6. In some pedons, gray, brown, and yellow mottles are throughout the C horizon.

Smyrna Series

The Smyrna series consists of poorly drained, nearly level sandy soils that formed in thick deposits of marine sandy materials. The water table is at a depth of less than 10 inches for 1 to 4 months and 10 to 40 inches for more than 6 months in most years. During the rainy seasons the water table rises above the surface briefly. Slopes range from 0 to 2 percent. These soils are sandy, siliceous, hyperthermic Aeric Haplaquods.

Smyrna soils are closely associated with Immokalee, Myakka, and St. Johns soils. In Smyrna soils, the spodic horizon is within 20 inches of the surface, whereas in Immokalee soils, this horizon is below a depth of 30 inches. Myakka soils differ from the Smyrna soils by having an A horizon that totals 20 to 30 inches over a Bh horizon. Smyrna soils differ from St. Johns soils by lacking an umbric epipedon.

Typical pedon of Smyrna fine sand, in a flatwoods area, on a slope of less than 2 percent, 0.5 mile north of intersection of State Road 16A and Leo Maguire Road and 50 feet west of Leo Maguire Road, SW1/4NW1/4 sec. 1, T. 6 S., R. 27 E.

Ap—0 to 7 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; many fine, medium, and coarse roots; many uncoated sand grains; very strongly acid; gradual wavy boundary.

A2—7 to 14 inches; gray (10YR 5/1) fine sand; common medium faint dark gray (10YR 4/1), many fine distinct black (10YR 2/1), and few coarse distinct (10YR 3/1) mottles; single grained; loose; common fine and medium roots; few, medium very dark gray (10YR 3/1) stains along root channels; strongly acid; clear wavy boundary.

B21h—14 to 18 inches; black (N 2/0) loamy fine sand; moderate medium subangular blocky structure; friable; many fine decaying roots; uncoated sand grains; strongly acid; clear smooth boundary.

B22h—18 to 21 inches; dark brown (7.5YR 3/2) loamy fine sand; many fine faint very dark brown and black mottles; weak medium subangular blocky structure; friable; many fine decaying roots; few medium and coarse pockets of dark grayish brown (10YR 4/2) fine sand with outer perimeter of black (10YR 2/1); very strongly acid; gradual wavy boundary.

B3h—21 to 32 inches; dark brown (10YR 3/3) fine sand; common medium distinct black (10YR 2/1), yellowish brown (10YR 5/4), and light yellowish brown (10YR 6/4) and few medium distinct brown (10YR 4/3) mottles; weak medium subangular blocky structure; friable; strongly acid; gradual wavy boundary.

B3&Bh—32 to 45 inches; brown (10YR 4/3) fine sand; common fine distinct black (10YR 2/1) and common coarse distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable; few fine and medium roots; few medium very dark brown (10YR 2/2) Bh fragments and pockets of dark grayish brown (10YR 4/2) fine sand with an outer perimeter of dark brown (7.5YR 3/2); very strongly acid; gradual wavy boundary.

B3—45 to 62 inches; brown (10YR 5/3) fine sand; common medium distinct black (10YR 2/1) and yellowish brown (10YR 5/4) mottles; moderate medium granular structure; friable; few medium pockets of pinkish gray (7.5YR 6/2) fine sand; strongly acid; gradual wavy boundary.

C—62 to 80 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; strongly acid.

In areas which have not been limed, soil reaction is strongly acid or very strongly acid throughout.

The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1, or value of 3 and chroma of 2, or value of 4 and chroma of 1 or 2; or it has no hue and value of 2 or 3. Thickness ranges from 4 to 10 inches.

The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1. Thickness ranges from 2 to 9 inches. The combined thickness of the A1 and A2 horizons ranges from 12 to 18 inches.

The B2h horizon has no hue and value of 2 or 3; or hue of 10YR, value of 2, and chroma of 1 or 2, or value of 3 and chroma of 3. The B2h horizon also has hue of 7.5YR, value of 3, and chroma of 2; or hue of 5YR, value of 2, and chroma of 1 or 2, or value of 3 and chroma of 3. Thickness ranges from 6 to 17 inches. Texture is sand, fine sand, or loamy fine sand.

The B3&Bh horizon has hue of 10YR, value of 3 to 5, and chroma of 3. Where value and chroma are 3, many uncoated sand grains are present. Thickness ranges from 8 to 12 inches. Fragments of the Bh horizon range from few to common and have colors similar to those of the Bh horizon. Texture is sand or fine sand.

Some pedons have a B3 horizon. In those pedons, the B3 horizon has colors similar to those of the B3&Bh horizon but lacks Bh fragments. It is as much as 14 inches thick. Some pedons have A'2 and B'h horizons below the B3&Bh or B3 horizon. The A'2 horizon has hue of 10YR and value of 5 and chroma of 1 or 2, or value of 6 and chroma of 1, or value of 8 and chroma of 2. The B'h horizon has colors similar to those of the Bh horizon.

The B3h horizon has hue of 10YR, value of 2, and chroma of 1 or 2, or value of 3 and chroma of 3; or hue of 5YR, value of 2, and chroma of 1 or 2, or value of 3 and chroma of 2 to 4; or hue of 7.5YR, value of 3, and chroma of 2. It also has no hue and value of 2. In some pedons, this horizon extends to a depth of 80 inches or more.

The B3 horizon has hue of 10YR, value of 4 or 5, and chroma of 3. Where value and chroma are 3, many uncoated sand grains are present.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2.

Because the Smyrna soils in this county have a slightly thicker solum than is defined in the range for the Smyrna series, they are considered taxadjuncts to the series. They are similar in behavior, use, and management, however, to the Smyrna series.

Sparr Series

The Sparr series consists of somewhat poorly drained, nearly level to gently sloping soils that formed in deposits of sandy and loamy marine sediments. These soils are on slopes adjacent to drainageways and on low knolls in the flatwoods. The water table is at a depth of 20 to 40 inches for periods of 1 to 4 months during most years. Slopes range from 0 to 2 percent. These soils are loamy, siliceous, hyperthermic Grossarenic Paleudults.

Sparr soils are closely associated with Adamsville, Pomona, Tavares, and Zolfo soils. Tavares, Adamsville, and Zolfo soils do not have a Bt horizon. Pomona soils have a Bh horizon and are poorly drained.

Typical pedon of Sparr fine sand, in a wooded area, on a 1 percent slope, 2.75 miles west of intersection of Racetrack Road and Russell Sampson Road and 50 feet south of Racetrack Road, SW1/4NE1/4 sec. 34, T. 4 S., R. 27 E.

A1—0 to 3 inches; gray (10YR 5/1) fine sand; weak fine granular structure; friable; common fine and few medium and coarse roots; very strongly acid; clear wavy boundary.

A21—3 to 8 inches; very pale brown (10YR 7/3) fine sand; few medium distinct pale brown (10YR 6/3) and common medium distinct light gray (10YR 7/1, 7/2) mottles; single grained; loose; common fine and few medium and coarse roots; strongly acid; gradual smooth boundary.

A22—8 to 20 inches; very pale brown (10YR 7/3) fine sand; common medium distinct light yellowish brown (10YR 6/4) and common coarse distinct light gray (10YR 7/1) mottles; single grained; loose; few fine, medium, and coarse roots; strongly acid; gradual smooth boundary.

A23—20 to 30 inches; white (10YR 8/2) fine sand; common medium faint white (10YR 8/1) mottles and few fine faint yellow mottles; single grained; loose; few fine, medium, and coarse roots; strongly acid; gradual smooth boundary.

A24—30 to 68 inches; white (10YR 8/1) fine sand; common medium distinct very pale brown (10YR 8/4) and yellow (10YR 7/6, 8/6) mottles; single grained; loose; few fine and medium roots in upper 10 inches; medium acid; abrupt wavy boundary.

B2tg—68 to 80 inches; grayish brown (10YR 5/2) fine sandy loam; common coarse distinct light gray (10YR 7/1), reddish yellow (7.5YR 7/8), and olive yellow (5Y 6/6) mottles; weak medium subangular blocky structure; friable; strongly acid.

Soil reaction ranges from medium acid to very strongly acid in all horizons.

The A1 horizon has hue of 10YR, value of 3, and chroma of 1, or value of 4 or 5 and chroma of 1 or 2. It is 3 to 8 inches thick. The A2 horizon has hue of 10YR, value of 4 to 8, and chroma of 1 to 4, with mottles of pale brown, light yellowish brown, brownish yellow, yellowish brown, light gray, or yellow. The gray or white matrix colors are generally in the lower part. At a depth of less than 20 inches, mottles having chroma of 2 or less are colors of uncoated sand grains and do not indicate wetness. Thickness ranges from 36 to 65 inches.

The B1 horizon, if present, has hue of 10YR, value of 5, and chroma of 8, with mottles of gray, grayish brown or yellow. Texture is loamy sand or loamy fine sand. The B1 horizon ranges to 4 inches in thickness.

The B2t horizon, if present, has hue of 10YR, value of 5, and chroma of 4 to 8, or value of 6 and chroma of 3 or 4, with mottles of gray, brown or yellow. Texture is fine sandy loam or sandy clay loam. The B2t horizon ranges to 12 inches in thickness.

The B2tg horizon has hue of 10YR, value of 5 or 6, and chroma of 2 or less; or hue of 7.5YR, value of 5, and chroma of 2, with mottles of gray, brown, yellow, or red. Texture is mostly sandy loam or fine sandy loam but ranges to sandy clay loam. Depth to the B2t or B2tg horizon ranges from 42 to 74 inches.

The B3g horizon, if present, has hue of 10YR, value of 6, and chroma of 1; or no hue and value of 5 or 6, with or without mottles of brown, yellow, or red. It is sandy loam or fine sandy loam.

St. Augustine Series

The St. Augustine series consists of somewhat poorly drained, nearly level soils that are the result of dredging and filling operations. The soils consist of sandy marine sediments mixed with fragments of loamy or clayey material and fragments of shells. These soils are sandy, siliceous, hyperthermic, Udalfic Arents.

These soils are on narrow to broad flat areas and low knolls adjacent to tidal marshes and estuaries near the Atlantic coast and Intracoastal Waterway. The water table is from 20 to 30 inches below the surface for 2 to 6 months. During tropical storms, these soils are flooded for very brief periods. Slopes range from 0 to 2 percent.

St. Augustine soils are closely associated with Moultrie, Pellicer, and Tisonia soils. All these soils are very poorly drained. In addition, Pellicer soils are clayey and have a high *n* value, Moultrie soils have a Bh horizon, and Tisonia soils are organic.

Typical pedon of St. Augustine fine sand, in a cleared area at the northeast corner of intersection of Gerado and Alcazar Streets, Davis Shores Subdivision, sec. 17, T. 6 S., R. 30 E.

A1—0 to 4 inches; very dark gray (10YR 3/1) fine sand; weak medium granular structure; very friable; about 5 percent by volume shell fragments sand sized to 3 centimeters in diameter; many uncoated light gray sand grains; moderately alkaline; clear smooth boundary.

C1—4 to 7 inches; brown (10YR 5/3) loamy fine sand; few fine faint light yellowish brown mottles; single grained; loose; about 10 percent by volume shell fragments, sand sized to 3 centimeters in diameter; common black sand-sized heavy mineral grains; moderately alkaline; gradual smooth boundary.

C2—7 to 10 inches; light gray (10YR 7/2) fine sand; many coarse faint light yellowish brown (10YR 6/4) and few fine faint brownish yellow mottles; single grained; loose; less than 5 percent by volume shell fragments, sand sized to 3 centimeters in diameter; moderately alkaline; gradual wavy boundary.

C3g—10 to 27 inches; light gray (2.5Y 7/2) fine sand; few coarse distinct brownish yellow (10YR 6/6) mottles in upper 6 inches of horizon; single grained; loose; few fragments of dark greenish gray (5GY 4/1) sandy clay 1 to 5 centimeters in diameter; few fragments of shells, sand sized to 3 centimeters in diameter; moderately alkaline; gradual wavy boundary.

C4g—27 to 33 inches; gray (10YR 6/1) fine sand; single grained; loose; few bodies of grayish brown (2.5Y 5/2) sandy clay 1 to 5 centimeters in diameter; about 30 percent shell fragments, sand sized to 1 centimeter in diameter; few fragments of shells as much as 5 centimeters in diameter; moderately alkaline; clear smooth boundary.

C5g—33 to 80 inches; gray (5Y 5/1) fine sand; single grained; loose; about 5 percent shell fragments sand sized to 1 centimeter in diameter; few black heavy mineral grains; moderately alkaline.

Soil reaction ranges from slightly acid to moderately alkaline throughout. Thickness of the fill material ranges from 20 to more than 80 inches. Fragments of shells are calcareous and range mostly from sand sized to 5 centimeters in diameter. The shell content ranges from less than 5 percent to 70. By weighted average, shell content in the control section is less than 20 percent. Fragments of shells are stratified in some pedons. The loamy or clayey bodies are at a depth of less than 40 inches and have a base saturation of more than 35 percent. Some pedons have silty clay loam, clay loam, or sandy clay Ab and Cb horizons at a depth of more than 40 inches.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. Texture is sand or fine sand. This horizon ranges from 1 to 6 inches in thickness.

The C1 and C2 horizons have hue of 10YR, value of 5 to 7, and chroma of 1 to 3. In most places they have mottles in shades of gray, brown, and yellow. Sand grains are uncoated. Texture is sand, fine sand, or loamy fine sand. Combined thickness of these horizons ranges from 6 to 28 inches.

The Cg horizon has hue of 10YR, value of 6 to 8, and chroma of 1 or 2; no hue and value of 4 to 6; hue of 5Y or 5GY, value of 4 to 6, and chroma of 1; or hue of 2.5Y, value of 5 to 7, and chroma of 2. In most places this horizon has mottles in shades of gray, brown, and yellow. Texture is sand, fine sand, or loamy fine sand. Silty clay loam, clay loam, or sandy clay bodies range from few to common in at least some part of this horizon. They have hue of 5GY, value of 4 or 5, and chroma of 1; or hue of 2.5Y, value of 4 or 5, and chroma of 2. This horizon extends to 80 inches or more.

St. Johns Series

The St. Johns series consists of poorly drained and very poorly drained, nearly level soils that formed in thick deposits of marine sands. These soils occur in broad flat areas, on nearly level landscapes adjacent to drainageways, and in depressions in the flatwoods. The water table is within a depth of 15 inches for 2 to 6 months each year and is at a depth between 15 and 30 inches for more than 6 months during most years. In depressions, the water table is above the surface for 6 months or more in most years. Slopes range from 0 to 2 percent. These soils are sandy, siliceous, hyperthermic Typic Haplaquods.

St. Johns soils are closely associated with Immokalee, Myakka, Ona, and Smyrna soils. St. Johns soils differ from Myakka and Smyrna soils by having an umbric epipedon. They differ from Immokalee soils by having an umbric epipedon and a spodic horizon within a depth of 30 inches and from Ona soils by having an A2 horizon.

Typical pedon of St. Johns fine sand, in a wooded area, on a 1 percent slope, 4,000 feet west of State Road 16 and I-95 intersection and 100 feet north of State Road 208, NW1/4SE1/4 sec. 6, T. 7 S., R. 29 E.

O1—2 inches to 0; partially decomposed organic material, leaves, and stems.

A11—0 to 7 inches; black (N 2/0) fine sand; moderate medium granular structure; friable; many fine, medium, and coarse roots; extremely acid; clear wavy boundary.

A12—7 to 10 inches; very dark gray (10YR 3/1) fine sand; weak medium granular structure; friable; few fine and many medium and coarse roots; extremely acid; clear wavy boundary.

A2—10 to 15 inches; gray (10YR 5/1) fine sand; common coarse distinct very dark gray (10YR 3/1) and dark gray (10YR 4/1) mottles; single grained; loose; few fine, medium, and coarse roots; extremely acid; abrupt smooth boundary.

B21h—15 to 19 inches; black (N 2/0) loamy fine sand; moderate medium subangular blocky structure; friable; noncemented; few fine, medium, and coarse roots; extremely acid; gradual smooth boundary.

B22h—19 to 28 inches; black (5YR 2/1) fine sand; few coarse faint dark reddish brown (5YR 2/2) mottles; moderate coarse subangular blocky structure; friable; noncemented; few fine, medium, and coarse roots; extremely acid; gradual wavy boundary.

A'2—28 to 42 inches; gray (10YR 6/1) fine sand; common coarse distinct dark gray (10YR 4/1) mottles and very dark gray (10YR 3/1) stains along root channels; single grained; loose; few fine, medium, and coarse roots; extremely acid; abrupt wavy boundary.

B'21h—42 to 50 inches; black (5YR 2/1) fine sand; moderate medium subangular blocky structure; friable; few fine, medium, and coarse roots; common fine distinct and common coarse distinct dark gray (10YR 4/1) and gray (10YR 5/1) pockets of fine sand; extremely acid; gradual smooth boundary.

B'22h—50 to 66 inches; black (N 2/0) fine sand; common coarse distinct very dark gray (10YR 3/1) mottles; moderate medium subangular blocky structure; friable; few fine and medium roots; few fine distinct dark gray (10YR 4/1) and gray (10YR 5/1) lenses and streaks of fine sand; few uncoated sand grains; extremely acid; gradual smooth boundary.

C—66 to 80 inches; dark gray (10YR 4/1) fine sand; common medium distinct black (10YR 2/1) and very dark gray (10YR 3/1) mottles and stains along root channels; single grained; loose; few fine and medium roots; very strongly acid.

Soil reaction ranges from extremely acid to strongly acid.

The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or it has no hue and value of 2. It ranges from 10 to 13 inches in thickness. The A2 horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2 and is 5 to 15 inches thick. Total thickness of the A1 and A2 horizons is less than 30 inches.

The Bh horizon has no hue and value of 2; or hue of 5YR or 10YR, value of 2 or 3, and chroma of 1 or 2; or hue of 7.5YR, value of 2 or 3, and chroma of 2. In this horizon some pedons have mottles that are darker or lighter than the matrix. Thickness ranges from 4 to 24 inches. Some pedons have a B3 horizon. It has hue of 10YR, value of 4 to 6, and chroma of 3 or 4 and is as much as 23 inches thick. The A'2 and B'h horizons, as described, are not present in all pedons. The A'2 horizon has colors similar to those of the A2 horizon, and the B'h has colors similar to those of the Bh horizon. The B'h horizon extends to a depth of 80 inches or more in some pedons.

The C horizon, as described, does not occur in all pedons. It has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. It extends to 80 inches or more.

Tavares Series

The Tavares series consists of moderately well drained, nearly level to gently sloping soils that formed in sandy marine sediments. These soils are on narrow to broad ridges and knolls in the flatwoods and on slopes adjacent to drainageways. The water table is between depths of 40 and 80 inches for more than 6 months in most years, but recedes to a depth greater than 80 inches during droughts. Slopes range from 0 to 5 percent. These soils are hyperthermic, uncoated Typic Quartzipsamments.

Tavares soils are closely associated with Astatula, Paola, Orsino, Pomello, and Zolfo soils. Tavares soils are moderately well drained, whereas the Astatula and Paola soils are excessively drained. Unlike Paola and Orsino soils, Tavares soils lack A2 and B horizons. Zolfo and Pomello soils have a spodic horizon. In addition, Zolfo soils are somewhat poorly drained.

Typical pedon of Tavares fine sand, 0 to 5 percent slopes, in a wooded area, on a 2 percent slope, 0.65 mile west of Wildwood Drive and 1,000 feet north of Rayonier Woods Road near Ft. Peyton, NW1/4SW1/4SE1/4 sec. 11, T. 8 S., R. 29 E.

A1—0 to 5 inches; gray (10YR 5/1) fine sand; single grained; loose; few fine, medium, and coarse roots; extremely acid; clear wavy boundary.

C1—5 to 9 inches; pale brown (10YR 6/3) fine sand; few fine faint yellow and common medium distinct light gray (10YR 7/1) mottles; single grained; loose; few fine, medium, and coarse roots; very strongly acid; gradual smooth boundary.

C2—9 to 32 inches; very pale brown (10YR 8/3) fine sand; few medium distinct yellow (10YR 7/8) and common medium distinct white (10YR 8/1) mottles; single grained; loose; few medium and coarse roots; strongly acid; gradual smooth boundary.

C3—32 to 47 inches; very pale brown (10YR 8/4) fine sand; common medium distinct yellow (10YR 7/6) and coarse distinct white (10YR 8/1) mottles; single grained; loose; few fine and medium roots; strongly acid; gradual wavy boundary.

C4—47 to 80 inches; white (10YR 8/1) fine sand; common coarse faint very pale brown (10YR 8/3) and few coarse distinct reddish yellow (7.5YR 7/8) mottles and stains along old root channels; single grained; loose; medium acid.

Soil reaction ranges from extremely acid to medium acid in the A horizon and from very strongly acid to medium acid in the other horizons. Texture is fine sand throughout the soil.

The A1 horizon has hue of 10YR, value of 3, and chroma of 2, or value of 4 and chroma of 1, or value of 5 and chroma of 1 or 2, or value of 6 and chroma of 1. Thickness ranges from 3 to 7 inches.

The C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 6. In most pedons, the upper part of the C horizon has chroma of 3 to 6, and the lower part has chroma of 1 to 3.

Mottles of gray, brown, or yellow are throughout the profile in some pedons. In some, mottles of chroma 2 or less are within a depth of 40 inches. These are colors of uncoated sand grains and do not indicate wetness.

Terra Ceia Series

The Terra Ceia series consists of very poorly drained organic soils that formed in thick beds of mostly nonwoody plant remains. These soils occur on flood plains along streams and rivers. They are flooded for up to 6 months during wet seasons. Slopes are less than 1 percent. These soils are euic, hyperthermic Typic Medisaprists.

Terra Ceia soils are closely associated with EauGallie, St. Johns, Riviera, and Winder soils. All the associated soils are mineral. EauGallie and St. Johns soils have a spodic horizon; additionally, EauGallie soils occupy higher positions in the landscape.

Typical pedon of Terra Ceia muck, in a wooded flood plain along Mill Creek, 2,500 feet west of intersection of State Roads 13 and 16A and 6,600 feet south, adjacent to powerline trail, Land Grant 38, T. 6 S., R. 27 E.

Oa1—0 to 35 inches; dark reddish brown (5YR 2/2) muck; weak medium granular structure; friable; common medium and fine, and few coarse roots; about 25 percent fiber, less than 5 percent fiber rubbed; sodium pyrophosphate extract color brown (10YR 5/3); very strongly acid (pH 4.8 in 0.01 molar calcium chloride); gradual wavy boundary.

Oa2—35 to 80 inches; very dark gray (5YR 3/1) muck; massive; slightly sticky; few fine, medium and coarse roots; about 18 percent fiber, less than 5 percent rubbed; sodium pyrophosphate extract color dark brown (10YR 4/3); strongly acid (pH 5.3 in 0.01 molar calcium chloride).

Soil reaction is more than 4.5 in 0.01 molar calcium chloride. It ranges from medium acid to moderately alkaline in 1:1, soil to water. Thickness of the organic material is more than 52 inches.

The Oa horizon has hue of 5YR or 10YR, value of 2 or 3, and chroma of 1 or 2; or it has no hue and value of 2. Fiber content ranges from less than 5 percent to 18 percent, rubbed. In some pedons, the Oa horizon is at a depth of less than 80 inches and is underlain by sandy through clayey materials. Shells and fragments of shells are mixed in the mineral material in some pedons.

Tisonia Series

The Tisonia series consists of very poorly drained organic soils that formed from halophytic plant remains overlying clayey materials. These soils are in broad tidal marshes. They are flooded twice daily by normal high tides. Slopes are less than 1 percent. These soils are clayey, montmorillonitic, euic, thermic Typic Sulfihemists.

Tisonia soils are closely associated with Durbin, Moultrie, Pellicer, and St. Augustine soils. Pellicer, Moultrie, and St. Augustine soils are mineral soils. Durbin soils have organic materials more than 52 inches thick.

Typical pedon of Tisonia mucky peat, in a tidal marsh, 0.8 mile south of intersection of Mickler Road and Neck Road, 200 feet east of Neck Road, Land Grant 52, T. 4 S., R. 29 E.

Oe—0 to 18 inches; very dark grayish brown (10YR 3/2) mucky peat; about 40 percent fiber, 30 percent rubbed; massive; slightly sticky; sodium pyrophosphate extract color is light brownish gray (10YR 6/2); about 20 percent mineral material; neutral in water at field moisture (air dry pH 4.8 in 0.01 molar calcium chloride); gradual smooth boundary.

IIC—18 to 65 inches; dark gray (5Y 4/1) clay; massive; sticky; flows easily between fingers when squeezed; few to common pockets and lenses of sandy loam and loamy sand are in the lower 10 inches; mildly alkaline in water at field moisture.

Thickness of the organic material ranges from 16 to 24 inches. Soil reaction is slightly acid or neutral in water throughout the profile in the natural state. After the soil is air dried, pH in 0.01 molar calcium chloride of the Oe horizon ranges from very strongly acid to medium acid.

The Oe horizon has hue of 10YR, value of 3 or 4, and chroma of 2; or hue of 5Y, value of 3, and chroma of 2. Fiber content ranges from 25 to 75 percent, unrubbed, and from 20 to 35 percent, rubbed.

The IIC horizon has hue of 5Y, value of 4, and chroma of 1 or value of 3 and chroma of 2. The *n* value is more than 1. Pockets and lenses of fine sand to sandy loam range from few to common in the lower part.

Tocoi Series

The Tocoi series consists of poorly drained, nearly level soils that formed in sandy marine sediments. These soils are in flatwoods. The water table is at a depth of less than 10 inches for 2 to 4 months during most years. It is at a depth of 20 to 40 inches for more than 6 months during most years. Slopes range from 0 to 2 percent. These soils are sandy, siliceous, hyperthermic Ultic Haplaquods.

Tocoi soils are closely associated with Holopaw, Ona, Placid, Pomona, and Sparr soils. All these soils, except Sparr soils, are on similar positions in the landscape. Sparr soils, which are on low knolls in the flatwoods and on slopes adjacent to drainageways, lack a spodic horizon. Holopaw soils have an argillic horizon, which has high base saturation. In Placid and Ona soils, an argillic horizon is lacking, and in addition, Placid soils lack a spodic horizon. Pomona soils have an A2 horizon.

Typical pedon of Tocoi fine sand, 0.6 mile southeast of intersection of Francis Road and State Road 16, 400 feet south of State Road 16, SE1/4NW1/4 sec. 26, T. 6 S., R. 28 E.

A1—0 to 13 inches; black (10YR 2/1) fine sand; weak medium granular structure; very friable; many fine and medium roots in the upper 4 inches and few fine and medium roots in the lower 9 inches; many uncoated light gray sand grains; very strongly acid; gradual smooth boundary.

B21h—13 to 20 inches; very dark brown (10YR 2/2) fine sand; moderate medium subangular blocky structure; friable; few fine and medium roots; sand grains are well coated; strongly acid; gradual smooth boundary.

B22h—20 to 23 inches; dark reddish brown (5YR 2/2) fine sand; moderate medium granular structure; friable; few pockets of dark brown (10YR 3/3, 4/3), sand grains are well coated; strongly acid; gradual smooth boundary.

B3—23 to 40 inches; dark brown (10YR 4/3) fine sand; weak fine granular structure; friable; few fine and medium roots; common coarse dark brown (10YR 3/3), very dark gray (10YR 3/1), and very dark brown (10YR 2/2) Bh bodies; very strongly acid; clear irregular boundary.

A2—40 to 45 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; strongly acid; gradual wavy boundary.

B2tg—45 to 76 inches; light brownish gray (10YR 6/2) loamy fine sand; common coarse distinct dark gray (10YR 4/1) and gray (5Y 6/1) mottles; weak medium subangular blocky structure; sand grains are lightly coated and bridged with clay; very strongly acid; gradual wavy boundary.

Cg—76 to 80 inches; gray (5Y 6/1) loamy fine sand; common coarse distinct dark grayish brown (10YR 4/2) mottles; weak medium granular structure; friable; strongly acid.

Soil reaction ranges from extremely acid to very strongly acid in all horizons. Where the soil has been recently limed, the A horizon ranges from medium acid to neutral.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or it has no hue and value of 2 or 3. Thickness ranges from 4 to 14 inches.

The B2h horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2, or value of 3 and chroma of 3; or hue of 7.5YR, value of 3, and chroma of 2; or hue of 5YR, value of 2, and chroma of 1 or 2, or value of 3 and chroma of 4; or it has no hue and value of 2. Texture is sand, fine sand, or loamy fine sand. Thickness ranges from 10 to 25 inches.

The B3 horizon has hue of 10YR, value of 4, and chroma of 2 to 4; or it has hue of 7.5YR, value of 4, and chroma of 2. Texture is sand or fine sand. Thickness ranges from 4 to 7 inches.

The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 2 to 4. Some pedons have gray, yellow, or brown mottles in this horizon. Texture is sand or fine sand. Thickness ranges from 5 to 25 inches.

The B2tg horizon has hue of 10YR, value of 6 or 7, and chroma of 1 or 2; or hue of 2.5YR, value of 6 or 7, and chroma of 2. This horizon also has hue of 7.5YR, value of 5 or 6, and chroma of 2; or hue of 5Y, value of 5 or 6, and chroma of 1. Mottles in shades of gray, brown, yellow, and red are in this horizon in some pedons. Texture is loamy sand or loamy fine sand that is 8 to 13 percent clay. The clay content is more than 3 percent greater than in the horizon above. Depth to the B2tg horizon is more than 40 inches.

The Cg horizon has hue of 10YR, value of 6 or 7, and chroma of 1 or 2; or hue of 2.5Y, value of 5 or 6, and chroma of 2; or hue of 5Y, value of 5 or 6, and chroma of 1. Texture is loamy sand, loamy fine sand, or fine sand.

Tomoka Series

The Tomoka series consists of very poorly drained, nearly level organic soils that formed in moderately thick deposits of sapric materials and underlying loamy materials. These soils are on broad low flats and in thickly wooded depressions. The water table is at or above the surface, except during extended dry periods when it may recede to a depth below 40 inches. Slopes are less than 1 percent. These soils are loamy, siliceous, dysic, hyperthermic Terric Medisaprists.

Tomoka soils are closely associated with Floridana, Hontoon, St. Johns, Samsula, and Wesconnett soils. Floridana, Myakka, St. Johns, and Wesconnett soils are mineral soils. Samsula soils have a sandy substratum. Hontoon soils have organic materials to a depth of 52 inches or more.

Typical pedon of Tomoka muck, in a wooded depression 1.7 miles south of intersection of Tillman Road and State Road 214; 1,150 feet west of Tillman Road, SE1/4NE1/4 sec. 6, T. 8 S., R. 29 E.

Oa1—0 to 9 inches; dark reddish brown (5YR 2/2) muck; 28 percent fiber, 10 percent rubbed; weak fine granular structure; friable; many fine, medium, and coarse roots; sodium pyrophosphate color very pale brown (10YR 7/4); extremely acid (pH 2.9 in 0.01 molar calcium chloride); clear smooth boundary.

Oa2—9 to 21 inches; black (5YR 2/1) muck; 19 percent fiber, 5 percent rubbed; moderate medium granular structure; friable; many fine, medium, and coarse roots; sodium pyrophosphate color dark yellowish brown (10YR 4/4); extremely acid (pH 2.8 in 0.01 molar calcium chloride); gradual wavy boundary.

IIC1—21 to 64 inches; dark gray (10YR 4/1) fine sandy loam; massive; slightly sticky; few fine, medium, and coarse roots; extremely acid; gradual wavy boundary.

IIC2—64 to 80 inches; dark grayish brown (10YR 4/2) fine sandy loam; massive; slightly sticky; few fine and medium roots; common medium distinct dark gray (10YR 4/1) fine sand pockets; very strongly acid.

Soil reaction of the Oa horizon is extremely acid in 0.01 molar calcium chloride. The Oa and C horizons range from extremely acid to strongly acid by the Hellige-Truog method.

The Oa horizon has no hue and value of 2; or hue of 5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. The sodium pyrophosphate extract color has hue of 10YR, value of 3 to 6, and chroma of 3 or 4. It is 17 to 35 inches thick.

The IIC horizon has hue of 10YR, value of 4, and chroma of 1 or 2, or value of 5 or 6 and chroma of 2; or hue of 2.5Y, value of 5, and chroma of 2. Texture is fine sandy loam or sandy clay loam. The C horizon extends to a depth of 80 inches or more.

Wabasso Series

The Wabasso series consists of poorly drained, nearly level soils that formed in sandy and loamy marine sediments. These soils are on broad flatlands. The water table is at a depth of 10 to 40 inches for more than 6 months during most years. It is at a depth of less than 10 inches for less than 60 days in wet seasons and is at a depth of more than 40 inches during very dry seasons. Slopes range from 0 to 2 percent. These soils are sandy, siliceous, hyperthermic Alfic Haplaquods.

Wabasso soils are closely associated with EauGallie, Ellzey, Floridana, and Riviera soils. EauGallie soils have an argillic horizon at a depth greater than 40 inches. Ellzey soils have a Bir horizon. Floridana and Riviera soils do not have a spodic horizon. Floridana soils also differ by having a mollic epipedon.

Typical pedon of Wabasso fine sand in a cleared area, 0.75 mile south of State Route 13 and 2,000 feet east of Deep Creek, NE1/4NE1/4 sec. 3, T. 10 S., R. 28 E.

A1—0 to 4 inches; black (N 2/0) fine sand; single grained; very friable; strongly acid; gradual smooth boundary.
A12—4 to 6 inches; very dark gray (10YR 3/1) fine sand; single grained; loose; strongly acid; gradual wavy boundary.
A2—6 to 25 inches; light gray (10YR 6/1) fine sand; single grained; loose; medium acid; clear wavy boundary.
B21h—25 to 28 inches; black (N 2/0) fine sand; moderate medium subangular blocky structure; friable; strongly acid; clear wavy boundary.
B22h—28 to 32 inches; very dark brown (10YR 2/2) fine sand; weak fine subangular blocky structure; friable; strongly acid; gradual wavy boundary.
B21tg—32 to 40 inches; brown (10YR 5/3) fine sandy loam; weak fine subangular blocky structure; friable; medium acid; gradual smooth boundary.
B22tg—40 to 45 inches; grayish brown (2.5Y 5/2) sandy clay loam; weak medium subangular blocky structure; slightly sticky; slightly acid; gradual wavy boundary.
C1g—45 to 55 inches; gray (5Y 6/1) loamy fine sand; weak medium subangular blocky structure; slightly sticky; neutral; gradual smooth boundary.
C2g—55 to 80 inches; gray (5Y 6/1) fine sand; many coarse distinct grayish brown (2.5Y 5/2) mottles; single grained; loose; neutral.

Soil reaction of the A horizon ranges from strongly acid to slightly acid except where limed. Reaction of the Bh horizon ranges from very strongly acid to slightly acid, and the B2tg horizon ranges from slightly acid to neutral.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1; or it has value of 3 and chroma of 2; or hue of *n* and value of 2. Thickness ranges from 4 to 8 inches. The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1; or value of 6 and chroma of 2. The combined thickness of the A1 and A2 horizons is less than 30 inches.

The Bh horizon has hue of 10YR, value of 2, and chroma of 1 or 2; or value of 3 and chroma of 2 or 3; or it has hue of 7.5YR, value of 3, and chroma of 2; or hue of 5YR, value of 2 or 3, and chroma of 2. Texture is fine sand or loamy fine sand. Thickness ranges from 7 to 14 inches.

Some pedons have a B3 horizon. It has hue of 10YR, value of 4, and chroma of 2 or 3; or value of 5 and chroma of 4. Thickness ranges from 0 to 9 inches.

Some pedons have an A'2 horizon. Where present, it has hue of 10YR, value of 6, and chroma of 3.

The B2tg horizon has hue of 10YR, value of 4, and chroma of 2 or 3, or value of 5 and chroma of 1 to 4, or value of 6 and chroma of 3; or hue of 2.5Y, value of 5, and chroma of 2; or hue of 5Y and value of 5 or 6 and chroma of 1. Mottles of brown, yellow, or red are in some pedons. Texture is fine sandy loam, sandy loam, or sandy clay loam. Depth to the B2tg horizon ranges from 32 to 38 inches.

The Cg horizon has hue of 10YR, value of 4, and chroma of 1, or value of 5 or 6 and chroma of 1 to 3, or value of 7 and chroma of 1; or hue of 5Y, value of 6 or 7, and chroma of 1. It is loamy fine sand or fine sand. This horizon extends to a depth of 80 inches or more.

Wesconnett Series

The Wesconnett series consists of deep, very poorly drained soils that formed in sandy deposits on marine terraces. These soils are on flood plains and in poorly defined drainageways. The water table is within 10 inches of the surface for more than 6 months during most years. It is subject to flooding for 1 to 3 months during rainy seasons. Slopes range from 0 to 2 percent. These soils are sandy, siliceous, thermic, Typic Haplaquods.

Wesconnett soils are closely associated with Myakka depressional, Myakka, St. Johns, and Tomoka soils. Wesconnett soils differ from the Myakka fine sand, depressional, and Myakka and St. Johns soils by lacking an A2 horizon and having poorer drainage. Tomoka soils are organic.

Typical pedon of Wesconnett fine sand, frequently flooded, in a wooded area, 1 mile south of State Road 16, 1.8 miles east of I-95, SE1/4SE1/4SW1/4 sec. 16, T. 7 S., R. 29 E.

O1—3 inches to 0; partially decomposed roots, leaves, and twigs mixed with muck.
A1—0 to 8 inches; black (N 2/0) fine sand; moderate medium granular structure; friable; many very fine and fine roots; strongly acid; abrupt wavy boundary.
B21h—8 to 18 inches; black (10YR 2/1) fine sand; moderate fine granular structure; friable; many fine roots; medium acid; gradual smooth boundary.
B22h—18 to 24 inches; dark reddish brown (5YR 2/2) fine sand; weak fine granular structure; very friable; medium acid; gradual wavy boundary.
B23h—24 to 34 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; friable; medium acid; clear smooth boundary.
A'2—34 to 45 inches; dark grayish brown (10YR 4/2) fine sand; common medium distinct black (10YR 2/1) mottles; single grained; loose; medium acid; clear wavy boundary.
B'2h—45 to 80 inches; black (10YR 2/1) fine sand; weak fine granular structure; very friable; medium acid.

Soil reaction ranges from very strongly acid to medium acid throughout.

The A horizon has hue of 10YR, value of 3, and chroma of 1; or it has no hue and value of 2. It is 5 to 8 inches thick. The B2h horizon has hue of 10YR, value of 2 or 3, and chroma of 1; or hue of 5YR, value of 2 or 3, and chroma of 2; or hue of 7.5YR, value of 2 or 3, and chroma of 2. Thickness ranges from 18 to 43 inches. The A'2 horizon has hue of 10YR, value of 4, and chroma of 2 or 3, or value of 5 and chroma of 3. It is 1 to 25 inches thick. The B'2h horizon has hue of 10YR, value of 2 or 3, and chroma of 1, or value of 3 and chroma of 2, and it extends to 80 inches or more.

Winder Series

The Winder series consists of poorly drained soils formed in thin beds of loamy marine materials. These soils are mainly on broad, low flats and in poorly defined drainageways, and some are on flood plains. The water table is at a depth of 0 to 10 inches for 2 to 6 months during most years. Some areas are flooded for up to 3 months during most years. Slope gradients are less than 2 percent. These soils are fine-loamy, siliceous, hyperthermic Typic Glossaqualfs.

Winder soils are associated with Holopaw, Immokalee, Myakka, Pompano, and Riviera soils. Immokalee and Myakka soils have a spodic horizon and lack an argillic horizon. Holopaw soils have an argillic horizon at a depth of more than 40 inches. Pompano soils lack an argillic horizon. Riviera soils have an A horizon 20 to 40 inches thick.

Typical pedon of Winder fine sand, frequently flooded, in a wooded area, approximately 3 miles west on Nine Mile Road and 0.9 mile south on Red Buck Island Road and 0.4 mile west on first graded road, SW1/4SW1/4 sec. 18, T. 6 S., R. 29 E.

A1—0 to 3 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; friable; many fine roots; many uncoated white sand grains; slightly acid; clear smooth boundary.

A2—3 to 11 inches; light gray (10YR 7/2) fine sand; few medium faint pale brown (10YR 6/3) mottles; single grained; loose; common fine roots; mildly alkaline; gradual irregular boundary.

B&A—11 to 16 inches; grayish brown (10YR 5/2) sandy loam; common fine faint gray (10YR 5/1) and pale brown (10YR 6/3) mottles; common coarse dark grayish brown (10YR 4/2) vertical sandy loam streaks and few medium light gray (10YR 7/2) fine sand intrusions and pockets; weak fine subangular blocky structure; friable; mildly alkaline; gradual irregular boundary.

B21tg—16 to 29 inches; dark grayish brown (10YR 4/2) sandy clay loam; common medium distinct dark yellowish brown (10YR 4/4) and common fine distinct gray (10YR 5/1) and pale brown (10YR 6/3) mottles; few medium distinct grayish brown (10YR 5/2) sandy loam vertical streaks and pockets and few fine light brownish gray (10YR 6/2) fine sand pockets; moderate medium subangular blocky structure; friable; sand grains coated and bridged with clay; mildly alkaline; clear wavy boundary.

B22tg—29 to 42 inches; gray (10YR 5/1) sandy loam; common medium distinct yellowish brown (10YR 5/4, 5/6) and brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; friable; sand grains coated and bridged with clay; moderately alkaline; clear wavy boundary.

IIC1g—42 to 62 inches; dark gray (5Y 4/1) sandy loam; weak medium granular structure; about 30 percent by volume white soft to hard shell fragments ranging from sand sized to 1/8 inch in diameter; moderately alkaline; calcareous; clear wavy boundary.

IIC2g—62 to 80 inches; olive gray (5Y 5/2) sandy loam; weak medium granular structure; about 20 percent by volume white soft to hard shells and shell fragments ranging from 1/8 inch to 1 1/2 inches in diameter; moderately alkaline; calcareous.

Thickness of the solum ranges from 26 to 60 inches. Soil reaction ranges from slightly acid to moderately alkaline throughout.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1. Thickness of the A1 horizon ranges from 3 to 7 inches. The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2, or value of 4 and chroma of 1. Thickness ranges from 4 to 11 inches. The combined thickness of the A1 and A2 horizons ranges from 8 to 15 inches.

The B&A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. Texture of the B part is fine sandy loam, sandy loam or sandy clay loam. Texture of the A part is fine sand or loamy fine sand, which extends vertically into the Btg horizon from the A2 horizon. The B&A horizon ranges in thickness from 3 to 6 inches.

The B2tg horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2, or value of 7 and chroma of 1; or hue of 5Y, value of 5, and chroma of 2. Texture is sandy loam, fine sandy loam, or sandy clay loam that ranges in thickness from 15 to 42 inches.

The IIC1g horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2; or hue of 5Y, value of 4 or 5, and chroma of 1. Texture is fine sandy loam, sandy loam, or sandy clay loam. In some pedons, this horizon is mixed with shell fragments. Shells range from sand sized to 1/8 inch in diameter. The IIC1g horizon ranges in thickness from 6 to 20 inches.

The IIC2g horizon has hue of 10YR, value of 6 to 8, and chroma of 1, or value of 7 and chroma of 2; or hue of 5Y, value of 5, and chroma of 1 or 2. Texture is sandy loam, fine sandy loam, or sandy clay loam. In some pedons, this horizon is mixed with shells and shell fragments, which range in size from 1/8 inch to 1 1/2 inches in diameter. This horizon extends to a depth of 80 inches or more.

Zolfo Series

The Zolfo series consists of somewhat poorly drained, nearly level soils that formed in thick sandy deposits on marine terraces. These soils occur on landscapes 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 during most years under natural conditions. Slopes range from 0 to 2 percent. These soils are sandy, siliceous, hyperthermic Grossarenic Entic Haplohumods.

Zolfo soils are closely associated with Myakka, Ona, Smyrna, and Tavares soils. Tavares soils lack a spodic horizon and are better drained. Zolfo soils have a spodic horizon below a depth of 50 inches, whereas Myakka, Ona, and Smyrna soils have a spodic horizon above a depth of 30 inches. Ona soils also have an umbric epipedon and lack an albic horizon.

Typical pedon of Zolfo fine sand, in a pine plantation area, on a 1 percent convex slope, 2.8 miles north of State Route 210 and 25 feet east of Sampson Road, NE1/4NW1/4 sec. 7, T. 5 S., R. 28 E.

Ap—0 to 5 inches; grayish brown (10YR 5/2) fine sand; common medium distinct light gray (10YR 7/2) mottles; weak medium granular structure; friable; common fine and medium roots; medium acid; clear wavy boundary.

A21—5 to 19 inches; pale brown (10YR 6/3) fine sand; fine medium distinct yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) mottles; single grained; loose; few fine, medium, and coarse roots; slightly acid; gradual smooth boundary.

A22—19 to 31 inches; very pale brown (10YR 7/3) fine sand; common coarse distinct light gray (10YR 7/1) and white (10YR 8/1) and few fine distinct strong brown (10YR 5/8) and reddish yellow (10YR 6/8) mottles; single grained; loose; slightly acid; gradual smooth boundary.

A23—31 to 66 inches; light gray (10YR 7/2) fine sand; few coarse distinct grayish brown (10YR 5/2), brownish yellow (10YR 6/8), and yellow (10YR 7/6) mottles; single grained; loose; slightly acid; clear smooth boundary.

B21h—66 to 69 inches; dark brown (10YR 4/2) fine sand; single grained; loose; few coarse distinct black (10YR 2/1) spodic fragments; many uncoated sand grains; medium acid; clear smooth boundary.

B22h—69 to 80 inches; black (10YR 2/1) fine sand; strong medium subangular blocky structure; friable; sand grains are well coated with organic matter; slightly acid.

Solum thickness exceeds 80 inches. Soil reaction ranges from slightly acid to very strongly acid.

The A1 or Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 1, or value of 5 and chroma of 1 or 2. Thickness ranges from 4 to 8 inches. The A2 horizon has hue of 10YR, value of 5 through 7, and chroma of 2 to 4 or value of 8 and chroma of 1. The combined thickness of the A1 and A2 horizons ranges from 50 to 72 inches.

The B21h horizon has hue of 10YR, value of 3, and chroma of 2, or value of 4 and chroma of 3; or hue of 7.5YR, value of 3 or 4, and chroma of 2; or hue of 5YR, value of 3 or 4, and chroma of 2. Thickness ranges from 3 to 10 inches.

The B22h horizon has hue of 10YR, value of 2, and chroma of 1, or value of 3 and chroma of 2; or hue of 5YR, value of 2 or 3, and chroma of 2, or value of 3 and chroma of 1. It extends to a depth of 80 inches or more.

Because the Zolfo soils in St. Johns County have a weighted average of more than 0.6 percent organic carbon in the upper 12 inches of the spodic horizon, they are considered taxadjuncts to the Zolfo series. They are similar in use, management, and behavior, however, to the Zolfo series.

Formation of the Soils

In this section, the factors of soil formation are discussed and related to the soils in the survey area.

The kind of soil that develops in a given area depends on five major factors. These are (1) the climate under which the soil material has accumulated and has existed since accumulation; (2) the physical and mineral composition of the parent material; (3) the organisms, or plant and animal life on and in the soil; (4) the relief, or lay of the land; and (5) the length of time that these four factors have acted on the soil material. The five factors of soil formation are interdependent; each modifies the effects of the others. As soil forms, it is influenced by the five factors, but in some places the major differences among soils appear to be the result of only one factor. A variation in one or more of the factors results in the formation of a different soil.

Climate

In St. Johns County, which has a subtropical maritime climate, most of the soils are in the hyperthermic temperature regime. In this regime the average temperature of the soil at a depth of 20 inches (50 centimeters) is about 72 degrees F (22 degrees C). The soils in St. Johns County are never frozen. As a result, biological activity and chemical reactions involved in the processes of soil formation proceed throughout the year. These processes are also accelerated by the adequate supply of moisture that is available. The average annual rainfall is about 55 inches. Under a warm and moist climate such as this, organic matter decomposes rapidly, and chemical reaction in the soil is faster than in cooler and drier areas. Heavy rainfall readily leaches the soils of most plant nutrients and produces strongly acid soil conditions, especially in well drained to excessively drained sandy soils. Fine particles of clay and sometimes organic matter are also carried down, or translocated, and eventually form a subsoil.

The climate is fairly uniform throughout the county. Therefore, it has not been a major factor contributing to the differences among the soils of the county. The differences are chiefly the result of other factors of soil formation.

Parent Material

The parent material of the soils of St. Johns County consists almost entirely of deposits of marine origin. These deposits were mostly quartz sand with varying amounts of clay and shell fragments. Clay is more abundant in soils formed in the sediments of marine terraces and lagoons. It is virtually absent in shoreline ridges where most deposits are eolian sands. Parent material was transported by seawaters, which covered the area a number of times during the Pleistocene age.

The parent materials in St. Johns County differ somewhat in their mineral and chemical composition and in their physical constitution. The main physical differences, such as those between sand, silt, and clay, can be observed in the field. Other differences, such as mineral and chemical composition, are important to soil formation and to present physical and chemical characteristics. Many differences among soils in the survey area appear to reflect original differences in the parent materials as they were laid down.

There are some organic soils throughout the county. They are formed in partially decayed remains of wetland vegetation.

Living Organisms

Plants, animals, and micro-organisms, such as bacteria and fungi, are important in the formation of soils. Plants generally supply organic matter, which decomposes, gives a dark color to the soil surface, and supplies the soil with plant nutrients. Trees and other plants take nutrients from the soil and store them in their roots, stems, leaves, and other parts. When these plants or plant parts decay, the nutrients are returned to the soil and can be used again. Bacteria and fungi decompose the vegetation and return the nutrients to the soil. In addition, many metabolic processes of the bacteria and fungi release organic acids and other materials that affect the process of soil formation. Earthworms, ants, and other animals mix the soil and influence porosity and other soil properties.

The native vegetation has had a major influence on soil genesis. Unless drastically disturbed by man, the soil and the natural vegetation show a close relationship, which is readily apparent in St. Johns County. Various swamp and marsh communities occupy the very poorly drained soils. Xerophytic communities of pines and oaks are on sand ridges, and pine-palmetto communities dominate the poorly drained soils of the flatwoods. The natural relationship between the soil and the native plants is sometimes disturbed by human activities. Clearing, logging, and burning, for example, have disrupted the natural succession of plants in some areas.

Relief

Relief, or lay of the land, affects soil formation because it influences microclimate and water relationships. Soil temperature is influenced by altitude and by the orientation of slopes toward or away from the sun. Relief controls drainage, runoff, erosion, soil fertility, and vegetation. Soil formation is retarded on steeper slopes because soil material and organic matter tend to gravitate downslope.

Even though the terrain of St. Johns County is nearly level, relief has a significant effect on the soils. Because the parent material of most of the soils was sandy marine deposits, the soils are sandy. Because sandy soils have low water-holding capacity and easily become droughty, most of the water available to plants comes from the water table. As a result, the depth to the water table becomes extremely important in determining the type of vegetation that grows in a particular area.

In addition, the depth to the water table affects internal drainage. On sand ridges, where the water table is deep and the soils are highly leached, soluble plant nutrients and colloidal clays and organic matter are carried rapidly downward through the sandy soil.

In flatwood areas the water table is commonly at or near the surface, and it rarely drops below 5 feet. Organic matter is translocated down a short distance and forms a humus-rich spodic horizon, or Bh horizon. This horizon is locally referred to as a hardpan.

In low areas or depressions, where the water table is normally above the surface, muck accumulates under the marsh or swamp vegetation. As these plants die, they accumulate in the water, where oxygen is excluded and decay is only partial and slow. The amount of muck that accumulates depends largely on the depth and duration of standing water. In some wet areas, accumulations of organic matter have formed a thick black topsoil on the mineral soil instead of a muck surface layer.

Time

The parent material of soils of St. Johns County is young. It is of Pleistocene or Holocene (Recent) age. The Pleistocene material was deposited during the interglacial stages when ice sheets melted and the sea level was high. When sea level remained fairly stationary over a long period, a nearly level marine terrace and shoreline ridge formed. A series of marine terraces is evident in St. Johns County. The oldest is the highest, and it has been most altered by weathering and geologic forces. Excluding the recent alluvial deposits, the soils are progressively older from the Atlantic coast westward. It is in coastal areas, however, that time as a factor in soil formation is most conspicuous, as is evident in the abundance of shells and shell fragments in the substratum.

Relatively little geologic time has elapsed since the material in which the soils in St. Johns County formed was laid down or emerged from the sea. The age of a soil refers to the degree of maturity of that soil. It does not refer to chronological or geological time. Because soils are influenced by the other four factors of soil formation, they mature at different rates. Immature soils, or soils that show little, if any, horizonation, may be on older landscapes than mature soils, which show distinct horizonation. Examples of this situation are common throughout St. Johns County.

In many areas in recent times, man has become a major factor in soil genesis. Man's tillage and management practices have altered soil structure, porosity, and other physical properties. The addition of lime, fertilizers, and other chemicals has altered chemical properties. Intensive use has sometimes caused removal of soil horizons through erosion. This process is often accompanied by increased deposition on flood plains and in depressions. In many places, man has created new soils, called Arents, that lack the normal diagnostic horizons attributed to natural soil-forming processes. Other areas, called Urban land, have been thoroughly covered or altered during construction of buildings, streets, or other structures. In some places, soils have been altered only to support activities on the surface. Little attention has been paid to the physical, chemical, and mineralogical properties of the underlying layers. Such neglect has often resulted in later problems that have been costly and difficult to remedy.

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Glossary

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.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in this county is expressed as—

	Inches
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

Bedding. A method of controlling excess water in areas of soils used for cultivated crops and tree crops. The surface soil is plowed into regularly spaced elevated beds and the crops are planted on the beds. The ditches between the beds drain the excess water.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms. The Lco horizon is a limnic layer that contains many fecal pellets.

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.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

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.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

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.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as *none, rare, occasional,* and *frequent. None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May,* for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or water commonly covering depressions is not considered flooding.

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.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual.* The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A horizon to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

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.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

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—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Large stones (in tables). Rock fragments 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.

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 colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

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.

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 affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 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). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. 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). Refers to areas where 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 acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). 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 or rock mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which 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.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Water control. Regulation of the water table according to the requirements for the intended use. Canals, ditches, or tiles and pumping or other appropriate methods can be used.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time has been allowed for adjustment in the surrounding soil. *Water table, perched.* A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded at St. Augustine, Florida]

Month	Temperature					Precipitation				
	Monthly normal mean	Normal daily maximum	Normal daily minimum	Mean number of days with temperature of-- 90° F or higher	Mean number of days with temperature of-- 32° F or lower	Normal total	Maximum total	Minimum total	Mean number of days with rainfall of-- 0.10 inch or more	Mean number of days with rainfall of-- 0.50 inch or more
	°F	°F	°F			In	In	In		
January----------	56.3	67.2	45.3	0	4	2.85	8.56	0.16	5	2
February---------	58.1	69.3	46.9	0	2	4.56	10.67	0.74	6	3
March------------	62.7	78.9	51.5	0	1	3.93	11.02	0.41	5	3
April------------	69.2	80.2	58.1	1	0	2.45	8.24	0.06	3	1
May--------------	74.5	85.0	64.0	5	0	3.59	9.16	0.83	5	2
June-------------	78.9	88.3	69.4	11	0	5.41	9.10	0.22	8	4
July-------------	80.8	90.4	71.2	19	0	6.20	10.56	2.51	9	4
August-----------	80.8	90.1	71.4	17	0	6.31	19.15	0.40	8	4
September--------	79.0	87.1	70.8	8	0	8.29	21.80	1.99	10	5
October----------	72.3	81.1	63.4	1	0	5.76	11.74	1.22	8	4
November---------	63.5	74.1	52.9	0	1	3.02	9.51	0.03	4	2
December---------	58.1	69.2	47.0	0	3	2.64	5.81	0.04	4	2
Year-----------	69.5	79.3	59.3	62	11	55.01	135.32	8.61	72	35

TABLE 2.--FREEZE DATA

[Recorded in 1952-79 at Hastings, Florida. Based on 28 years of data]

Freeze threshold temperature	Mean date of last spring occurrence	Mean date of first fall occurrence	Mean number of days between dates	Number of occurrences in spring	Number of occurrences in fall
°F					
32	February 20	December 8	292	28	23
28	January 24	December 24	334	19	13
24	(*)	(*)	(*)	8	3
20	(*)	(*)	(*)	2	1
16	---	---	0	0	0

*Number of occurrences insufficient to compute mean.

TABLE 3.--SOIL RATINGS AND LIMITING PROPERTIES FOR SELECTED USES, BY GENERAL SOIL MAP UNIT

[The overall rating for the soil unit is based on the rating for the most dominant soil or soils]

Map unit	Percentage of survey area	Potential and limitations for-- Cropland	Pasture	Pine trees	Septic tank absorption fields	Building sites*	Local roads and streets	Degree and kind of limitations for recreation areas**
1. Fripp-Satellite-Paola:	1.8	Very low	Very low	Very low	Very high	Very high.	High	Severe.
Fripp		Very low: droughty, low fertility.	Very low: droughty, low fertility.	Very low: seedling mortality, equipment limitations.	Very high	Very high.	High: slope.	Severe: too sandy.
Satellite		Low: droughty, low fertility.	Medium: droughty, low fertility.	Moderate: seedling mortality, plant competition, equipment limitations.	High: wetness.	High: wetness.	High: wetness.	Severe: too sandy, wetness.
Paola		Very low: droughty, low fertility.	Low: droughty, low fertility.	Low: seedling mortality, equipment limitations.	Very high	Very high.	Very high.	Severe: too sandy.
2. Astatula-Tavares:	3.2	Very low	Low	Low	Very high	Very high.	Very high.	Severe.
Astatula		Very low: droughty, low fertility.	Low: droughty, low fertility.	Low: seedling mortality, equipment limitations.	Very high	Very high.	Very high.	Severe: too sandy.
Tavares		Low: droughty, low fertility.	Medium: droughty, low fertility.	Moderately high: seedling mortality, equipment limitations.	Very high	Very high.	Very high.	Severe: too sandy.
3. Tavares-Zolfo-Sparr:	5.7	Medium	Medium	Moderately high.	High	High	High	Severe:
Tavares		Low: droughty, low fertility.	Medium: droughty, low fertility.	Moderately high: seedling mortality, equipment limitations.	Very high	Very high.	Very high.	Severe: too severe.

See footnotes at end of table.

TABLE 3.--SOIL RATINGS AND LIMITING PROPERTIES FOR SELECTED USES, BY GENERAL SOIL MAP UNIT--Continued

Map unit	Percentage of survey area	Potential and limitations for-- Cropland	Pasture	Pine trees	Septic tank absorption fields	Building sites*	Local roads and streets	Degree and kind of limitations for recreation areas**
3. Tavares-Zolfo-Sparr: (Cont'd)								
Zolfo		Medium: wetness, low fertility.	Medium: wetness, low fertility.	Moderately high: seedling mortality, plant competition, equipment limitations.	High: wetness.	High: wetness.	High wetness.	Severe: too sandy.
Sparr		Medium: wetness, low fertility.	Medium: wetness, low fertility.	Moderately high: seedling mortality.	High: wetness.	High: wetness.	High: wetness.	Severe: too sandy.
4. Cassia-Tavares:	1.0	Low	Low	Moderate	High	High	High	Severe.
Cassia		Low: wetness, low fertility.	Low: wetness, low fertility.	Moderate: seedling mortality, equipment limitations.	High: wetness.	High: wetness.	High: wetness.	Severe: too sandy.
Tavares		Low: droughty, low fertility.	Medium: droughty, low fertility.	Moderately high: seedling mortality, equipment limitations.	Very high	Very high.	Very high.	Severe: too sandy.
5. Myakka-Immokalee-St. Johns:	28.9	Medium	High	Moderate	Medium	Medium	Medium	Severe.
Myakka		Medium: wetness, low fertility.	High: low fertility.	Moderate: seedling mortality, equipment limitations.	Medium: wetness.	Medium: wetness.	Medium: wetness.	Severe: wetness, too sandy.
Immokalee		Medium: wetness, low fertility.	Medium: low fertility.	Moderate: seedling mortality, equipment limitations, plant competition.	Medium: wetness.	Medium: wetness.	Medium: wetness.	Severe: wetness, too sandy.
St. Johns		High: wetness.	High: wetness.	Moderately high: seedling mortality, equipment limitations, plant competition.	Medium: wetness.	Medium: wetness.	Medium: wetness.	Severe: wetness, too sandy.

See footnotes at end of table.

TABLE 3.--SOIL RATINGS AND LIMITING PROPERTIES FOR SELECTED USES, BY GENERAL SOIL MAP UNIT--Continued

Map unit	Percentage of survey area	Potential and limitations for-- Cropland	Pasture	Pine trees	Septic tank absorption fields	Building sites*	Local roads and streets	Degree and kind of limitations for recreation areas**
6. Holopaw-Riviera-Pompano:	7.1	Medium	Medium	Moderately high.	Medium	Medium	Medium	Severe.
Holopaw		Medium: wetness.	Medium: wetness.	Moderately high: seedling mortality, equipment limitations.	Medium: wetness.	Medium: wetness.	Medium: wetness.	Severe: wetness, too sandy.
Riviera		Medium: wetness.	Medium: wetness.	Moderately high: seedling mortality, equipment limitations.	Medium: wetness.	Medium: wetness.	Medium: wetness.	Severe: wetness, too sandy.
Pompano		Medium: wetness.	Medium: wetness.	Moderate: seedling mortality, equipment limitations.	Medium: wetness.	Medium: wetness.	Medium: wetness.	Severe: wetness, too sandy.
7. Pomona-Tocoi-Ona:	16.0	Medium	Medium	Moderately high:	Medium	Medium	Medium	Severe.
Pomona		Medium: wetness, low fertility.	Medium: wetness.	Moderately high: seedling mortality, equipment limitations.	Medium: wetness.	Medium: wetness.	Medium: wetness.	Severe: wetness, too sandy.
Tocoi		High: wetness, low fertility.	High: wetness.	Moderately high: seedling mortality, equipment limitations.	Medium: wetness.	Medium: wetness.	Medium: wetness.	Severe: wetness, too sandy.
Ona		High: wetness, low fertility.	High: wetness.	Moderately high: seedling mortality, equipment limitations.	Medium: wetness.	Medium: wetness.	Medium: wetness.	Severe: wetness, too sandy.
8. Floridana-Placid-Ellzey:	9.0	High	High	Moderately high.	Medium	Medium	Medium	Severe.
Floridana		High: wetness.	High: wetness.	Moderately high: seedling mortality, equipment limitations, plant competition.	Medium: wetness.	Medium: wetness.	Medium: wetness.	Severe: wetness, too sandy.

See footnotes at end of table.

TABLE 3.--SOIL RATINGS AND LIMITING PROPERTIES FOR SELECTED USES, BY GENERAL SOIL MAP UNIT--Continued

Map unit	Percentage of survey area	Potential and limitations for--: Cropland	Pasture	Pine trees	Septic tank absorption fields	Building sites*	Local roads and streets	Degree and kind of limitations for recreation areas**
8. Floridana-Placid-Ellzey: (Cont'd)								
Placid----------		High: wetness.	High: wetness.	High: seedling mortality, equipment limitations, plant competition.	Medium: wetness.	Medium: wetness.	Medium: wetness.	Severe: wetness, too sandy.
Ellzey----------		High: wetness.	High: wetness.	Moderately high: seedling mortality, equipment limitations.	Medium: wetness.	Medium: wetness.	Medium: wetness.	Severe. wetness, too sandy.
9. Riviera-Holopaw-Winder:	11.6	Low----------	Low---------	Moderately high.	Very low---------	Very low--	Very low---	Severe.
Riviera---------		Low: flooding, wetness.	Low: flooding, wetness.	Moderately high: seedling mortality, equipment limitations.	Very low: flooding, wetness.	Very low: flooding, wetness.	Very low: flooding, wetness.	Severe: floods, wetness, percs slowly.
Holopaw---------		Low: flooding, wetness.	Low: flooding, wetness.	Moderately high: seedling mortality, equipment limitations, plant competition.	Very low: flooding, wetness.	Very low: flooding.	Very low: flooding.	Severe: floods, wetness, too sandy.
Winder----------		Low: flooding, wetness.	Medium: flooding, wetness.	High: seedling mortality, equipment limitations, plant competition.	Very low: flooding, wetness.	Very low: flooding.	Very low: flooding.	Severe: floods, wetness, percs slowly.

See footnotes at end of table.

TABLE 3.--SOIL RATINGS AND LIMITING PROPERTIES FOR SELECTED USES, BY GENERAL SOIL MAP UNIT--Continued

Map unit	Percentage of survey area	Potential and limitations for--						Degree and kind of limitations for recreation areas**
		Cropland	Pasture	Pine trees	Septic tank absorption fields	Building sites*	Local roads and streets	
10. Terra Ceia-Wesconnett-Tomoka:	6.0	High	High	Very low	Very low	Very low	Very low	Severe.
Terra Ceia		High: flooding, wetness.	High: flooding, wetness.	Very low: windthrow hazard, seedling mortality, equipment limitations.	Very low: flooding, wetness.	Very low: flooding, low strength.	Very low: flooding, low strength.	Severe: wetness, excess humus.
Wesconnett		Low: flooding, wetness.	Low: flooding, wetness.	High: seedling mortality, equipment limitations, plant competition.	Very low: flooding, wetness.	Very low: flooding, wetness.	Very low: flooding, wetness.	Severe: wetness, flooding.
Tomoka		High: wetness.	High: wetness.	Very low: windthrow hazard, seedling mortality, equipment limitations.	Very low: flooding, wetness.	Very low: wetness, low strength.	Very low: wetness, low strength.	Severe: ponding, excess humus.
11. Pellicer-Tisonia:	4.3	Very low	Very low	Very low	Very low	Very low	Very low	Severe.
Pellicer		Very low: flooding, too salty, low strength.	Very low: flooding, too salty, low strength.	Very low: too salty, equipment limitations.	Very low: flooding, wetness.	Very low: flooding, wetness, low strength.	Very low: flooding, wetness, low strength.	Severe: flooding, wetness, percs slowly.
Tisonia		Very low: flooding, too salty, low strength.	Very low: flooding, too salty, low strength.	Very low: too salty, equipment limitations.	Very low: flooding, wetness.	Very low: flooding, wetness, low strength.	Very low: flooding, wetness, low strength.	Severe: flooding, wetness, excess humus.

* Ratings apply to dwellings without basements and small commercial buildings.
** Ratings apply to camp and picnic areas and playgrounds.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Adamsville fine sand	2,100	0.5
2	Astatula fine sand, 0 to 8 percent slopes	5,350	1.4
3	Myakka fine sand	39,760	9.7
4	Myakka fine sand, depressional	2,990	0.8
5	St. Johns fine sand, depressional	5,790	1.5
6	Tavares fine sand, 0 to 5 percent slopes	10,650	2.7
7	Immokalee fine sand	20,000	4.9
8	Zolfo fine sand	8,030	2.1
9	Pomona fine sand	26,380	6.8
11	Smyrna fine sand	10,660	2.7
12	Ona fine sand	5,120	1.3
13	St. Johns fine sand	9,920	2.5
14	Cassia fine sand	4,660	1.2
15	Pomello fine sand, 0 to 5 percent slopes	4,350	1.1
16	Orsino fine sand, 0 to 5 percent slopes	2,350	0.6
18	Floridana fine sand, frequently flooded	4,870	1.2
19	Pompano fine sand	3,540	0.9
21	Wabasso fine sand	3,340	0.9
22	Manatee fine sandy loam, frequently flooded	3,290	0.8
23	Paola fine sand, 0 to 8 percent slopes	1,450	0.4
24	Pellicer silty clay loam, frequently flooded	17,440	4.5
25	Parkwood fine sandy loam, frequently flooded	5,090	1.3
26	Samsula muck	4,730	1.2
27	St. Augustine fine sand	1,840	0.5
28	Beaches	2,420	0.6
29	Satellite fine sand	1,670	0.4
30	Wesconnett fine sand, frequently flooded	5,020	1.3
31	Fripp-Satellite complex	2,800	0.7
32	Palm Beach sand, 0 to 5 percent slopes	810	0.2
33	Jonathan fine sand	170	*
34	Tocoi fine sand	19,690	5.1
35	Hontoon muck	2,260	0.6
36	Riviera fine sand, frequently flooded	25,040	6.1
38	Pits	410	0.1
40	Pottsburg fine sand	4,320	1.1
41	Tomoka muck	4,870	1.2
42	Bluff sandy clay loam, frequently flooded	3,620	0.9
44	Sparr fine sand, 0 to 5 percent slopes	5,190	1.3
45	St. Augustine fine sand, clayey substratum	1,280	0.3
46	Holopaw fine sand	16,590	4.2
47	Holopaw fine sand, frequently flooded	9,370	2.4
48	Winder fine sand, frequently flooded	3,020	0.8
49	Moultrie fine sand, frequently flooded	1,730	0.4
50	Narcoossee fine sand, shelly substratum	360	0.1
51	St. Augustine-Urban land complex	2,620	0.7
52	Durbin muck, frequently flooded	730	0.2
53	Immokalee-Urban land complex	1,370	0.4
54	Astatula-Urban land complex	1,080	0.3
55	Arents, 0 to 2 percent slopes	140	*
57	Adamsville Variant fine sand	660	0.2
58	EauGallie fine sand	6,180	1.6
61	Riviera fine sand, depressional	4,020	1.0
62	Floridana fine sand	9,951	2.5
63	Placid fine sand	7,760	2.0
64	Ellzey fine sand	8,629	2.2
65	Riviera fine sand	12,460	3.0
66	Terra Ceia muck, frequently flooded	10,240	2.6
67	Tisonia mucky peat, frequently flooded	1,210	0.3
68	Winder fine sand	2,590	0.7
69	Bakersville muck	4,170	1.1
	Water**	1,610	0.4
	Total	389,760	100.0

* Less than 0.1 percent.
** The acreage of water includes all bodies of water more than about 3 acres in size and all streams wider than one-eighth mile.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Irish potatoes	Cabbage	Corn	Grain sorghum	Bahiagrass	Grass-clover
	Cwt	Crate	Bu	Bu	AUM*	AUM*
1 Adamsville	150	400	75	30	7.0	10.0
2 Astatula	---	---	---	---	3.0	---
3 Myakka	180	320	80	35	9.0	12.0
4 Myakka	---	---	---	---	---	---
5 St. Johns	---	---	---	---	---	---
6 Tavares	---	---	---	---	8.0	---
7 Immokalee	180	200	75	30	7.5	12.0
8 Zolfo	140	250	75	30	7.0	10.0
9 Pomona	175	250	70	30	8.0	10.0
11 Smyrna	175	250	80	35	8.0	12.0
12 Ona	100	450	100	60	8.5	12.0
13 St. Johns	180	400	95	40	8.5	12.0
14 Cassia	---	---	---	---	6.0	---
15 Pomello	---	---	---	---	3.5	---
16 Orsino	---	---	---	30	5.0	---
18 Floridana	250	600	100	40	10.0	13.0
19 Pompano	200	260	50	30	8.0	10.0
21 Wabasso	180	250	80	35	8.0	12.0
22 Manatee	---	---	---	---	8.0	10.4
23 Paola	---	---	---	---	3.0	---
24 Pellicer	---	---	---	---	---	---

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Irish potatoes	Cabbage	Corn	Grain sorghum	Bahiagrass	Grass-clover
	Cwt	Crate	Bu	Bu	AUM*	AUM*
25----- Parkwood	---	---	---	---	---	---
26----- Samsula	---	---	---	---	---	---
27----- St. Augustine	---	---	---	---	---	---
28**----- Beaches	---	---	---	---	---	---
29----- Satellite	---	---	---	---	5.0	---
30----- Wesconnett	---	---	---	---	7.0	9.0
31----- Fripp-Satellite	---	---	---	---	---	---
32----- Palm Beach	---	---	---	---	---	---
33----- Jonathan	---	---	---	---	---	---
34----- Tocoi	320	250	90	40	9.0	11.0
35----- Hontoon	---	---	---	---	---	---
36----- Riviera	---	---	---	---	---	10.0
38**----- Pits	---	---	---	---	---	---
40----- Pottsburg	140	250	70	35	7.0	8.0
41----- Tomoka	---	---	---	---	---	10.0
42----- Bluff	---	---	---	---	10.0	12.0
44----- Sparr	150	200	50	30	9.0	---
45----- St. Augustine	---	---	---	---	---	---
46----- Holopaw	180	300	80	30	8.0	10.0
47----- Holopaw	---	---	---	---	---	---
48----- Winder	---	---	---	---	8.0	10.0
49----- Moultrie	---	---	---	---	---	---
50----- Narcoossee	100	450	75	30	6.0	6.0

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Irish potatoes	Cabbage	Corn	Grain sorghum	Bahiagrass	Grass-clover
	Cwt	Crate	Bu	Bu	AUM*	AUM*
51------------------------ St. Augustine-Urban land	---	---	---	---	---	---
52------------------------ Durbin	---	---	---	---	---	---
53------------------------ Immokalee-Urban land	---	---	---	---	---	---
54------------------------ Astatula-Urban land	---	---	---	---	---	---
55**---------------------- Arents	---	---	---	---	---	---
57------------------------ Adamsville Variant	200	400	80	35	7.0	10.0
58------------------------ EauGallie	175	250	80	40	8.0	12.0
61------------------------ Riviera	---	---	---	---	---	---
62------------------------ Floridana	250	600	100	40	10.0	13.0
63------------------------ Placid	250	480	100	60	8.5	10.5
64------------------------ Ellzey	250	500	100	60	10.0	12.0
65------------------------ Riviera	---	---	---	---	---	---
66------------------------ Terra Ceia	250	425	100	40	8.0	10.0
67------------------------ Tisonia	---	---	---	---	---	---
68------------------------ Winder	250	450	80	45	9.0	12.0
69------------------------ Bakersville	---	---	---	---	---	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.
** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Absence of an entry indicates no acreage]

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I	---	---	---	---	---
II	---	---	---	---	---
III	113,079	---	97,239	15,840	---
IV	135,318	---	132,968	2,350	---
V	36,820	---	36,820	---	---
VI	37,222	---	18,560	18,662	---
VII	17,345	---	12,800	4,545	---
VIII	21,110	---	21,110	---	---

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: Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Trees to plant
1 Adamsville	3w	Moderate	Moderate	Slight	Moderate	Slash pine	80	Slash pine.
						Longleaf pine	65	
2 Astatula	5s	Severe	Moderate	Slight	Slight	Sand pine	60	Sand pine.
3 Myakka	4w	Moderate	Moderate	Moderate	Moderate	Slash pine	70	Slash pine.
						Longleaf pine	60	
6 Tavares	3s	Moderate	Moderate	Slight	Moderate	Slash pine	80	Slash pine.
						Longleaf pine	70	
						Turkey oak	---	
						Bluejack oak	---	
7 Immokalee	4w	Moderate	Moderate	Moderate	Moderate	Slash pine	70	Slash pine.
						Longleaf pine	65	
8 Zolfo	3w	Moderate	Moderate	Slight	Moderate	Slash pine	80	Slash pine.
						Longleaf pine	65	
9 Pomona	3w	Moderate	Moderate	Slight	Moderate	Slash pine	80	Slash pine.
						Loblolly pine	80	
						Longleaf pine	70	
11 Smyrna	3w	Moderate	Moderate	Slight	Moderate	Slash pine	80	Slash pine.
						Longleaf pine	70	
12 Ona	3w	Moderate	Moderate	Slight	Moderate	Slash pine	80	Slash pine.
						Longleaf pine	70	
13 St. Johns	3w	Moderate	Moderate	Slight	Moderate	Slash pine	80	Slash pine.
						Longleaf pine	70	
14 Cassia	4s	Moderate	Severe	Slight	Moderate	Slash pine	70	Sand pine.
						Longleaf pine	60	
15 Pomello	4s	Moderate	Severe	Moderate	Moderate	Slash pine	70	Sand pine, slash pine.
						Longleaf pine	60	
						Sand pine	60	
16 Orsino	4s	Moderate	Severe	Slight	Moderate	Slash pine	70	Slash pine, sand pine.
						Longleaf pine	60	
						Sand pine	70	
						Sand live oak	---	
						Turkey oak	---	
18 Floridana	3w	Severe	Severe	Slight	Severe	Slash pine	90	Slash pine.
						Longleaf pine	75	
19 Pompano	4w	Severe	Severe	Slight	Moderate	Slash pine	70	Slash pine.
21 Wabasso	3w	Moderate	Moderate	Slight	Moderate	Slash pine	80	Slash pine.
22 Manatee	2w	Severe	Severe	Slight	Moderate	Slash pine	90	Slash pine.
						Longleaf pine	75	
23 Paola	5s	Moderate	Severe	Slight	Slight	Sand pine	50	Sand pine.
25 Parkwood	3w	Moderate	Moderate	Slight	Moderate	Slash pine	80	Slash pine.
						Longleaf pine	70	
						Cabbage palm	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
29----------------- Satellite	4s	Moderate	Severe	Slight	Moderate	Slash pine---------- Longleaf pine------- Sand pine----------- Sand live oak-------	70 60 65 ---	Slash pine, sand pine.
30----------------- Wesconnett	2w	Severe	Severe	Slight	Severe	Slash pine---------- Longleaf pine------- Sweetgum------------ Baldcypress--------- Water oak----------- Cabbage palm-------- Red maple-----------	90 80 --- --- --- --- ---	Slash pine.
31:*								
Fripp-------------	4s	Moderate	Moderate	Slight	Slight	Slash pine---------- Longleaf pine------- Loblolly pine------- Sand pine----------- Live oak------------	70 60 70 --- ---	Slash pine, longleaf pine, loblolly pine, sand pine.
Satellite---------	4s	Moderate	Severe	Slight	Moderate	Slash pine---------- Longleaf pine------- Sand pine----------- Sand live oak-------	70 60 65 ---	Slash pine, sand pine.
33----------------- Jonathan	5s	Moderate	Severe	Slight	Slight	Sand pine-----------	45	Sand pine.
34----------------- Tocoi	3w	Moderate	Moderate	Slight	Moderate	Slash pine---------- Longleaf pine-------	80 70	Slash pine.
36----------------- Riviera	3w	Moderate	Moderate	Moderate	Moderate	Slash pine---------- Longleaf pine-------	80 70	Slash pine.
40----------------- Pottsburg	4w	Moderate	Moderate	Moderate	Moderate	Slash pine---------- Longleaf pine-------	70 60	Slash pine.
42----------------- Bluff	2w	Severe	Severe	Moderate	Moderate	Slash pine---------- Loblolly pine------- Longleaf pine------- Cabbage palm-------- Cypress-------------	90 90 80 --- ---	Slash pine, loblolly pine.
44----------------- Sparr	3s	Moderate	Moderate	Slight	Moderate	Slash pine---------- Loblolly pine------- Longleaf pine-------	80 80 70	Slash pine.
46----------------- Holopaw	3w	Moderate	Severe	Slight	Moderate	Slash pine---------- Longleaf pine------- Cabbage palm--------	80 70 ---	Slash pine.
47----------------- Holopaw	3w	Severe	Severe	Slight	Severe	Slash pine---------- Longleaf pine-------	80 70	Slash pine.
48----------------- Winder	2w	Moderate	Moderate	Moderate	Moderate	Slash pine----------	90	Slash pine.
50----------------- Narcoossee	3w	Moderate	Moderate	Slight	Moderate	Slash pine---------- Longleaf pine-------	80 70	Slash pine.
57----------------- Adamsville Variant	3w	Moderate	Moderate	Slight	Moderate	Slash pine---------- Longleaf pine-------	75 65	Slash pine.
58----------------- EauGallie	3w	Moderate	Moderate	Slight	Moderate	Slash pine---------- Longleaf pine-------	80 70	Slash pine.
62----------------- Floridana	3w	Severe	Severe	Slight	Moderate	Slash pine---------- Longleaf pine------- Cabbage palm--------	90 75 ---	Slash pine.
63----------------- Placid	2w	Severe	Severe	Slight	Severe	Slash pine---------- Longleaf pine-------	90 80	Slash pine.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
64------------------ Ellzey	3w	Moderate	Severe	Slight	Moderate	Longleaf pine-------- Slash pine-----------	80 65	Slash pine.
65------------------ Riviera	3w	Moderate	Moderate	Moderate	Moderate	Slash pine----------- Longleaf pine--------	80 70	Slash pine.
68------------------ Winder	2w	Moderate	Moderate	Moderate	Moderate	Slash pine-----------	90	Slash pine.
69------------------ Bakersville	2w	Severe	Severe	Moderate	Severe	Baldcypress---------- Sweetgum------------- Red maple------------	--- 90 ---	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1 Adamsville	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
2 Astatula	Severe: too sandy.	Severe: too sandy.	Severe: 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 Myakka	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
5 St. Johns	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	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 Zolfo	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
9 Pomona	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
11 Smyrna	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
12 Ona	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
13 St. Johns	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
14 Cassia	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: wetness, droughty.
15 Pomello	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
16 Orsino	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
18 Floridana	Severe: flooding, wetness, percs slowly.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.
19 Pompano	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
21-------------------- 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.
22-------------------- Manatee	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
23-------------------- Paola	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
24-------------------- Pellicer	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness, excess salt.	Severe: wetness, flooding, excess salt.	Severe: wetness, flooding.	Severe: excess salt, excess sulfur, wetness.
25-------------------- Parkwood	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
26-------------------- Samsula	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
27-------------------- St. Augustine	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
28.* Beaches					
29-------------------- Satellite	Severe: wetness, too sandy.	Severe: too sandy.	Severe: too sandy, wetness.	Severe: too sandy.	Severe: droughty.
30-------------------- Wesconnett	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.
31:*					
Fripp-----------------	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
Satellite------------	Severe: wetness, too sandy.	Severe: too sandy.	Severe: too sandy, wetness.	Severe: too sandy.	Severe: droughty.
32-------------------- Palm Beach	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
33-------------------- Jonathan	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
34-------------------- Tocoi	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
35-------------------- Hontoon	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
36-------------------- Riviera	Severe: flooding, wetness, percs slowly.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
38.* Pits					
40 Pottsburg	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
41 Tomoka	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
42 Bluff	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
44 Sparr	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: wetness, droughty.
45 St. Augustine	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: excess salt, droughty.
46 Holopaw	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
47 Holopaw	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, flooding.
48 Winder	Severe: flooding, wetness, percs slowly.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, floods.
49 Moultrie	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: excess salt, wetness, flooding.
50 Narcoossee	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
51:* St. Augustine	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
Urban land.					
52 Durbin	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus, excess salt.	Severe: excess humus, wetness, flooding.	Severe: wetness, excess humus.	Severe: excess salt, wetness, flooding.
53:* Immokalee	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
Urban land.					
54:* Astatula	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
54:* Urban land.					
55.* Arents					
57 Adamsville Variant	Severe: too sandy.	Severe: too sandy.	Severe: small stones, too sandy.	Severe: too sandy.	Moderate: small stones, droughty.
58 EauGallie	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, droughty.
61 Riviera	Severe: ponding, percs slowly, too sandy.	Severe: ponding, too sandy, percs slowly.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
62 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.
63 Placid	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
64 Ellzey	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
65 Riviera	Severe: wetness, percs slowly, too sandy.	Severe: wetness, too sandy, percs slowly.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness.
66 Terra Ceia	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness.	Severe: ponding, excess humus.	Severe: wetness, excess humus.
67 Tisonia	Severe: flooding, wetness, percs slowly.	Severe: wetness, excess humus, excess salt.	Severe: excess humus, wetness, flooding.	Severe: wetness, excess humus.	Severe: excess salt, excess sulfur, wetness.
68 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.
69 Bakersville	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.

* See description of the map unit for composition and behavior characteristics of the map unit.

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 herba-ceous plants	Hard-wood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1----------------- Adamsville	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor
2----------------- Astatula	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
3----------------- Myakka	Poor	Fair	Good	Poor	Fair	Fair	Poor	Fair	Fair	Poor
4----------------- Myakka	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Good	Very poor.	Very poor.	Good
5----------------- St. Johns	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	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----------------- Zolfo	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor
9----------------- Pomona	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair
11---------------- Smyrna	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair
12---------------- Ona	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair
13---------------- St. Johns	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair
14---------------- Cassia	Very poor.	Poor	Poor	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
15---------------- Pomello	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
16---------------- Orsino	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
18---------------- Floridana	Very poor.	Poor	Fair	Poor	Poor	Good	Good	Poor	Poor	Good
19---------------- Pompano	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair
21---------------- Wabasso	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair	Poor
22---------------- Manatee	Poor	Poor	Fair	Poor	Fair	Good	Good	Poor	Poor	Good
23---------------- Paola	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
24---------------- Pellicer	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Good	Very poor.	Very poor.	Fair
25---------------- Parkwood	Very poor.	Fair	Fair	Fair	Poor	Good	Good	Poor	Fair	Good

TABLE 9.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
26: Samsula	Very poor.	Very poor.	Poor	Fair	Very poor.	Good	Good	Very poor.	Poor	Good
27: St. Augustine	Very poor.	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor
28.*: Beaches										
29: Satellite	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.
30: Wesconnett	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
31:*: Fripp	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Satellite	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.
32: Palm Beach	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
33: Jonathan	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
34: Tocoi	Poor	Fair	Fair	Poor	Fair	Poor	Fair	Fair	Fair	Poor
35: Hontoon	Very poor.	Very poor.	Poor	Fair	Very poor.	Good	Good	Very poor.	Fair	Good
36: Riviera	Poor	Fair	Fair	Fair	Fair	Poor	Fair	Fair	Fair	Fair
38.*: Pits										
40: Pottsburg	Poor	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor
41: Tomoka	Very poor.	Poor	Poor	Fair	Poor	Good	Good	Poor	Poor	Good
42: Bluff	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
44: Sparr	Poor	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
45: St. Augustine	Very poor.	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor
46: Holopaw	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair
47: Holopaw	Very poor.	Very poor.	Poor	Fair	Poor	Good	Fair	Very poor.	Fair	Fair
48: Winder	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair
49: Moultrie	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Fair	Very poor.	Very poor.	Fair

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
50------------------ Narcoossee	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor
51:*										
St. Augustine------	Very poor.	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor
Urban land.										
52------------------ Durbin	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor
53:*										
Immokalee----------	Poor	Poor	Fair	Poor	Poor	Fair	Poor	Poor	Poor	Poor
Urban land.										
54:*										
Astatula-----------	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Urban land.										
55:* Arents										
57------------------ Adamsville Variant	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor
58------------------ EauGallie	Poor	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor
61------------------ Riviera	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good
62------------------ Floridana	Poor	Poor	Fair	Poor	Poor	Good	Good	Poor	Poor	Good
63------------------ Placid	Poor	Fair	Fair	Poor	Fair	Good	Good	Fair	Fair	Good
64------------------ Ellzey	Good	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair
65------------------ Riviera	Poor	Fair	Fair	Fair	Fair	Poor	Fair	Fair	Fair	Fair
66------------------ Terra Ceia	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
67------------------ Tisonia	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Fair	Very poor.	Very poor.	Poor
68------------------ Winder	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair
69------------------ Bakersville	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good

* See description of the map unit for composition and behavior characteristics of the map unit.

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 and 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-----Adamsville	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
2-----Astatula	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Severe: droughty.
3-----Myakka	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
4-----Myakka	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
5-----St. Johns	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-----Zolfo	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
9-----Pomona	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
11-----Smyrna	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
12-----Ona	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
13-----St. Johns	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
14-----Cassia	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
15-----Pomello	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
16-----Orsino	Severe: cutbanks cave.	Slight-----	Moderate: wetness.	Slight-----	Slight-----	Severe: droughty.
18-----Floridana	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
19-----Pompano	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, 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
21----------------- Wabasso	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
22----------------- Manatee	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
23----------------- Paola	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: droughty.
24----------------- Pellicer	Severe: wetness, flooding.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: excess salt, excess sulfur, wetness.
25----------------- Parkwood	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
26----------------- Samsula	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, excess humus.
27----------------- St. Augustine	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Moderate: droughty.
28.* Beaches						
29----------------- Satellite	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Severe: droughty.
30----------------- Wesconnett	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: ponding, wetness.	Severe: wetness, flooding.
31:*						
Fripp-------------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: droughty.
Satellite---------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Severe: droughty.
32----------------- Palm Beach	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: droughty.
33----------------- Jonathan	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Severe: droughty.
34----------------- Tocoi	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
35----------------- Hontoon	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: low strength, ponding.	Severe: ponding, excess humus.
36----------------- Riviera	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
38.* Pits						

See footnote at end of table.

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
40---------------- Pottsburg	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
41---------------- Tomoka	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, excess humus
42---------------- 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.
44---------------- Sparr	Severe: cutbanks cave.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
45---------------- St. Augustine	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Moderate: droughty.
46---------------- Holopaw	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
47---------------- Holopaw	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.
48---------------- Winder	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	
49---------------- Moultrie	Severe: cutbanks cave, wetness, flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: excess salt, wetness, flooding.
50---------------- Narcoossee	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty.
51:*						
St. Augustine-----	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Moderate: droughty.
Urban land.						
52---------------- Durbin	Severe: excess humus, wetness.	Severe: flooding, wetness, low strength.	Severe: flooding, wetness.	Severe: flooding, wetness, low strength.	Severe: wetness, flooding.	Severe: excess salt, wetness, flooding.
53:*						
Immokalee---------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
Urban land.						
54:*						
Astatula----------	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: droughty.
Urban land.						
55.* Arents						

See footnote at end of table.

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
57----------------- Adamsville Variant	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: small stones, droughty.
58----------------- EauGallie	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
61----------------- Riviera	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
62----------------- Floridana	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
63----------------- Placid	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
64----------------- Ellzey	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
65----------------- Riviera	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
66----------------- Terra Ceia	Severe: excess humus, wetness.	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, excess humus.
67----------------- Tisonia	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: excess salt, excess sulfur, wetness.
68----------------- Winder	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
69----------------- Bakersville	Severe: cutbanks cave. ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.

*See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition and 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: Adamsville	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
2*: Astatula	Slight	Severe: seepage.	Severe: 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: Myakka	Severe: ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
5: St. Johns	Severe: ponding.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
6*: Tavares	Moderate: wetness.	Severe: seepage.	Severe: 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: Zolfo	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
9: Pomona	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
11: Smyrna	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
12: Ona	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
13: St. Johns	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
14: Cassia	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.

See footnotes 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
15------------------ Pomello	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
16------------------ Orsino	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
18------------------ Floridana	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
19------------------ Pompano	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
21------------------ Wabasso	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: wetness.	Poor: seepage, too sandy, wetness.
22------------------ Manatee	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
23*----------------- Paola	Slight-----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
24------------------ Pellicer	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: too clayey, wetness, excess salt.
25------------------ Parkwood	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: too sandy, wetness.
26------------------ Samsula	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
27------------------ St. Augustine	Severe: wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
28.* Beaches					
29------------------ Satellite	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
30------------------ Wesconnett	Severe: flooding, wetness, poor filter.	Severe: seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.

See footnotes 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
31:**					
Fripp*	Slight	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Satellite	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
32* Palm Beach	Slight	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
33 Jonathan	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
34 Tocoi	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
35 Hontoon	Severe: ponding, poor filter.	Severe: excess humus, seepage, ponding.	Severe: excess humus, seepage, ponding.	Severe: seepage, ponding.	Poor: excess humus, ponding.
36 Riviera	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
38.** Pits					
40 Pottsburg	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: wetness, seepage.	Poor: too sandy, wetness, seepage.
41 Tomoka	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: ponding.
42 Bluff	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
44 Sparr	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
45 St. Augustine	Severe: wetness.	Severe: seepage, flooding, wetness.	Severe: wetness, too sandy, excess salt.	Severe: seepage, wetness.	Poor: seepage, too sandy.
46 Holopaw	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.

See footnotes 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
47------------------ Holopaw	Severe: flooding, wetness.	Severe: seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
48------------------ Winder	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, thin layer.
49------------------ Moultrie	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
50------------------ Narcoossee	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
51:**					
St. Augustine------	Severe: wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
Urban land.					
52------------------ Durbin	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, excess humus, excess salt.
53:**					
Immokalee----------	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Urban land.					
54:**					
Astatula-----------	Slight*----------	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land.					
55.** Arents					
57------------------ Adamsville Variant	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
58------------------ EauGallie	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: wetness, seepage.	Poor: too sandy, wetness, seepage.
61------------------ Riviera	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.

See footnotes 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 ccver for landfill
62------------------ Floridana	Severe: wetness, percs slowly.	Severe: wetness, seepage.	Severe: wetness.	Severe: wetness, seepage.	Poor: wetness.
63------------------ Placid	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, ponding, too sandy.	Severe: seepage, wetness.	Poor: wetness, too sandy, seepage.
64------------------ Ellzey	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
65------------------ Riviera	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
66------------------ 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.
67------------------ Tisonia	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, excess humus.	Severe: flooding, wetness, too clayey.	Severe: flooding, seepage, wetness.	Poor: too clayey, hard to pack, wetness.
68------------------ Winder	Severe: percs slowly, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness, thin layer.
69------------------ Bakersville	Severe: ponding.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.

* A hazard of ground water contamination may exist in areas having many septic tank absorption fields.
**See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition and does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
1 Adamsville	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
2 Astatula	Good	Probable	Improbable: too sandy.	Poor: too sandy.
3, 4 Myakka	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
5 St. Johns	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 Zolfo	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
9 Pomona	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
11 Smyrna	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
12 Ona	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
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 Pomello	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
16 Orsino	Good	Probable	Improbable: too sandy.	Poor: too sandy.
18 Floridana	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
19 Pompano	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
21 Wabasso	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
22 Manatee	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
23 Paola	Good	Probable	Improbable: too sandy.	Poor: too sandy.
24 Pellicer	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, wetness.
25 Parkwood	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
26 Samsula	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
27 St. Augustine	Fair: wetness.	Probable	Improbable: excess fines.	Poor: too sandy.
28.* Beaches				
29 Satellite	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
30 Wesconnett	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
31:*				
Fripp	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Satellite	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
32 Palm Beach	Good	Probable	Improbable: too sandy.	Poor: too sandy.
33 Jonathan	Good	Probable	Improbable: too sandy.	Poor: too sandy.
34 Tocoi	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
35 Hontoon	Poor: low strength, wetness.	Improbable	Improbable	Poor: wetness, excess humus.
36 Riviera	Poor: wetness.	Probable	Improbable: excess fines.	Poor: too sandy, wetness.
38.* Pits				
40 Pottsburg	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
41 Tomoka	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
42 Bluff	Poor: wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
44 Sparr	Fair: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
45 St. Augustine	Fair: wetness.	Probable	Improbable: excess fines.	Poor: too sandy.
46 Holopaw	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
47 Holopaw	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
48 Winder	Poor: wetness.	Probable	Improbable: excess fines.	Poor: too sandy, wetness.
49 Moultrie	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, excess salt, wetness.
50 Narcoossee	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
51:* St. Augustine	Fair: wetness.	Probable	Improbable: excess fines.	Poor: too sandy.
Urban land.				
52 Durbin	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, excess salt, wetness.
53:* Immokalee	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Urban land.				
54:* Astatula	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Urban land.				
55.* Arents				
57 Adamsville Variant	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
58 EauGallie	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
61 Riviera	Poor: wetness.	Probable	Improbable: excess fines.	Poor: too sandy, wetness.
62 Floridana	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
63-------------------- Placid	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy, wetness.
64-------------------- Ellzey	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy, wetness.
65-------------------- Riviera	Poor: wetness.	Probable-------------	Improbable: excess fines.	Poor: too sandy, wetness.
66-------------------- Terra Ceia	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
67-------------------- Tisonia	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, excess salt, wetness.
68-------------------- Winder	Poor: wetness.	Probable-------------	Probable-------------	Poor: too sandy, wetness.
69-------------------- Bakersville	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: excess humus, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

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 and does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
1----------------- Adamsville	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
2----------------- Astatula	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
3----------------- Myakka	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
4----------------- Myakka	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.
5----------------- St. Johns	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy.	Wetness, droughty.
6----------------- Tavares	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
7----------------- Immokalee	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
8----------------- Zolfo	Severe: seepage.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
9----------------- Pomona	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
11---------------- Smyrna	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
12---------------- Ona	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy.	Wetness, droughty.
13---------------- St. Johns	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Wetness, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy.	Wetness.
14---------------- Cassia	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
15---------------- Pomello	Severe: seepage, piping.	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-- Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
16----------------- Orsino	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
18----------------- Floridana	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, flooding.	Wetness, fast intake, soil blowing.	Wetness, soil blowing, percs slowly.	Wetness, percs slowly.
19----------------- Pompano	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
21----------------- Wabasso	Severe: seepage, wetness.	Severe: slow refill.	Percs slowly, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy.	Wetness, droughty.
22----------------- Manatee	Severe: wetness.	Severe: cutbanks cave.	Flooding--------	Wetness, soil blowing.	Wetness, soil blowing.	Wetness.
23----------------- Paola	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
24----------------- Pellicer	Severe: hard to pack, wetness, excess salt.	Severe: slow refill, salty water.	Flooding, excess salt, percs slowly.	Wetness, flooding, excess salt.	Wetness, percs slowly.	Wetness, excess salt, percs slowly.
25----------------- Parkwood	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, soil blowing, flooding.	Wetness, soil blowing.	Wetness.
26----------------- Samsula	Severe: excess humus, ponding.	Severe: cutbanks cave.	Ponding, subsides.	Ponding, soil blowing.	Ponding, soil blowing.	Wetness.
27----------------- St. Augustine	Severe: seepage, piping, excess salt.	Severe: salty water, cutbanks cave.	Cutbanks cave, excess salt.	Wetness, droughty, excess salt.	Wetness, too sandy, soil blowing.	Droughty.
28.* Beaches						
29----------------- Satellite	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
30----------------- Wesconnett	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Wetness, flooding, cutbanks cave.	Wetness, fast intake, soil blowing.	Wetness, too sandy.	Wetness.
31:* Fripp-------------	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, slope.	Slope, too sandy, soil blowing.	Slope, droughty.
Satellite---------	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
32----------------- Palm Beach	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
33----------------- Jonathan	Severe: seepage, piping.	Severe: slow refill, cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
34----------------- Tocoi	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
35----------------- Hontoon	Severe: excess humus, ponding.	Slight: favorable.	Subsides, ponding.	Ponding, soil blowing.	Ponding, soil blowing.	Wetness.
36----------------- Riviera	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Wetness, percs slowly, flooding.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty, percs slowly.
38.* Pits						
40----------------- Pottsburg	Severe: seepage, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
41----------------- Tomoka	Severe: piping, ponding.	Severe: cutbanks cave.	Ponding, subsides.	Ponding---------	Ponding---------	Wetness.
42----------------- Bluff	Severe: wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
44----------------- Sparr	Severe: seepage.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
45----------------- St. Augustine	Severe: seepage, piping.	Severe: salty water, cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, too sandy, soil blowing.	Droughty.
46----------------- Holopaw	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
47----------------- Holopaw	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
48----------------- Winder	Severe: seepage, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, flooding.	Wetness, droughty, fast intake.	Wetness, soil blowing, percs slowly.	Wetness, droughty, percs slowly.
49----------------- Moultrie	Severe: seepage, piping, wetness.	Severe: salty water, cutbanks cave.	Flooding, cutbanks cave, excess salt.	Wetness, flooding, excess salt.	Wetness, too sandy.	Wetness, excess salt.
50----------------- Narcoossee	Severe: seepage.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
51:*						
St. Augustine----	Severe: seepage, piping.	Severe: salty water, cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, too sandy, soil blowing.	Droughty.
Urban land.						

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
52----------------- Durbin	Severe: excess humus, wetness, excess salt.	Severe: salty water, cutbanks cave.	Flooding, subsides, excess salt.	Wetness, flooding, excess salt.	Wetness---------	Wetness, excess salt.
53:* Immokalee---------	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Urban land.						
54:* Astatula----------	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
Urban land.						
55.* Arents						
57----------------- Adamsville Variant	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
58----------------- EauGallie	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Fast intake, wetness, droughty.	Wetness, too sandy, soil blowing.	Wetness, droughty.
61----------------- Riviera	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, percs slowly.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty, percs slowly.
62----------------- Floridana	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly---	Wetness, fast intake, soil blowing.	Wetness, soil blowing, percs slowly.	Wetness, percs slowly.
63----------------- Placid	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, fast intake, soil blowing.	Wetness, too sandy, soil blowing.	Wetness.
64----------------- Ellzey	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, fast intake.	Wetness, too sandy, soil blowing.	Wetness.
65----------------- Riviera	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Percs slowly---	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty, percs slowly.
66----------------- Terra Ceia	Severe: excess humus, wetness.	Slight----------	Flooding, subsides.	Wetness, soil blowing, flooding.	Wetness, soil blowing.	Wetness.
67----------------- Tisonia	Severe: hard to pack, wetness, excess salt.	Severe: slow refill, salty water.	Wetness, percs slowly, flooding.	Wetness, percs slowly, flooding.	Wetness, percs slowly.	Wetness, excess salt, percs slowly.
68----------------- Winder	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly---	Wetness, droughty, fast intake.	Wetness, soil blowing, percs slowly.	Wetness, droughty, percs slowly.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
69---------------- Bakersville	Severe: seepage, ponding, piping.	Severe: cutbanks cave.	Ponding, subsides, cutbanks cave.	Ponding, fast intake.	Ponding, too sandy.	Wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1----------------- Adamsville	0-8	Fine sand--------	SP-SM	A-3, A-2-4	0	100	100	90-100	5-12	---	NP
	8-80	Fine sand, sand	SP-SM, SP	A-3, A-2-4	0	100	100	90-100	2-12	---	NP
2----------------- Astatula	0-80	Fine sand--------	SP, SP-SM	A-3	0	100	100	75-99	1-7	---	NP
3----------------- Myakka	0-23	Fine sand--------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	23-53	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	53-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	2-8	---	NP
4----------------- Myakka	0-17	Fine sand--------	SP, SP-SM	A-3	0	100	100	85-100	2-10	---	NP
	17-31	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	31-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	2-8	---	NP
5----------------- St. Johns	0-13	Fine sand--------	SP, SP-SM	A-3	0	100	100	75-100	3-10	---	NP
	13-25	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	3-10	---	NP
	25-50	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
6----------------- Tavares	0-7	Fine sand--------	SP, SP-SM	A-3	0	100	95-100	85-100	2-8	---	NP
	7-80	Sand, fine sand	SP, SP-SM	A-3	0	100	95-100	85-100	2-8	---	NP
7----------------- Immokalee	0-8	Fine sand--------	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
	8-40	Fine sand, sand	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
	40-64	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	70-100	5-21	---	NP
	64-80	Fine sand, sand	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
8----------------- Zolfo	0-5	Fine sand--------	SP-S, SP	A-3, A-2-4	0	100	100	90-100	3-12	---	NP
	5-66	Fine sand, sand	SP-SM, SM, SP	A-3, A-2-4	0	100	100	90-100	3-18	---	NP
	66-80	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	90-100	5-18	---	NP
9----------------- Pomona	0-6	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
	6-21	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
	21-31	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-15	---	NP
	31-47	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
	47-63	Sandy clay loam, sandy loam, sandy clay	SC, SM-SC	A-2, A-4, A-6	0	100	95-100	85-100	25-50	25-40	4-16
	63-80	Sand, fine sand.	SP, SP-SM	A-3, A-2-4	0	100	100	85-100	2-12	---	NP
11---------------- Smyrna	0-14	Fine sand--------	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
	14-21	Sand, fine sand	SM, SP-SM	A-3, A-2-4	0	100	100	80-100	5-20	---	NP
	21-32	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
	32-45	Sand, fine sand	SM, SP-SM	A-3, A-2-4	0	100	100	80-100	5-20	---	NP
	45-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
12---------------- Ona	0-8	Fine sand--------	SP-SM, SP	A-3	0	100	100	85-95	3-10	---	NP
	8-25	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-20	---	NP
	25-80	Fine sand, sand	SP-SM, SP	A-3	0	100	100	85-95	3-10	---	NP

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
13--------------- St. Johns	0-10	Fine sand--------	SP, SP-SM	A-3	0	100	100	75-100	3-10	---	NP
	10-15	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	3-10	---	NP
	15-28	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-20	---	NP
	28-42	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-90	2-10	---	NP
	42-66	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-20	---	NP
	66-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-90	2-10	---	NP
14--------------- Cassia	0-18	Fine sand--------	SP, SP-SM	A-3	0	100	100	90-100	2-7	---	NP
	18-32	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	90-100	5-20	---	NP
	32-75	Sand, fine sand	SP, SP-SM	A-3	0	100	100	90-100	2-10	---	NP
	75-80	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	90-100	5-20	---	NP
15--------------- Pomello	0-45	Fine sand--------	SP, SP-SM	A-3	0	100	100	60-100	1-8	---	NP
	45-57	Coarse sand, sand, fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	60-100	6-15	---	NP
	57-80	Coarse sand, sand, fine sand.	SP, SP-SM	A-3	0	100	100	60-100	4-10	---	NP
16--------------- Orsino	0-18	Fine sand--------	SP	A-3	0	100	100	85-100	1-3	---	NP
	18-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	85-100	2-7	---	NP
18--------------- Floridana	0-18	Fine sand--------	SP-SM, SM	A-3, A-2-4	0	100	100	80-90	5-25	---	NP
	18-28	Fine sand, sand	SP, SP-SM	A-3	0	100	100	85-95	2-10	---	NP
	28-80	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	80-95	15-35	20-30	7-16
19--------------- Pompano	0-80	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	75-100	1-12	---	NP
21--------------- Wabasso	0-25	Fine sand--------	SP, SP-SM	A-3	0	100	100	95-100	2-10	---	NP
	25-32	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	95-100	5-20	---	NP
	32-45	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
	45-80	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	95-100	5-20	---	NP
22--------------- Manatee	0-13	Fine sandy loam	SM-SC, SC	A-2-4	0	100	100	90-100	18-30	<30	4-10
	13-34	Fine sandy loam, sandy loam.	SM-SC, SC	A-2-4	0	100	100	90-100	18-30	<30	4-10
	34-52	Fine sandy loam, sandy loam, loamy fine sand.	SM, SM-SC, SC	A-2-4	0	95-100	90-100	85-100	13-30	<30	NP-10
	52-80	Fine sandy loam, sandy loam, loamy fine sand.	SM, SM-SC, SC	A-2-4	0-5	60-100	50-100	50-100	13-30	<30	NP-10
23--------------- Paola	0-17	Fine sand--------	SP	A-3	0	100	100	85-100	1-2	---	NP
	17-80	Sand, fine sand	SP	A-3	0	100	100	80-100	1-4	---	NP
24--------------- Pellicer	0-10	Silty clay loam	CH, SC	A-7	0	100	100	90-100	40-85	60-100	30-60
	10-70	Sandy clay, clay loam, clay.	CH, SC	A-7	0	100	100	85-100	50-90	50-100	25-60
	70-80	Fine sand, loamy fine sand, fine sandy loam.	SP-SM, SM	A-2-4, A-3	0	100	90-100	80-100	5-20	---	NP
25--------------- Parkwood	0-10	Fine sandy loam	SM, SM-SC	A-2-4	0	100	97-100	80-95	20-35	<28	NP-7
	10-55	Fine sandy loam, sandy loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	97-100	80-95	20-35	<28	NP-12
	55-80	Fine sand, loamy fine sand.	SM	A-2-4	0	100	88-97	85-95	13-25	---	NP

See footnote at end of table.

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	
26---------------- Samsula	0-31	Muck--------------	PT	---	---	---	---	---	---	---	---
	31-80	Sand, fine sand, loamy sand.	SP-SM, SM, SP	A-3, A-2-4	0	100	100	80-100	2-20	---	NP
27---------------- St. Augustine	0-10	Fine sand---------	SP, SP-SM	A-3	0	85-95	80-95	80-90	2-5	---	NP
	10-80	Sand, fine sand, loamy fine sand.	SP-SM, SM, SP	A-3, A-2-4	0	85-95	80-100	80-98	2-15	---	NP
28.* Beaches											
29---------------- Satellite	0-6	Fine sand---------	SP	A-3	0	100	100	60-100	1-4	---	NP
	6-80	Coarse sand, sand, fine sand.	SP	A-3	0	100	100	60-100	1-4	---	NP
30---------------- Wesconnett	0-8	Fine sand---------	SP-SM	A-3, A-2-4	0	100	100	90-100	5-12	---	NP
	8-34	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	90-100	5-15	---	NP
	34-45	Fine sand, sand	SP-SM	A-3, A-2-4	0	100	100	90-100	5-12	---	NP
	45-80	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	90-100	5-15	---	NP
31:*											
Fripp------------	0-5	Fine sand---------	SP, SP-SM	A-3	0	100	98-100	85-99	0-5	---	NP
	5-80	Fine sand, sand	SP, SP-SM	A-3	0	100	98-100	85-100	0-5	---	NP
Satellite--------	0-6	Fine sand---------	SP	A-3	0	100	100	60-100	1-4	---	NP
	6-80	Coarse sand, sand, fine sand.	SP	A-3	0	100	100	60-100	1-4	---	NP
32---------------- Palm Beach	0-80	Sand--------------	SP-SM, SP, SW	A-1, A-3, A-2-4	0	100	75-95	15-90	1-5	---	NP
33---------------- Jonathan	0-4	Fine sand---------	SP	A-3	0	100	100	85-100	1-4	---	NP
	4-71	Fine sand, sand	SP	A-3	0	100	100	85-100	1-4	---	NP
	71-80	Fine sand, sand, loamy sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-15	---	NP
34---------------- Tocoi	0-13	Fine sand---------	SP, SP-SM	A-3	0	100	100	80-100	2-5	---	NP
	13-23	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-100	5-20	---	NP
	23-45	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-100	2-5	---	NP
	45-76	Loamy sand, loamy fine sand.	SP-SM, SM	A-2	0	100	100	90-100	10-30	---	NP
	76-80	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-98	5-20	---	NP
35---------------- Hontoon	0-55	Muck--------------	PT	---	0	---	---	---	---	---	---
	55-80	Mucky sand, sand	SP, SP-SM	A-3	0	100	100	80-95	2-8	---	NP
36---------------- Riviera	0-23	Fine sand---------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	4-12	---	NP
	23-28	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	0	100	100	80-100	15-35	<35	NP-15
	28-71	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
	71-80	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
38.* Pits											
40---------------- Pottsburg	0-60	Fine sand---------	SP-SM	A-3, A-2-4	0	100	100	90-100	5-18	---	NP
	60-80	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	90-100	5-18	---	NP

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
41----------------- Tomoka	0-21	Muck--------------	PT	---	0	---	---	---	---	---	NP
	21-80	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
42----------------- Bluff	0-3	Muck--------------	PT	A-8	0	---	---	---	---	---	---
	3-9	Sandy clay loam	SC	A-6, A-7	0	100	95-100	85-95	36-50	35-50	20-35
	9-25	Sandy clay loam, sandy clay.	SC, CL, CH	A-6, A-7	0	100	95-100	85-95	36-55	35-55	20-40
	25-53	Sandy clay loam, sandy clay, loam.	SC	A-6, A-7	0	95-100	90-100	80-95	36-50	35-50	20-35
	53-80	Sandy clay loam, sandy clay, loam.	SC	A-6, A-7	0	95-100	90-100	80-95	36-50	35-50	20-35
44----------------- Sparr	0-3	Fine sand---------	SP-SM	A-3, A-2-4	0	100	100	75-100	5-12	---	NP
	3-68	Sand, fine sand	SP-SM	A-3, A-2-4	0	100	100	75-100	5-12	---	NP
	68-80	Sandy loam, sandy clay loam, fine sandy loam.	SM-SC, SC, SM	A-2-4	0	100	100	75-100	15-35	<30	NP-10
45----------------- St. Augustine	0-21	Fine sand---------	SP, SP-SM	A-3	0	85-95	80-100	80-98	2-10	---	NP
	21-48	Sand, fine sand, loamy fine sand.	SP-SM, SP	A-3, A-2-4	0	85-95	80-95	80-90	2-12	---	NP
	48-53	Sandy loam, fine sandy loam.	SM, SM-SC	A-2-4	0	85-95	80-95	80-95	15-20	<22	NP-7
	53-80	Sandy clay, clay	CH, SC, CL	A-6, A-7	0	85-95	80-95	80-95	40-85	38-60	25-36
46----------------- Holopaw	0-53	Fine sand---------	SP, SP-SM	A-3	0	100	95-100	70-100	2-10	---	NP
	53-72	Sandy loam, sandy clay loam, fine sandy loam.	SM, SM-SC	A-2-4	0	100	95-100	70-100	15-30	<25	NP-7
	72-80	Loamy sand, loamy fine sand, fine sand.	SM	A-2-4	0	100	95-100	70-99	11-20	---	NP
47----------------- Holopaw	0-50	Fine sand---------	SP, SP-SM	A-3	0	100	95-100	75-90	2-10	---	NP
	50-68	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
	68-80	Fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	95-100	65-90	5-15	---	NP
48----------------- Winder	0-11	Fine sand---------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	11-16	Loamy sand, sandy loam, fine sandy loam.	SM	A-2-4	0	100	100	80-100	15-25	<35	NP-10
	16-42	Sandy clay loam	SC	A-2-4, A-2-6	0	100	100	80-100	18-35	20-40	9-26
	42-80	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC, GM-GC	A-2-4, A-2-6, A-1-B	0	60-80	50-75	40-70	15-35	<35	NP-20
49----------------- Moultrie	0-22	Fine sand---------	SP, SP-SM	A-3	0	100	100	80-100	2-10	---	NP
	22-29	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-25	---	NP
	29-80	Sand, fine sand	SP, SP-SM	A-3	0	100	100	80-95	2-10	---	NP
50----------------- Narcoossee	0-3	Fine sand---------	SP-SM	A-3	0	100	100	95-100	5-10	---	NP
	3-11	Fine sand, sand	SP, SP-SM	A-3	0	100	100	95-100	2-8	---	NP
	11-14	Fine sand, sand	SP-SM	A-3, A-2-4	0	85-95	80-95	75-95	5-12	---	NP
	14-80	Fine sand, sand	SP, SP-SM	A-3	0	85-95	80-100	75-99	2-8	---	NP

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
51:* St. Augustine---	0-10	Fine sand--------	SP, SP-SM	A-3	0	85-95	80-95	80-90	2-5	---	NP
	10-80	Sand, fine sand, loamy fine sand.	SP-SM, SM, SP	A-3, A-2-4	0	85-95	80-100	80-98	2-15	---	NP
Urban land.											
52--------------- Durbin	0-59	Muck-------------	PT	---	0	---	---	---	---	---	---
	59-80	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-2-4, A-3	0	100	100	85-95	5-15	---	NP
53:* Immokalee-------	0-6	Fine sand--------	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
	6-42	Fine sand, sand	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
	42-66	Fine sand, sand	SP-SM, SM	A-3, A-2-4	0	100	100	70-100	5-21	---	NP
	66-80	Fine sand, sand	SP, SP-SM	A-3	0	100	100	70-100	2-10	---	NP
Urban land.											
54:* Astatula--------	0-80	Fine sand--------	SP, SP-SM	A-3	0	100	100	75-99	1-7	---	NP
Urban land.											
55.* Arents											
57--------------- Adamsville Variant	0-10	Fine sand--------	SP, SP-SM	A-3, A-1-B, A-2-4	0	55-80	50-75	45-70	4-10	---	NP
	10-80	Fine sand--------	SP, SP-SM	A-3	0	100	100	85-99	3-5	---	NP
58--------------- EauGallie	0-17	Fine sand--------	SP, SP-SM	A-3	0	100	100	80-100	2-5	---	NP
	17-23	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	80-100	5-20	---	NP
	23-53	Sand, fine sand	SP, SP-SM, SM	A-3, A-2-4	0	100	100	80-100	2-13	---	NP
	53-58	Sandy loam, fine sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4, A-2-6	0	100	100	80-98	20-35	<40	NP-20
	58-80	Sand, loamy sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	80-98	5-25	---	NP
61--------------- Riviera	0-25	Fine sand--------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	4-12	---	NP
	25-35	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	0	100	100	80-100	15-35	<35	NP-15
	35-55	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
62--------------- Floridana	0-11	Fine sand--------	SP-SM, SM	A-3, A-2-4	0	100	100	80-90	5-25	---	NP
	11-30	Fine sand, sand	SP, SP-SM	A-3	0	100	100	80-90	2-10	---	NP
	30-80	Sandy loam, fine sandy loam, sandy clay loam.	SM-SC, SC	A-2-4, A-2-6	0	100	100	85-95	20-35	20-30	7-16
63--------------- Placid	0-12	Fine sand--------	SP, SP-SM, SM	A-3, A-2-4	0	100	100	90-100	1-20	---	NP
	12-80	Fine sand, sand, loamy fine sand.	SP, SP-SM, SM	A-3, A-2-4	0	100	100	90-100	1-20	---	NP

See footnote at end of table.

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	
64 Ellzey	0-12	Fine sand	SP-SM	A-3	0	100	100	85-98	5-10	---	NP
	12-37	Fine sand, sand	SP, SP-SM	A-3	0	100	100	90-100	2-8	---	NP
	37-58	Loamy fine sand, loamy sand.	SP-SM, SM	A-2-4	0	100	100	95-100	10-30	---	NP
	58-80	Fine sand, sand	SP, SP-SM	A-3	0	100	100	90-98	2-8	---	NP
65 Riviera	0-28	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	4-12	---	NP
	28-40	Sandy loam, sandy clay loam.	SM, SM-SC, SC	A-2-4	0	100	100	80-100	15-35	<35	NP-15
	40-65	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
	65-80	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
66 Terra Ceia	0-80	Muck	PT	A-8	---	---	---	---	---	---	---
67 Tisonia	0-18	Mucky peat	PT	A-8	0	---	---	---	---	---	---
	18-65	Clay	CH	A-7	0	100	100	95-100	90-100	80-95	50-60
68 Winder	0-10	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	10-14	Loamy sand, sandy loam, fine sandy loam.	SM	A-2-4	0	100	100	80-100	15-25	<35	NP-10
	14-56	Sandy clay loam	SC	A-2-4, A-2-6	0	100	100	80-100	18-35	20-40	9-26
	56-80	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
69 Bakersville	0-5	Muck	PT	---	0	---	---	---	---	---	NP
	5-41	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-17	---	NP
	41-59	Sandy loam, fine sandy loam.	SM, SM-SC	A-2-4	0	100	100	90-100	15-25	<20	NP-7
	59-86	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	85-95	5-15	---	NP

* See description of the map unit for composition and behavior characteristics of the map unit.

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	Salinity	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH	Mmhos/cm				Pct
1-----------------	0-8	2-8	1.37-1.44	6.0-20	0.05-0.10	4.5-7.8	<2	0.10	5	2	<1
Adamsville	8-80	1-7	1.49-1.58	6.0-20	0.03-0.08	4.5-7.8	<2	0.10			
2-----------------	0-80	1-3	1.45-1.60	>20	0.02-0.05	4.5-6.5	<2	0.10	5	2	<.5
Astatula											
3-----------------	0-23	<2	1.36-1.44	6.0-20	0.02-0.05	3.6-6.5	<2	0.10	5	2	1-2
Myakka	23-53	2-8	1.47-1.59	0.6-6.0	0.10-0.15	3.6-6.5	<2	0.15			
	53-80	<2	1.48-1.61	6.0-20	0.02-0.05	3.6-6.5	<2	0.10			
4-----------------	0-17	<2	1.36-1.44	6.0-20	0.02-0.05	3.6-6.5	<2	0.10	5	2	1-2
Myakka	17-31	2-8	1.47-1.59	0.6-6.0	0.10-0.15	3.6-6.5	<2	0.15			
	31-80	<2	1.48-1.61	6.0-20	0.02-0.05	3.6-6.5	<2	0.10			
5-----------------	0-13	1-4	1.30-1.50	6.0-20	0.10-0.15	3.6-5.5	<2	0.10	5	2	2-4
St. Johns	13-25	1-3	1.50-1.70	6.0-20	0.03-0.08	3.6-5.5	<2	0.10			
	25-50	2-6	1.50-1.58	0.2-2.0	0.10-0.30	3.6-5.5	<2	0.15			
	50-80	1-4	1.50-1.65	6.0-20	0.03-0.08	3.6-5.5	<2	0.10			
6-----------------	0-7	.5-4	1.25-1.45	6.0-20	0.05-0.10	3.6-6.0	<2	0.10	5	2	.5-2
Tavares	7-80	.5-4	1.40-1.65	6.0-20	0.02-0.05	4.5-6.0	<2	0.10			
7-----------------	0-8	1-5	1.20-1.50	6.0-20	0.05-0.10	3.6-6.0	<2	0.10	5	2	1-2
Immokalee	8-40	1-5	1.45-1.70	6.0-20	0.02-0.05	3.6-6.0	<2	0.10			
	40-64	2-7	1.30-1.60	0.6-2.0	0.10-0.25	3.6-6.0	<2	0.15			
	64-80	1-5	1.40-1.60	6.0-20	0.02-0.05	3.6-6.0	<2	0.10			
8-----------------	0-5	1-5	1.40-1.55	6.0-20	0.10-0.15	4.5-7.3	<2	0.10	5	2	.5-1
Zolfo	5-66	1-5	1.50-1.60	6.0-20	0.03-0.10	4.5-7.3	<2	0.10			
	66-80	1-5	1.50-1.70	0.6-2.0	0.10-0.25	3.6-6.5	<2	0.15			
9-----------------	0-6	1-6	1.20-1.50	6.0-20	0.05-0.10	3.6-5.5	<2	0.10	5	2	1-2
Pomona	6-21	1-6	1.45-1.70	6.0-20	0.03-0.08	3.6-5.5	<2	0.10			
	21-31	2-7	1.30-1.60	0.6-2.0	0.10-0.15	3.6-5.5	<2	0.15			
	31-47	1-6	1.40-1.60	6.0-20	0.03-0.08	3.6-5.5	<2	0.10			
	47-63	16-36	1.50-1.70	0.2-0.6	0.13-0.17	3.6-5.5	<2	0.20			
	63-80	1-6	1.45-1.70	6.0-20	0.03-0.08	3.6-5.5	<2	0.10			
11----------------	0-14	1-6	1.35-1.45	6.0-20	0.03-0.07	3.6-7.3	<2	0.10	5	2	1-5
Smyrna	14-21	3-8	1.35-1.45	0.6-6.0	0.10-0.15	3.6-7.3	<2	0.15			
	21-32	1-6	1.50-1.65	6.0-20	0.03-0.07	4.5-5.5	<2	0.10			
	32-45	3-8	1.35-1.45	0.6-6.0	0.10-0.15	3.6-7.3	<2	0.15			
	45-80	1-6	1.35-1.45	6.0-20	0.13-0.07	3.6-7.3	<2	0.10			
12----------------	0-8	1-7	1.40-1.55	6.0-20	0.10-0.15	3.6-6.0	<2	0.10	5	2	1-5
Ona	8-25	3-8	1.50-1.65	0.6-2.0	0.10-0.15	3.6-6.0	<2	0.15			
	25-80	1-4	1.50-1.65	6.0-20	0.03-0.08	3.6-6.0	<2	0.10			
13----------------	0-10	1-4	1.30-1.50	6.0-20	0.10-0.15	3.6-5.5	<2	0.10	5	2	2-4
St. Johns	10-15	1-3	1.50-1.70	6.0-20	0.03-0.08	3.6-5.5	<2	0.10			
	15-28	2-6	1.50-1.58	0.2-2.0	0.10-0.30	3.6-5.5	<2	0.15			
	28-42	1-4	1.50-1.65	6.0-20	0.03-0.08	3.6-5.5	<2	0.10			
	42-66	2-6	1.50-1.58	0.2-2.0	0.10-0.30	3.6-5.5	<2	0.15			
	66-80	1-4	1.50-1.65	6.0-20	0.03-0.08	3.6-5.5	<2	0.10			
14----------------	0-18	1-4	1.30-1.55	6.0-20	0.03-0.07	4.5-6.0	<2	0.10	5	2	<1
Cassia	18-32	2-10	1.30-1.55	0.6-6.0	0.10-0.15	4.5-6.0	<2	0.15			
	32-75	1-5	1.40-1.60	6.0-20	0.03-0.07	4.5-6.0	<2	0.10			
	75-80	2-10	1.30-1.55	0.6-6.0	0.10-0.15	4.5-6.0	<2	0.15			
15----------------	0-45	<2	1.35-1.65	>20	0.02-0.05	4.5-6.0	<2	0.10	5	1	<1
Pomello	45-57	<2	1.45-1.60	2.0-6.0	0.10-0.30	4.5-6.0	<2	0.15			
	57-80	<2	1.35-1.65	6.0-20	0.02-0.05	4.5-6.0	<2	0.10			
16----------------	0-18	<1	1.35-1.55	>20	0.02-0.08	3.6-6.0	<2	0.10	5	2	<1
Orsino	18-80	<2	1.35-1.55	>20	0.02-0.08	3.6-6.0	<2	0.10			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	G/cm^3	In/hr	In/in	pH	Mmhos/cm				Pct
18---------------- Floridana	0-18	3-10	1.40-1.49	6.0-20	0.10-0.20	4.5-8.4	<2	0.10	5	2	6-15
	18-28	1-7	1.52-1.58	6.0-20	0.05-0.10	4.5-8.4	<2	0.10			
	28-80	15-30	1.60-1.69	<0.2	0.10-0.20	4.5-8.4	<2	0.24			
19---------------- Pompano	0-80	<5	1.30-1.65	>20	0.02-0.05	4.5-7.8	<2	0.10	5	2	1-5
21---------------- Wabasso	0-25	<5	1.25-1.55	6.0-20	0.02-0.05	4.5-6.5	<2	0.10	5	2	1-4
	25-32	1-12	1.50-1.75	0.6-2.0	0.10-0.15	4.5-7.3	<2	0.15			
	32-45	12-30	1.60-1.80	<0.2	0.10-0.15	5.1-8.4	<2	0.24			
	45-80	2-12	1.40-1.70	6.0-20	0.05-0.10	7.4-8.4	<2	0.10			
22---------------- Manatee	0-13	10-20	1.25-1.45	0.6-2.0	0.15-0.25	5.6-8.4	<2	0.10	5	3	4-15
	13-34	10-20	1.50-1.65	0.6-2.0	0.10-0.15	6.6-7.8	<2	0.24			
	34-52	6-20	1.55-1.70	0.6-2.0	0.08-0.15	7.4-8.4	<2	0.24			
	52-80	6-20	1.55-1.70	0.6-2.0	0.08-0.15	7.4-8.4	<2	0.24			
23---------------- Paola	0-17	<2	1.45-1.60	>20	0.02-0.05	3.6-7.3	<2	0.10	5	1	<.5
	17-80	<3	1.45-1.60	>20	0.02-0.05	3.6-7.3	<2	0.10			
24---------------- Pellicer	0-10	30-40	0.60-1.00	0.06-0.2	0.20-0.30	6.1-8.4	>16	0.32	5	4	15-25
	10-70	35-60	0.50-1.00	<0.06	0.15-0.20	6.1-8.4	>16	0.24			
	70-80	5-20	1.30-1.50	6.0-20	0.05-0.10	6.1-8.4	>16	0.24			
25---------------- Parkwood	0-10	10-18	1.00-1.40	6.0-20.0	0.15-0.26	6.6-8.4	<2	0.10	5	3	4-18
	10-55	15-22	1.30-1.55	0.06-0.6	0.10-0.20	7.4-8.4	<2	0.15			
	55-80	3-13	1.45-1.60	6.0-20	0.05-0.22	7.4-8.4	<2	0.10			
26---------------- Samsula	0-31	---	0.25-0.50	6.0-20	0.20-0.25	4.5-5.5	<2	----	---	2	>20
	31-80	1-14	1.35-1.55	6.0-20	0.02-0.05	3.6-5.5	<2	0.17			
27---------------- St. Augustine	0-10	<2	1.30-1.40	6.0-20	0.02-0.05	6.1-8.4	<2	0.10	5	2	1-3
	10-80	4-12	1.40-1.55	2.0-20	0.05-0.10	6.1-8.4	<2	0.15			
28*. Beaches											
29---------------- Satellite	0-6	1-3	1.10-1.45	>20	0.02-0.10	4.5-7.8	<2	0.10	5	2	.5-2
	6-80	.5-2	1.35-1.55	>20	0.02-0.05	4.5-7.8	<2	0.10			
30---------------- Wesconnett	0-8	1-7	1.10-1.40	6.0-20	0.10-0.15	3.6-6.5	<2	0.10	5	2	2-8
	8-34	3-8	1.30-1.55	0.6-6.0	0.10-0.15	3.6-6.5	<2	0.15			
	34-45	2-7	1.35-1.50	6.0-20	0.05-0.08	3.6-6.5	<2	0.10			
	45-80	2-8	1.40-1.65	0.6-6.0	0.10-0.15	3.6-6.5	<2	0.15			
31:* Fripp------------	0-5	<5	1.30-1.70	6.0-20	0.02-0.08	5.1-7.8	<2	0.10	5	1	<1
	5-80	<5	1.30-1.70	6.0-20	0.01-0.03	5.6-7.8	<2	0.10			
Satellite--------	0-6	1-3	1.10-1.45	>20	0.02-0.10	4.5-7.8	<2	0.10	5	2	.5-2
	6-80	.5-2	1.35-1.55	>20	0.02-0.05	4.5-7.8	<2	0.10			
32---------------- Palm Beach	0-80	>2	1.25-1.50	>20	0.02-0.05	7.4-8.4	<2	0.10	5	1	>.5
33---------------- Jonathan	0-4	<0-3	1.30-1.55	6.0-20	0.05-0.08	4.5-5.5	<2	0.10	5	2	1-2
	4-71	<0-3	1.40-1.70	6.0-20	0.01-0.05	5.1-6.0	<2	0.24			
	71-80	1-8	1.55-1.75	<0.2	0.10-0.15	3.6-5.0	<2	0.28			
34---------------- Tocoi	0-13	<5	1.35-1.45	6.0-20	0.02-0.10	3.6-7.3	<2	0.10	5	2	1-3
	13-23	2-13	1.45-1.60	2.0-20	0.05-0.15	3.6-5.5	<2	0.15			
	23-45	<5	1.35-1.50	6.0-20	0.02-0.10	3.6-5.5	<2	0.10			
	45-76	8-13	1.50-1.60	2.0-6.0	0.10-0.20	3.6-5.5	<2	0.15			
	76-80	2-13	1.40-1.60	0.6-20	0.05-0.15	3.6-5.5	<2	0.15			
35---------------- Hontoon	0-55	---	0.22-0.38	6.0-20	0.20-0.25	4.5-5.5	<2	----	---	2	>75
	55-80	1-5	1.30-1.55	6.0-20	0.15-0.20	4.5-5.5	<2	0.15			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH	Mmhos/cm				Pct
36	0-23	1-6	1.40-1.65	6.0-20	0.05-0.08	4.5-7.3	<2	0.10	4	2	.1-2
Riviera	23-28	12-25	1.50-1.70	<0.2	0.10-0.14	6.1-8.4	<2	0.24			
	28-71	15-25	1.50-1.70	<0.2	0.12-0.15	6.1-8.4	<2	0.24			
	71-80	1-8	1.40-1.65	0.6-6.0	0.05-0.08	7.9-8.4	<2	0.15			
38:*											
Pits											
40	0-60	<5	1.20-1.45	6.0-20	0.03-0.07	4.5-6.5	<2	0.10	5	2	<2
Pottsburg	60-80	2-6	1.30-1.50	0.6-2.0	0.07-0.10	4.5-6.0	<2	0.15			
41	0-21	>5	0.25-0.30	6.0-20	0.30-0.50	3.6-4.4	<2	----	---	2	>30
Tomoka	21-80	15-30	1.60-1.70	0.6-6.0	0.10-0.15	3.6-4.4	<2	0.28			
42	0-3	---	0.25-0.50	6.0-20	0.20-0.25	3.6-6.0	<2	---	---	2	>20
Bluff	3-9	20-40	0.65-1.25	0.2-0.6	0.18-0.20	5.6-7.3	<2	0.28	5		
	9-25	20-40	1.30-1.50	0.06-0.2	0.12-0.17	6.1-8.4	<2	0.28			
	25-53	20-40	1.30-1.50	0.06-0.2	0.12-0.17	6.1-8.4	<2	0.28			
	53-80	20-40	1.30-1.50	0.06-0.2	0.12-0.17	7.4-8.4	<2	0.28			
44	0-3	1-5	1.20-1.50	6.0-20	0.08-0.12	4.5-6.5	<2	0.10	5	2	1-3
Sparr	3-68	1-5	1.55-1.70	6.0-20	0.05-0.08	4.5-6.5	<2	0.20			
	68-80	15-32	1.55-1.70	0.6-2.0	0.11-0.15	4.5-6.5	<2	0.24			
45	0-21	1-6	1.30-1.40	6.0-20	0.02-0.05	6.1-8.4	<2	0.10	5	2	1-3
St. Augustine	21-48	4-12	1.40-1.55	2.0-20	0.05-0.10	6.1-8.4	<2	0.15			
	48-53	15-20	1.40-1.60	0.2-0.6	0.10-0.20	6.1-8.4	>16	0.20			
	53-80	60-85	1.60-1.70	<0.06	0.15-0.20	6.1-8.4	>16	0.32			
46	0-53	1-7	1.35-1.60	6.0-20	0.07-0.10	5.1-7.3	<2	0.10	5	2	1-4
Holopaw	53-72	13-28	1.60-1.70	0.2-2.0	0.15-0.20	5.1-8.4	<2	0.20			
	72-80	7-13	1.50-1.60	6.0-20	0.05-0.10	5.1-8.4	<2	0.15			
47	0-50	2-5	1.20-1.60	6.0-20	0.03-0.07	5.1-7.3	<2	0.10	5	2	1-4
Holopaw	50-68	16-24	1.50-1.70	0.6-2.0	0.10-0.15	5.1-8.4	<2	0.24			
	68-80	6-12	1.20-1.60	6.0-20	0.05-0.10	4.5-8.4	<2	0.15			
48	0-11	1-6	1.40-1.65	6.0-20	0.03-0.08	5.6-7.8	<2	0.10	5	2	.1-2
Winder	11-16	10-18	1.45-1.65	0.2-0.6	0.06-0.10	6.1-7.8	<2	0.20			
	16-42	20-30	1.60-1.70	<0.2	0.10-0.15	6.6-8.4	<2	0.24			
	42-80	15-30	1.50-1.70	<0.2	0.06-0.12	7.4-8.4	<2	0.24			
49	0-22	<2	1.40-1.55	>20.0	0.02-0.05	6.1-8.4	>16	0.10	5	---	1-2
Moultrie	22-29	2-8	1.45-1.60	2.0-20	0.10-0.15	4.5-6.5	>16	0.10			
	29-80	<2	1.45-1.55	>20.0	0.02-0.05	4.5-6.5	>16	0.10			
50	0-3	1-5	1.40-1.50	>20	0.03-0.10	3.6-6.0	<2	0.10	5	2	.5-1
Narcoossee	3-11	1-5	1.40-1.60	>20	0.02-0.05	3.6-6.0	<2	0.10			
	11-14	2-6	1.45-1.60	>20	0.05-0.10	5.1-6.5	<2	0.10			
	14-80	1-5	1.40-1.50	6.0->20	0.05-0.10	6.6-8.4	<2	0.10			
51:*											
St. Augustine	0-10	<2	1.30-1.40	6.0-20	0.02-0.05	6.1-8.4	<2	0.10	5	2	1-3
	10-80	4-12	1.40-1.55	2.0-20	0.05-0.10	6.1-8.4	<2	0.15			
Urban land.											
52	0-59	---	0.20-0.50	6.0-20	0.20-0.25	3.6-7.3	>16	----	---	---	40-65
Durbin	59-80	2-5	1.30-1.45	6.0-20	0.10-0.15	3.6-8.4	>16	0.10			
53:*											
Immokalee	0-6	1-5	1.20-1.50	6.0-20	0.05-0.10	3.6-6.0	<2	0.10	5	2	1-2
	6-42	1-5	1.45-1.70	6.0-20	0.02-0.05	3.6-6.0	<2	0.10			
	42-66	2-7	1.30-1.60	0.6-2.0	0.10-0.25	3.6-6.0	<2	0.15			
	66-80	1-5	1.40-1.60	6.0-20	0.02-0.05	3.6-6.0	<2	0.10			
Urban land.											

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH	Mmhos/cm				Pct
54:*											
Astatula--------	0-80	1-3	1.45-1.60	>20	0.02-0.05	4.5-6.5	<2	0.10	5	2	<.5
Urban land.											
55*.											
Arents											
57---------------- Adamsville Variant	0-10	2-8	1.05-1.44	>20	0.10-0.15	6.1-8.4	<2	0.10	5	2	2-4
	10-80	1-5	1.30-1.58	6.0-20	0.05-0.10	6.6-8.4	<2	0.10			
58---------------- EauGallie	0-17	<5	1.25-1.50	6.0-20	0.02-0.07	4.5-6.0	<2	0.10	5	2	2-8
	17-23	1-8	1.45-1.60	0.6-6.0	0.15-0.25	4.5-6.5	<2	0.15			
	23-53	1-5	1.45-1.65	6.0-20	0.02-0.05	5.1-7.8	<2	0.10			
	53-58	13-31	1.55-1.70	0.06-2.0	0.10-0.20	5.1-7.8	<2	0.20			
	58-80	1-13	1.45-1.55	0.6-6.0	0.05-0.15	5.1-7.8	<2	0.15			
61---------------- Riviera	0-25	1-6	1.40-1.65	6.0-20	0.05-0.08	4.5-7.3	<2	0.10	4	2	.1-2
	25-35	12-25	1.50-1.70	<0.2	0.10-0.14	6.1-8.4	<2	0.24			
	35-55	15-25	1.50-1.70	<0.2	0.12-0.15	6.1-8.4	<2	0.24			
	55-80	1-8	1.40-1.65	0.6-6.0	0.05-0.08	7.9-8.4	<2	0.15			
62---------------- Floridana	0-11	3-10	1.40-1.49	6.0-20	0.10-0.20	4.5-8.4	<2	0.10	5	2	6-15
	11-30	1-7	1.52-1.58	6.0-20	0.05-0.10	4.5-8.4	<2	0.10			
	30-80	15-30	1.60-1.69	<0.2	0.10-0.20	4.5-8.4	<2	0.24			
63---------------- Placid	0-12	<10	1.20-1.40	6.0-20	0.15-0.20	3.6-5.5	<2	0.10	5	2	2-10
	12-80	<10	1.30-1.60	6.0-20	0.05-0.08	3.6-6.5	<2	0.10			
64---------------- Ellzey	0-12	1-5	1.35-1.45	2.0-6.0	0.10-0.20	5.6-7.3	<2	0.10	5	2	2-6
	12-37	2-6	1.35-1.50	2.0-6.0	0.10-0.15	5.6-7.3	<2	0.10			
	37-58	8-14	1.50-1.60	0.6-2.0	0.15-0.20	4.5-7.3	<2	0.17			
	58-80	2-7	1.40-1.60	2.0-6.0	0.10-0.15	4.5-7.3	<2	0.10			
65---------------- Riviera	0-28	1-6	1.40-1.65	6.0-20	0.05-0.08	4.5-7.3	<2	0.10	4	2	.1-2
	28-40	12-25	1.50-1.70	<0.2	0.10-0.14	6.1-8.4	<2	0.24			
	40-65	15-25	1.50-1.70	<0.2	0.12-0.15	6.1-8.4	<2	0.24			
	65-80	1-8	1.40-1.65	0.6-6.0	0.05-0.08	7.9-8.4	<2	0.15			
66---------------- Terra Ceia	0-80	---	0.15-0.35	6.0-20	0.30-0.50	5.6-8.4	<2	----	---	2	>60
67---------------- Tisonia	0-18	---	0.20-0.50	6.0-20	0.25-0.35	6.1-7.8	>16	----	5	2	40-65
	18-65	60-85	1.25-1.55	<0.06	0.15-0.20	6.1-7.8	>16	0.20			
68---------------- Winder	0-10	1-6	1.40-1.65	6.0-20	0.03-0.08	5.6-7.8	<2	0.10	5	2	.1-2
	10-14	10-18	1.45-1.65	0.2-0.6	0.06-0.10	6.1-7.8	<2	0.20			
	14-56	20-30	1.60-1.70	<0.2	0.10-0.15	6.6-8.4	<2	0.32			
	56-80	15-30	1.50-1.70	<0.2	0.06-0.12	7.4-8.4	<2	0.32			
69---------------- Bakersville	0-5	0-8	0.20-0.55	6.0-20	0.20-0.25	4.5-5.5	<2	----	---	---	---
	5-41	1-10	1.40-1.65	2.0-6.0	0.10-0.20	4.5-5.5	<2	0.10			
	41-59	10-18	1.60-1.70	0.6-2.0	0.10-0.20	4.5-5.5	<2	0.15			
	59-86	1-10	1.40-1.65	2.0-6.0	0.05-0.15	4.5-5.5	<2	0.10			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief" and "apparent" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth*	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
1: Adamsville	C	None	---	---	2.0-3.5	Apparent	Jun-Nov	---	---	Low	Moderate.
2: Astatula	A	None	---	---	>6.0	---	---	---	---	Low	High.
3: Myakka	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	---	---	High	High.
4: Myakka	D	None	---	---	+2-1.0	Apparent	Jun-Feb	---	---	High	High.
5: St. Johns	D	None	---	---	+2-1.0	Apparent	Jun-Apr	---	---	High	High.
6: Tavares	A	None	---	---	3.5-6.0	Apparent	Jun-Dec	---	---	Low	High.
7: Immokalee	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	---	---	High	High.
8: Zolfo	C	None	---	---	2.0-3.5	Apparent	Jun-Nov	---	---	Low	Moderate.
9: Pomona	B/D	None	---	---	0-1.0	Apparent	Jul-Sep	---	---	High	High.
11: Smyrna	A/D	None	---	---	0-1.0	Apparent	Jul-Oct	---	---	High	High.
12: Ona	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	---	---	High	High.
13: St. Johns	B/D	None	---	---	0-1.0	Apparent	Jun-Apr	---	---	High	High.
14: Cassia	C	None	---	---	1.5-3.5	Apparent	Jul-Jan	---	---	Moderate	High.
15: Pomello	C	None	---	---	2.0-3.5	Apparent	Jul-Nov	---	---	Low	High.
16: Orsino	A	None	---	---	3.5-5.0	Apparent	Jun-Dec	---	---	Low	Moderate.
18: Floridana	D	Frequent	Very long	Jul-Sep	0-1.0	Apparent	Jun-Feb	---	---	Moderate	Low.
19: Pompano	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	---	---	High	Moderate.
21: Wabasso	B/D	None	---	---	0-1.0	Apparent	Jun-Oct	---	---	Moderate	High.
22: Manatee	D	Frequent	Very long	Jun-Feb	0-1.0	Apparent	Jun-Feb	---	---	High	Low.
23: Paola	A	None	---	---	>6.0	---	---	---	---	Low	High.
24: Pellicer	D	Frequent	Very long	Jan-Dec	0-0.5	Apparent	Jan-Dec	---	---	High	High.
25: Parkwood	B/D	Frequent	Brief to very long.	Jul-Nov	0-1.0	Apparent	Jun-Oct	---	---	High	Low.

See footnotes at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth*	Kind	Months	Ini-tial	Total	Uncoated steel	Concrete
					Ft			In	In		
26 Samsula	B/D	None	---	---	+2-1.0	Apparent	Jan-Dec	16-20	30-36	High	High.
27 St. Augustine	C	Rare	---	---	1.5-3.0	Apparent	Jul-Oct	---	---	High	High.
28.** Beaches											
29 Satellite	A	None	---	---	1.0-3.5	Apparent	Jun-Nov	---	---	Low	Moderate.
30 Wesconnett	D	Frequent	Very long	Jun-Feb	0-1.0	Apparent	Jun-Feb	---	---	Moderate	High.
31:**											
Fripp	A	None	---	---	>6.0	---	---	---	---	Low	Low.
Satellite	A	None	---	---	1.0-3.5	Apparent	Jun-Nov	---	---	Low	Moderate.
32 Palm Beach	A	None	---	---	>6.0	---	---	---	---	Low	Low.
33 Jonathan	B	None	---	---	3.0-5.0	Apparent	Jun-Oct	---	---	Low	High.
34 Tocoi	B/D	None	---	---	0-1.0	Apparent	Aug-Feb	---	---	High	High.
35 Hontoon	B/D	None	---	---	+2-1.0	Apparent	Jan-Dec	16-24	>52	High	High.
36 Riviera	C/D	Frequent	Brief	Jul-Oct	0-1.0	Apparent	Jun-Dec	---	---	High	High.
38.** Pits											
40 Pottsburg	B/D	None	---	---	0-1.0	Apparent	Jul-Mar	---	---	High	High.
41 Tomoka	B/D	None	---	---	+1-0	Apparent	Jun-Apr	---	24	High	High.
42 Bluff	D	Frequent	Long	Jun-Nov	0-1.0	Apparent	Jul-Dec	---	---	High	Low.
44 Sparr	C	None	---	---	1.5-3.5	Apparent	Jul-Oct	---	---	Moderate	High.
45 St. Augustine	C	Rare	---	---	1.5-3.0	Apparent	Jul-Oct	---	---	High	High.
46 Holopaw	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	---	---	High	Moderate.
47 Holopaw	D	Frequent	Very long	Jun-Feb	0-1.0	Apparent	Jun-Feb	---	---	High	High.
48 Winder	B/D	Frequent	Long	Jul-Oct	0-1.0	Apparent	Jun-Dec	---	---	High	Low.
49 Moultrie	D	Frequent	Very long	Jan-Dec	0-1.0	Apparent	Jan-Dec	---	---	High	High.
50 Narcoossee	C	None	---	---	2.0-3.5	Apparent	Jun-Nov	---	---	Moderate	Low.
51:**											
St. Augustine	C	Rare	---	---	1.5-3.0	Apparent	Jul-Oct	---	---	High	High.

See footnotes at end of table.

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		
51:** Urban land.											
52---------------- Durbin	D	Frequent----	Very long	Jan-Dec	0-0.5	Apparent	Jan-Dec	12-14	15-24	High-----	High.
53:** Immokalee--------	B/D	None--------	---	---	0-1.0	Apparent	Jun-Nov	---	---	High-----	High.
Urban land.											
54:** Astatula---------	A	None--------	---	---	>6.0	---	---	---	---	Low------	High.
Urban land.											
55.** Arents											
57---------------- Adamsville Variant	C	None--------	---	---	2.0-3.5	Apparent	Jun-Nov	---	---	High-----	Low.
58---------------- EauGallie	B/D	None--------	---	---	0-1.0	Apparent	Jun-Oct	---	---	High-----	Moderate.
61---------------- Riviera	D	None--------	---	---	+2-1.0	Apparent	Jun-Dec	---	---	High-----	High.
62---------------- Floridana	D	None--------	---	---	0-1.0	Apparent	Jun-Feb	---	---	Moderate	Low.
63---------------- Placid	B/D	None--------	---	---	0-1.0	Apparent	Jun-Mar	---	---	High-----	High.
64---------------- Ellzey	B/D	None--------	---	---	0-1.0	Apparent	Jun-Oct	---	---	High-----	High.
65---------------- Riviera	C/D	None--------	Brief-----	Dec-Apr	0-1.0	Apparent	Jun-Dec	---	---	High-----	High.
66---------------- Terra Ceia	B/D	Frequent----	Long------	Jun-Nov	0-1.0	Apparent	Jan-Dec	---	---	Moderate	Moderate.
67---------------- Tisonia	D	Frequent----	Very long	Jan-Dec	0-0.5	Apparent	Jan-Dec	16-18	16-25	High-----	High.
68---------------- Winder	B/D	None--------	---	---	0-1.0	Apparent	Jun-Dec	---	---	High-----	Low.
69---------------- Bakersville	D	None--------	---	---	+2-1.0	Apparent	Jul-Mar	2-3	4-5	High-----	High.

* The plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

**See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--WATER TABLE DEPTHS

[Monthly readings based on the average of two readings taken on the first and middle of the month]

Soil Series	Year	January	February	March	April	May	June	July	August	September	October	November	December
		In	In	In	In	In	In	In	In	In	In	In	In
Ellzey:	1977	-	10	8	20	40	43	52	55	50	52	51	31
	1978	15	5	4	16	25	29	26	5	24	32	39	48
	1979	31	11	14	25	15	15	8	9	2	9	16	15
	1980	7	3	+1	7	18	12	15	20	21	-	-	-
Immokalee:	1977	2	16	17	34	42	54	55	59	59	55	61	41
	1978	36	27	10	17	26	28	23	2	11	13	17	22
	1979	15	0	1	6	0	0	0	3	2	13	24	13
	1980	5	0	0	11	22	23	17	12	3	-	-	-
Myakka:	1977	10	20	22	32	36	47	54	65	53	64	61	44
	1978	22	11	12	24	31	41	43	14	34	35	47	55
	1979	27	21	15	27	12	15	21	39	9	12	17	15
	1980	8	7	9	14	24	33	35	38	39	-	-	-
Narcoossee:	1977	-	-	-	-	-	35	44	42	35	39	34	23
	1978	30	44	30	40	39	46	40	33	41	37	26	26
	1979	16	24	30	40	28	34	27	39	22	17	23	24
	1980	20	15	17	16	39	41	43	45	44	49	47	48
Ona:	1977	-	25	25	47	51	55	59	65	55	60	76	69
	1978	54	30	25	34	27	43	33	25	24	27	39	39
	1979	20	14	21	31	17	23	11	9	10	8	16	17
	1980	16	9	11	-	-	-	-	-	-	-	-	-
Pomona:	1977	-	17	21	33	37	37	49	54	41	47	50	31
	1978	13	15	9	20	13	31	17	8	17	43	49	54
	1979	32	18	11	24	19	17	11	13	8	11	17	16
	1980	11	9	11	8	-	-	-	-	-	-	-	-
Riviera:	1977	-	-	-	-	-	32	49	55	51	45	27	5
	1978	0	3	0	11	11	35	30	20	41	54	64	61
	1979	5	4	10	20	15	25	21	17	+1	2	15	+2
	1980	7	11	2	5	16	23	33	37	41	-	-	-
Smyrna:	1977	-	17	21	38	46	60	63	65	67	71	74	69
	1978	49	25	18	29	18	37	37	21	38	43	53	57
	1979	22	13	10	27	13	20	7	10	10	11	25	26
	1980	15	9	5	10	18	22	29	31	37	-	-	-
Sparr:	1977	-	-	-	-	-	-	-	-	-	-	-	-
	1978	-	-	-	-	50	54	57	43	48	53	65	68
	1979	59	45	42	48	39	25	45	31	20	18	27	23
	1980	26	25	22	19	27	36	37	27	-	-	-	-
St. Johns:	1977	10	15	13	31	42	45	45	44	30	44	53	31
	1978	9	5	8	23	19	38	38	25	45	55	59	57
	1979	31	10	15	25	15	15	19	5	7	9	14	13
	1980	9	9	7	11	18	31	32	23	27	-	-	-
Tavares:	1977	-	-	-	-	-	-	-	-	-	-	-	-
	1978	-	-	77	78	75	75	75	71	75	74	73	71
	1979	75	75	77	78	70	77	80	80	66	56	70	64
	1980	54	54	55	59	66	69	71	72	72	-	-	-
Zolfo:	1977	-	38	43	51	59	54	60	64	38	50	57	53
	1978	45	45	31	43	38	60	45	33	35	45	59	48
	1979	40	31	34	43	33	33	41	35	17	22	37	33
	1980	27	27	23	-	-	-	-	-	-	-	-	-

TABLE 18.--PHYSICAL ANALYSES OF SELECTED SOILS

Soil name and sample number	Depth	Horizon	Particle-size distribution (Percent less than 2 mm): Sand: Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Total (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Hydraulic conductivity (saturated)	Bulk density (field moisture)	Water content: 1/10 bar	1/3 bar	15 bar
	Cm										Cm/hr	G/cm3	-----Pct (wt)----		
Adamsville fine sand: (S78FL-109-014)	0-20	Ap	0.0	0.1	1.7	87.0	5.5	94.3	2.9	2.8	147.0	1.07	10.9	8.4	2.0
	20-48	C1	0.0	0.0	1.8	86.7	5.4	93.9	3.2	2.9	42.1	1.37	8.4	5.6	1.3
	48-76	C2	0.0	0.1	2.1	88.1	5.1	95.4	2.1	2.5	46.0	1.46	7.0	5.0	0.9
	76-112	C3	0.0	0.1	1.6	89.2	5.4	96.3	2.0	1.7	42.5	1.43	4.7	3.0	0.2
	112-135	C4	0.0	0.1	1.6	86.0	5.2	92.9	2.6	4.5	23.7	1.57	10.8	8.3	1.8
	135-203	C5	0.0	0.1	1.5	87.1	5.3	94.0	1.5	4.5	15.3	1.60	9.3	6.3	0.9
Adamsville Variant fine sand: (S78FL-109-023)	0-25	A1	0.0	0.5	5.4	83.4	2.8	92.6	3.3	4.1	69.6	1.08	15.1	11.4	4.9
	25-58	C1	0.1	0.6	5.6	85.5	2.6	94.4	2.8	2.8	61.7	1.36	7.4	5.3	1.9
	58-89	C2	0.0	0.5	5.3	86.7	2.7	95.2	2.6	2.2	43.1	1.33	8.6	6.2	1.8
	89-117	C3	0.0	0.5	5.5	86.9	2.4	95.3	2.7	2.0	44.9	1.52	6.2	4.0	1.3
	117-170	C4	0.0	0.6	5.7	88.6	2.3	97.2	1.5	1.3	---	---	---	---	---
	170-203	C5	0.0	0.3	3.3	89.3	2.9	95.8	3.0	1.2	---	---	---	---	---
Astatula fine sand: (S78FL-109-011)	0-13	A1	0.0	0.1	3.9	89.8	3.6	97.4	0.6	2.0	108.0	1.19	11.1	8.2	2.5
	13-36	C1	0.0	0.1	3.5	89.7	3.6	96.9	1.3	1.8	86.8	1.32	7.0	5.3	0.7
	36-79	C2	0.0	0.2	4.3	89.4	3.2	97.1	1.1	1.8	84.1	1.40	4.8	3.1	0.5
	79-140	C3	0.0	0.1	3.8	89.8	3.3	97.0	1.1	1.9	76.2	1.34	5.4	3.7	0.5
	140-203	C3	0.0	0.1	3.7	89.6	3.7	97.1	1.4	1.5	72.3	1.37	6.6	4.7	0.3
Bluff sandy clay loam: (S78FL-109-006)	8-0	Oa	---	---	---	---	---	---	---	---	105.9	0.41	184.7	159.3	45.8
	0-15	A1	0.0	0.4	3.7	58.1	3.2	65.4	8.0	26.6	23.1	0.67	90.1	79.3	24.2
	15-33	B21ca	0.0	0.6	3.9	57.0	3.0	64.5	10.9	24.6	0.0	1.43	32.5	30.2	15.2
	33-56	B22gca	0.0	0.4	3.2	45.2	3.6	52.4	20.1	27.5	1.1	1.35	36.7	33.9	20.6
	56-127	B3gca	0.0	0.4	3.6	36.4	3.6	44.0	29.9	26.1	0.7	1.28	37.9	34.9	22.6
	127-203	Cg	0.0	0.7	5.8	74.7	3.0	84.2	4.5	11.3	0.1	1.48	33.5	28.9	16.0
Cassia fine sand: (S78FL-109-029-1)	0-8	A1	0.0	0.5	13.5	80.6	2.5	97.1	1.0	1.9	30.0	1.36	5.0	3.1	1.3
	8-46	A2	0.0	0.7	13.1	81.4	3.0	98.2	1.4	0.4	31.1	1.46	3.9	2.6	1.1
	46-71	B21h	0.0	0.6	14.2	71.6	2.4	88.8	6.7	4.5	7.9	1.37	19.4	15.1	4.4
	71-81	B22h	0.0	0.5	13.8	73.5	2.3	90.1	4.1	5.8	10.8	1.40	18.9	13.6	3.9
	81-190	A'2	0.0	2.5	2.3	77.7	1.9	84.4	13.6	2.0	47.3	1.53	5.7	3.2	0.5
	190-203	B'2h	0.0	7.3	16.1	68.5	2.7	94.6	2.4	3.0	0.6	1.56	19.1	13.6	3.2
Durbin muck: (S78FL-109-019)	0-15	Oa1	---	---	---	---	---	---	---	---	---	---	---	---	---
	15-64	Oa2	---	---	---	---	---	---	---	---	---	---	---	---	---
	64-150	Oa3	---	---	---	---	---	---	---	---	---	---	---	---	---
	150-203	IIC	0.0	0.5	4.6	82.1	2.7	89.9	6.2	3.9	---	---	---	---	---

TABLE 18.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Particle-size distribution (Percent less than 2 mm): Sand: Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Total (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Hydraulic conductivity (saturated)	Bulk density (field moisture)	Water content: 1/10 bar	1/3 bar	15 bar
	Cm										Cm/hr	G/cm3	-----Pct (wt)----		
EauGallie fine sand: (S78FL-109-033)	0-15	Ap	0.0	0.1	3.3	83.6	6.2	93.2	4.6	2.2	16.1	1.40	11.0	6.9	3.3
	15-25	A21	0.0	0.1	3.4	84.8	6.7	95.0	0.8	4.2	10.5	1.49	7.2	3.9	1.5
	25-43	A22	0.0	0.1	2.9	86.1	6.7	95.8	0.4	3.8	20.2	1.44	5.1	3.1	1.1
	43-51	B21h	0.0	0.1	3.1	77.8	6.1	87.1	2.7	10.2	2.2	1.32	26.7	20.6	6.1
	51-58	B22h	0.0	0.1	2.7	81.0	5.6	89.4	2.1	8.5	3.8	1.33	19.5	15.1	5.1
	58-81	B3	0.0	0.2	3.3	82.5	5.5	91.5	1.5	7.0	10.1	1.37	14.3	10.1	3.5
	81-114	A'2	0.0	0.2	2.8	87.5	6.6	97.1	1.6	1.3	27.8	1.52	4.0	2.1	0.7
	114-135	B1g	0.0	0.1	2.8	80.1	5.3	88.3	2.1	9.6	1.3	1.63	15.7	10.5	4.5
	135-147	B2tg	0.0	0.1	2.0	75.7	5.1	82.9	2.5	14.6	1.6	1.61	17.8	12.1	5.9
	147-203	Cg	0.0	0.0	2.0	85.5	6.1	93.6	1.5	4.9	4.2	1.61	9.8	5.0	2.1
Ellzey fine sand: (S78FL-109-034)	0-30	Ap	0.0	0.2	4.2	81.2	8.6	94.2	5.2	0.7	8.9	1.39	15.6	10.8	3.1
	30-48	A21	0.0	0.2	4.1	83.0	7.4	94.7	3.0	2.3	14.8	1.49	9.5	6.5	1.4
	48-68	A22	0.0	0.3	5.3	85.2	7.0	97.8	1.3	0.9	33.2	1.50	5.4	3.2	0.4
	68-76	B11ir	0.0	0.2	4.0	80.8	6.9	91.9	3.9	4.2	7.9	1.61	10.0	5.7	1.9
	76-84	B12ir	0.0	0.2	4.5	81.3	7.3	93.3	2.7	4.0	12.6	1.58	9.3	4.8	1.4
	84-94	B13ir	0.0	0.3	4.7	78.7	6.7	90.4	3.0	6.6	1.8	1.64	15.6	9.4	3.8
	94-104	B21t	0.0	0.2	5.0	73.8	6.5	85.5	3.2	11.3	2.4	1.59	14.9	9.3	4.0
	104-147	B22t	0.0	0.2	3.9	78.0	6.9	89.0	2.2	8.8	1.5	1.57	18.4	11.9	4.7
	147-162	B3	0.0	0.2	5.2	79.7	6.1	91.2	1.8	7.0	2.6	1.54	14.7	10.2	3.1
	162-203	C	0.0	0.3	4.7	81.1	7.0	93.1	1.6	5.3	6.2	1.43	11.5	7.6	2.3
Fripp fine sand: (S78FL-109-027)	0-2	A11	0.0	0.0	0.5	93.4	5.3	99.2	0.0	0.8	---	---	---	---	---
	2-10	A12	0.0	0.0	0.5	93.8	4.2	98.5	1.3	0.2	41.8	1.32	4.9	3.1	1.3
	10-23	C1	0.0	0.1	1.0	94.0	3.6	98.7	0.7	0.6	46.9	1.26	5.2	3.7	1.3
	23-122	C2	0.0	0.2	1.1	94.9	3.2	99.4	0.4	0.2	45.3	1.35	4.3	3.2	1.6
	122-203	C3	0.0	0.2	1.5	95.1	1.9	98.7	1.1	0.2	39.6	1.41	3.2	2.5	1.7
Holopaw fine sand: (S77FL-109-008)	2-0	Oa	---	---	---	---	---	---	---	---	---	---	---	---	---
	0-18	A11	0.0	0.2	3.4	83.4	5.6	92.6	3.9	3.5	12.5	1.53	11.9	8.5	2.5
	18-33	A12	0.0	0.1	2.7	85.8	4.9	93.5	3.7	2.8	14.0	1.55	10.6	7.4	2.1
	33-68	A21g	0.0	0.2	3.5	88.5	4.8	97.0	1.7	1.3	25.2	1.59	6.4	4.0	1.1
	68-107	A22g	0.0	0.1	2.5	82.1	5.6	90.3	3.2	6.5	5.4	1.67	15.8	10.0	3.0
	107-135	A23g	0.0	0.2	2.5	81.1	5.5	89.3	3.7	7.0	0.9	1.65	17.7	12.2	3.2
	135-183	B2tg	0.0	0.1	2.2	74.5	4.3	81.1	5.6	13.3	0.5	1.61	20.3	15.9	6.1
	183-203	Cg	0.0	0.1	4.2	84.5	2.4	91.2	1.8	7.0	---	1.61	---	---	---
Hontoon muck: (S78FL-109-018)	0-18	Oa1	---	---	---	---	---	---	---	---	---	---	---	---	---
	18-41	Oa2	---	---	---	---	---	---	---	---	5.9	0.20	344.3	300.3	43.0
	41-61	Oa3	---	---	---	---	---	---	---	---	2.9	0.24	270.6	228.4	39.3
	61-140	Oa4	---	---	---	---	---	---	---	---	---	---	---	---	---
	140-178	IIC1	0.0	0.2	3.6	83.9	3.5	91.2	5.2	3.6	---	---	---	---	---
	178-203	IIC2	0.0	0.2	3.0	83.8	2.8	89.8	4.5	5.7	---	---	---	---	---

TABLE 18.--PHYSICAL ANALYSES OF SELECTED SOILS-Continued

Soil name and sample number	Depth	Horizon	Particle-size distribution (Percent less than 2 mm): Sand: Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Total (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Hydraulic conductivity (saturated)	Bulk density (field moisture)	Water content: 1/10 bar	1/3 bar	15 bar
	Cm										Cm/hr	G/cm³	-----Pct (wt)----		
Immokalee fine sand: (S78FL-109-028)	0-20	A1	0.0	1.4	13.4	76.1	1.0	91.9	5.5	2.6	99.1	1.01	22.9	17.2	8.1
	20-38	A21	0.0	1.1	10.6	85.1	1.0	97.8	1.9	0.3	32.8	1.46	5.3	3.6	2.2
	38-102	A22	0.0	0.9	8.5	88.0	1.0	98.4	1.3	0.3	34.1	1.52	4.3	3.1	1.3
	102-162	B2h	0.0	0.9	7.1	84.3	0.7	93.0	4.2	2.8	2.4	1.49	21.5	15.1	2.4
	162-203	B3	0.0	0.6	7.3	87.6	0.8	96.3	2.2	1.5	---	---	---	---	---
Jonathan fine sand: (S78FL-109-024)	0-10	A1	0.0	0.2	3.5	93.8	1.7	99.2	0.3	0.4	44.2	1.30	5.0	2.9	2.2
	10-23	A21	0.0	0.2	2.8	94.5	1.6	99.1	0.7	0.2	44.9	1.27	4.2	2.2	1.2
	23-99	A22	0.0	0.2	2.4	94.5	1.7	98.8	1.0	0.2	42.7	1.38	5.5	4.2	1.7
	99-180	A23	0.0	0.1	1.7	95.4	1.6	98.8	1.0	0.2	29.6	1.41	8.7	5.6	2.4
	180-203	B2hm	0.1	0.1	1.2	85.6	1.9	88.9	6.3	4.8	0.3	1.58	23.4	21.5	7.4
Manatee fine sandy loam: (S77FL-109-003)	0-20	A11	0.0	0.5	6.4	59.5	3.4	69.8	10.7	19.5	106.5	0.62	65.2	57.9	23.8
	20-33	A12	0.0	0.6	7.4	68.1	3.4	79.5	9.6	10.9	5.5	1.16	33.4	29.0	11.2
	33-64	B21t	0.0	0.5	8.2	66.7	3.4	78.8	6.0	15.2	1.9	1.64	22.4	21.7	10.7
	64-86	B22tg	0.0	0.6	7.3	61.5	4.0	73.4	6.0	20.6	1.9	1.63	23.5	22.0	13.0
	86-132	B3g	0.0	0.1	5.5	78.0	3.2	86.8	2.6	10.6	2.7	1.61	20.7	17.9	5.7
	132-203	Cg	0.0	0.0	0.2	86.2	9.1	95.5	1.1	3.4	1.1	1.64	16.5	8.2	2.1
Moultrie fine sand: (S77FL-109-005)	0-5	A1	0.1	0.8	8.1	84.6	1.3	94.9	2.2	2.9	---	---	---	---	---
	5-20	A21	0.0	0.8	7.4	82.5	1.7	92.4	3.4	4.2	---	---	---	---	---
	20-56	A22	0.1	0.6	6.3	86.7	1.9	95.6	2.0	2.4	---	---	---	---	---
	56-66	B21h	0.1	0.5	6.8	84.6	2.1	94.1	3.1	2.8	---	---	---	---	---
	66-74	B22h	0.0	0.6	6.9	84.0	1.9	93.4	3.1	3.5	---	---	---	---	---
	74-119	B3	0.0	0.6	6.5	83.6	1.9	92.6	3.2	4.2	---	---	---	---	---
Myakka fine sand: (S78FL-109-030)	0-10	A11	0.0	0.2	4.5	82.2	1.2	87.8	9.5	2.7	78.7	0.97	34.6	27.5	10.0
	10-20	A12	0.0	0.2	3.3	88.8	1.6	93.9	4.2	1.9	44.2	1.30	10.6	8.1	2.3
	20-36	A21	0.0	0.1	3.6	90.7	1.7	96.1	2.4	1.5	31.3	1.42	4.5	3.0	0.9
	36-58	A22	0.0	0.2	3.1	92.1	1.8	97.2	1.2	1.6	26.5	1.50	4.2	2.7	0.6
	58-76	B21h	0.0	0.2	3.4	81.4	1.6	86.6	1.5	4.9	0.5	1.38	33.4	27.6	3.5
	76-135	B22h	0.0	0.1	3.7	86.1	1.0	90.9	3.4	5.7	1.1	1.50	19.8	15.6	5.8
	135-203	B3&Bh	0.1	0.1	3.7	92.7	0.8	97.4	0.4	2.2	8.6	1.54	10.7	7.5	1.5
Narcoossee fine sand, shelly substratum: (S77FL-109-009)	0-8	A1	0.2	2.1	14.1	72.0	3.7	92.1	6.0	1.9	105.5	1.03	12.5	9.4	4.6
	8-28	A2	0.2	2.4	14.3	78.2	3.5	98.6	0.9	0.5	73.6	1.36	4.7	3.9	1.3
	28-30	B21h	0.7	5.3	24.0	62.9	2.0	94.9	3.1	2.0	105.0	1.31	8.4	6.6	1.2
	30-36	B22h	0.4	4.9	28.2	61.4	1.7	96.6	1.7	1.7	125.0	1.28	8.3	6.3	1.1
	36-51	B3	0.1	1.6	16.8	77.4	2.0	97.9	1.1	1.0	91.9	1.29	8.9	6.4	0.8
	51-64	C1	0.2	0.2	5.1	89.9	3.7	99.1	0.4	0.5	58.8	1.36	6.0	3.8	0.9
	64-76	C2	0.0	0.4	7.6	84.6	5.9	98.5	0.9	0.6	53.9	1.40	8.2	5.5	1.5
	76-203	C3	0.1	1.3	7.4	83.9	5.7	98.4	0.9	0.7	41.1	1.46	6.7	4.7	1.8

TABLE 18.--PHYSICAL ANALYSES OF SELECTED SOILS-Continued

Soil name and sample number	Depth	Horizon	Particle-size distribution (Percent less than 2 mm): Sand: Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Total (2.0-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Hydraulic conductivity (saturated)	Bulk density (field moisture)	Water content: 1/10 bar	1/3 bar	15 bar
	Cm										Cm/hr	G/cm3	-----Pct (wt)----		
Orsino fine sand: (S78FL-108-012)	0-10	A1	0.0	0.7	20.8	75.3	1.5	98.3	1.2	0.5	187.0	0.88	17.0	13.5	4.3
	10-46	A2	0.0	0.6	17.6	77.8	2.2	98.2	1.4	0.4	104.0	1.36	3.1	2.0	0.7
	46-74	B21&Bh	0.0	0.6	17.7	74.5	1.8	94.6	2.4	3.0	85.5	1.47	6.3	4.9	1.3
	74-112	B22&Bh	0.0	0.6	18.7	74.9	1.7	95.9	1.7	2.4	84.1	1.42	4.4	3.1	0.6
	150-203	C	0.0	0.6	16.7	79.1	2.3	98.7	0.7	0.6	78.9	1.46	4.3	3.1	0.8
Palm Beach sand: (S78FL-109-013)	0-8	A1	0.6	10.3	41.2	42.6	1.8	96.5	1.8	1.7	145.0	1.36	6.1	4.9	1.7
	8-25	C11	0.3	12.1	42.1	39.1	1.0	94.7	4.1	1.2	250.0	1.36	5.8	5.3	2.1
	25-71	C12	2.1	17.1	48.8	28.8	0.8	97.6	1.3	1.1	256.0	1.32	6.0	5.4	0.7
	71-203	C2	9.6	34.1	36.4	15.8	1.0	96.9	2.0	1.1	---	---	---	---	---
Paola fine sand: (S78FL--109-015)	0-10	A1	0.0	0.1	1.7	95.6	1.7	99.1	0.5	0.4	69.7	1.24	5.4	4.0	1.7
	10-43	A2	0.0	0.1	2.0	94.7	1.7	98.5	1.1	0.4	60.5	1.27	5.8	4.2	0.7
	43-81	B&A	0.0	0.1	1.5	93.7	1.5	96.8	1.4	1.8	57.8	1.32	6.1	4.3	0.8
	81-142	C	0.0	0.1	1.2	94.4	1.7	97.4	0.8	1.8	118.0	1.41	4.6	3.0	0.5
	142-203	C	0.0	0.1	1.4	94.7	1.8	98.0	0.4	1.6	67.0	1.40	6.4	5.0	0.3
Parkwood fine sandy loam: (S77FL-109-004)	0-15	A1	0.0	0.0	0.6	44.4	14.3	59.3	23.1	17.1	27.7	0.61	78.5	68.4	28.8
	15-25	A2	0.0	0.1	2.0	85.3	7.4	94.8	2.8	2.4	19.2	1.46	8.1	5.4	1.5
	25-46	B21tca	0.0	0.2	1.6	68.3	8.3	78.4	6.1	15.5	0.8	1.53	24.7	21.6	10.8
	46-99	B22tca	0.7	1.0	3.2	63.9	10.2	79.0	4.7	16.3	1.0	1.29	34.7	32.1	21.7
	99-140	B23tca	0.0	0.1	1.1	51.5	10.1	62.8	14.9	22.3	0.5	1.40	32.0	28.6	15.8
	140-203	Cg	0.0	0.1	1.2	77.1	8.8	87.2	4.8	8.0	2.6	1.54	20.8	14.7	5.4
Pellicer silty clay loam: (S77FL-109-010)	0-25	A1	0.0	0.0	0.5	0.5	0.2	1.2	42.1	56.7	---	---	---	---	---
	25-140	C1g	0.0	0.3	0.7	19.4	7.1	27.5	31.6	40.9	---	---	---	---	---
	140-178	C2g	0.0	0.5	1.6	51.2	7.3	60.6	33.0	6.1	---	---	---	---	---
	178-203	C3g	0.0	0.8	2.4	64.0	11.4	78.6	10.0	11.4	---	---	---	---	---
Placid fine sand: (S79FL-109-037)	0-30	Ap	0.0	0.2	3.1	88.7	3.2	95.2	3.6	1.2	14.0	1.42	12.3	8.6	2.2
	30-51	C1	0.0	0.1	2.9	90.0	2.7	95.7	2.6	1.7	15.8	1.33	10.7	7.4	3.5
	51-66	C2	0.0	0.1	2.6	90.9	2.9	96.5	2.0	1.5	19.7	1.49	7.3	4.2	1.4
	66-84	C3	0.0	0.1	2.9	90.2	2.4	95.6	2.5	1.9	32.6	1.41	7.6	4.8	1.4
	84-107	C4	0.0	0.1	2.6	89.3	2.6	94.6	2.4	3.0	12.9	1.58	9.5	5.9	2.3
	107-130	C5	0.0	0.1	2.4	87.5	2.8	92.8	1.8	5.4	9.6	1.56	8.1	5.0	1.8
	130-147	C6	0.0	0.1	2.4	84.5	2.6	89.6	2.0	8.4	4.7	1.55	10.7	7.3	4.4
	147-203	C7	0.0	0.1	2.9	86.5	2.2	91.7	1.6	6.7	6.4	1.54	11.0	7.3	3.2

TABLE 18.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Particle-size distribution (Percent less than 2 mm): Sand: Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Total (2.0-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Hydraulic conductivity (saturated)	Bulk density (field moisture)	Water content: 1/10 bar	1/3 bar	15 bar
	Cm										Cm/hr	G/cm³	-----Pct (wt)		----
Pomello fine sand: (S78FL-109-017)	0-10	A1	0.0	0.1	4.4	91.0	1.4	96.9	2.9	0.2	47.3	1.17	13.2	10.4	3.2
	10-48	A21	0.0	0.1	4.3	92.0	1.4	97.8	1.8	0.4	68.4	1.41	3.8	2.8	0.9
	48-89	A22	0.0	0.1	5.0	90.6	1.3	97.0	2.6	0.4	63.1	1.43	4.2	3.1	0.7
	89-102	A23	0.0	0.1	3.9	91.0	1.2	96.2	3.4	0.4	36.2	1.45	5.8	3.8	0.6
	102-114	B1	0.0	0.1	3.7	90.4	1.1	95.3	3.7	1.0	4.9	1.54	8.3	5.9	1.9
	114-130	B21h	0.0	0.1	4.8	85.4	0.8	91.1	5.3	3.6	15.1	1.18	31.8	24.7	4.7
	130-145	B22h	0.0	0.1	4.0	86.0	0.6	90.7	5.2	4.1	11.5	1.44	13.7	10.8	3.2
	145-203	B3&Bh	0.0	0.1	5.5	87.7	0.5	93.8	3.2	3.0	---	---	---	---	---
Pompano fine sand: (S77FL-109-002)	0-10	A1	0.0	0.1	0.7	86.8	2.9	90.5	3.7	5.8	98.1	0.89	25.2	21.5	13.9
	10-71	C1	0.0	0.1	0.5	96.1	2.6	99.3	0.2	0.5	36.8	1.49	3.9	3.2	1.8
	71-81	C2	0.0	0.0	2.4	94.9	2.0	99.3	0.3	0.4	49.9	1.56	5.5	5.0	1.7
	81-203	C3	0.0	0.0	1.5	94.9	2.4	98.8	0.6	0.6	---	---	---	---	---
Pottsburg fine sand: (S77FL-109-007)	0-15	A1	0.0	0.1	2.2	92.8	2.3	97.4	0.8	1.8	62.4	1.12	15.6	11.8	4.6
	15-33	A21	0.0	0.1	2.5	93.5	1.3	97.4	2.1	0.5	46.6	1.35	5.8	4.0	2.4
	33-51	A22	0.0	0.1	1.8	94.6	1.5	98.0	1.6	0.4	44.7	1.36	5.6	4.0	1.9
	51-152	A23	0.0	0.1	1.7	94.2	1.8	97.8	1.7	0.5	41.4	1.51	6.1	4.6	1.5
	152-168	B21h	0.0	0.0	0.7	94.2	2.0	96.9	1.5	1.6	---	---	---	---	---
	168-203	B22h	0.0	0.0	0.9	91.4	1.9	94.2	2.6	3.2	---	---	---	---	---
Riviera fine sand: (S78FL-109-031)	0-25	Ap	0.2	0.3	3.7	76.7	10.1	91.0	5.2	3.8	83.5	1.18	14.0	11.1	4.6
	25-38	A21	0.0	0.4	4.4	78.4	10.0	93.2	3.2	3.6	12.7	1.48	6.5	4.4	1.0
	38-58	A22	0.0	0.4	4.2	80.3	10.0	94.9	0.3	4.8	17.5	1.46	4.5	2.6	0.7
	58-71	Bt&A	0.0	0.3	3.6	67.0	9.1	80.0	3.1	16.9	0.3	1.67	19.2	16.5	8.0
	71-86	B2tg	0.0	0.2	3.9	66.1	9.1	79.3	3.2	17.5	0.9	1.66	19.9	15.9	8.7
	86-140	B3g	0.0	0.2	3.8	69.0	9.5	82.5	3.5	14.0	0.6	2.08	16.3	12.4	5.9
	140-180	IIC1g	1.4	4.8	5.2	41.0	6.2	58.6	27.5	13.9	---	---	---	---	---
	180-203	IIC2g	0.0	0.5	8.7	78.8	2.6	90.6	1.1	8.3	---	---	---	---	---
Satellite fine sand: (S77FL-109-001)	0-15	A1	0.0	0.1	0.5	90.8	4.2	95.6	1.1	3.3	26.9	1.08	23.5	18.9	7.9
	15-84	C1	0.0	0.1	0.5	95.5	3.1	99.2	0.3	0.5	48.8	1.34	5.1	3.8	1.2
	84-104	C2	0.0	0.0	0.2	96.1	3.0	99.3	0.3	0.4	53.9	1.50	4.4	3.7	1.8
	104-203	C3	0.0	0.1	2.2	96.2	1.0	99.5	0.1	0.4	53.2	1.55	4.4	4.0	1.6
Smyrna fine sand: (S78FL-109-032)	0-18	Ap	0.0	0.0	0.4	82.2	6.4	89.0	4.8	6.2	37.0	1.09	23.9	17.7	6.5
	18-36	A2	0.0	0.0	0.5	87.3	5.6	93.4	2.5	4.1	18.0	1.37	8.6	5.7	1.5
	36-46	B21h	0.0	0.0	0.3	78.7	5.3	84.3	5.6	10.1	1.4	1.20	34.6	27.5	6.9
	46-53	B22h	0.0	0.0	0.4	79.1	4.8	84.3	4.8	10.9	3.7	1.29	24.6	19.2	6.1
	53-81	B3h	0.0	0.0	0.6	85.7	3.6	89.9	2.2	7.9	0.4	1.51	20.5	17.3	3.9
	81-114	B3&Bh	0.0	0.0	0.6	88.8	4.1	92.9	1.5	5.6	11.9	1.50	9.3	5.4	0.9
	114-157	B3	0.1	0.0	0.4	84.5	3.8	88.8	4.2	7.0	2.6	1.58	16.6	11.9	3.3
	157-203	C	0.0	0.0	0.5	88.6	3.8	92.9	1.4	5.7	2.4	1.58	15.4	8.7	2.1

TABLE 18.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Particle-size distribution (Percent less than 2 mm): Sand: Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Total (2.0-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Hydraulic conductivity (saturated)	Bulk density (field moisture)	Water content: 1/10 bar	1/3 bar	15 bar
	Cm										Cm/hr	G/cm3	-----Pct (wt)		----
Sparr fine sand: (S78FL-109-021)	0-8	A1	0.0	0.0	0.6	86.0	8.0	94.6	4.4	1.0	61.5	1.00	10.8	7.0	3.4
	8-20	A21	0.0	0.1	0.5	85.4	7.2	93.2	5.2	1.6	31.5	1.35	8.3	4.2	1.2
	20-51	A22	0.0	0.1	0.5	86.4	7.0	94.0	4.5	1.5	19.9	1.39	6.4	3.2	0.9
	51-76	A23	0.0	0.1	0.6	86.2	8.1	95.0	3.8	1.2	22.3	1.43	5.9	3.1	0.6
	76-173	A24	0.0	0.0	0.5	87.3	8.1	95.9	3.4	0.7	20.1	1.52	5.4	2.4	0.4
	173-203	B2tg	0.0	0.0	0.2	69.7	9.2	79.1	7.0	13.9	0.1	1.63	20.3	17.8	6.9
St. Augustine fine sand: (S79FL-109-028)	0-10	A1	0.0	1.0	4.5	83.2	0.8	89.5	4.7	5.9	49.3	1.05	25.1	16.8	5.0
	10-18	C1	1.1	3.8	8.5	71.5	0.0	84.9	8.9	6.2	9.5	1.47	10.2	7.0	3.2
	18-25	C2	1.1	3.0	7.6	76.5	6.1	94.3	1.6	4.1	18.7	1.47	7.1	4.2	2.1
	25-68	C3g	0.4	1.8	7.6	86.3	0.4	96.5	2.1	1.4	39.4	1.44	4.2	2.5	0.5
	68-84	C4g	1.4	4.5	7.0	81.3	0.3	94.5	4.1	1.4	---	---	---	---	---
	84-203	C5g	0.0	0.0	4.0	91.2	3.3	98.5	0.5	1.0	---	---	---	---	---
St. Johns fine sand: (S78FL-109-026)	8-0	O1	---	---	---	---	---	---	---	---	---	---	---	---	---
	0-18	A11	0.0	0.1	3.2	84.1	1.5	88.9	8.2	2.9	11.0	1.02	47.8	35.4	8.9
	18-25	A12	0.0	0.1	2.4	89.5	1.6	93.6	5.0	1.4	6.3	1.46	13.0	8.9	2.3
	25-38	A2	0.0	0.1	2.3	91.8	1.5	95.7	3.5	0.8	20.3	1.51	6.3	4.0	0.7
	38-48	B21h	0.0	0.1	2.2	83.2	1.7	87.2	6.4	6.4	0.7	1.24	36.9	31.7	4.8
	48-71	B22h	0.0	0.1	2.3	87.7	1.5	91.6	4.2	4.2	0.7	1.45	26.0	20.3	3.2
	71-107	A'2	0.0	0.1	2.3	94.7	1.3	98.4	0.8	0.8	21.4	1.56	4.7	2.6	1.2
	107-127	B'21h	0.0	0.0	1.6	87.4	1.0	90.0	6.7	3.3	0.4	1.69	17.4	12.8	3.3
	127-167	B'22h	0.0	0.1	2.2	83.5	1.3	87.1	9.6	3.3	1.4	1.42	28.8	18.5	5.1
	167-203	C	0.0	0.1	2.4	94.8	1.1	98.4	0.6	1.0	18.0	1.54	7.3	4.0	1.9
Tavares fine sand: (S78FL-109-016)	0-13	A	0.0	0.9	14.4	79.1	1.8	96.2	3.0	0.8	68.4	1.28	7.3	5.1	1.3
	13-23	C1	0.0	0.9	15.5	77.7	1.8	95.9	2.2	1.9	85.5	1.45	5.2	3.7	0.9
	23-81	C2	0.0	1.0	15.4	78.6	1.6	96.6	1.8	1.6	82.8	1.44	4.3	2.8	0.5
	81-119	C3	0.0	0.9	15.6	78.7	1.7	96.8	1.7	1.5	86.8	1.39	4.4	3.0	0.3
	119-157	C4	0.0	0.9	14.8	80.4	1.7	97.8	1.2	1.0	71.0	1.44	4.8	3.5	0.2
	157-203	C4	0.0	0.5	13.1	84.0	0.8	98.4	0.8	0.8	86.8	1.44	3.6	2.7	0.2
Tocoi fine sand: (S79FL-109-036)	0-33	A1	0.0	0.0	1.9	84.4	8.2	94.5	4.3	1.2	10.5	1.42	10.7	6.8	1.7
	33-51	B21h	0.0	0.0	1.8	82.7	6.1	90.6	3.7	5.7	18.4	1.30	21.5	15.8	3.6
	51-58	B22h	0.0	0.1	1.9	84.1	4.5	90.6	3.5	5.9	8.3	1.38	17.3	12.6	3.9
	58-102	B3	0.0	0.1	2.2	83.5	5.8	91.6	2.8	5.6	10.1	1.43	15.6	10.5	3.2
	102-114	A2	0.0	0.1	2.1	85.7	6.5	94.4	1.4	4.2	21.7	1.53	8.3	4.9	1.3
	114-193	B2tg	0.0	0.1	1.7	76.3	7.5	85.6	1.8	12.6	1.1	1.59	17.6	12.8	4.4
	193-203	Cg	0.0	0.1	2.7	80.5	7.0	90.3	1.6	8.1	---	---	---	---	---

TABLE 18.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Particle-size distribution (Percent less than 2 mm): Sand: Very coarse (2.0-1.0)	Coarse (1.0-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Total (2.0-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Hydraulic conductivity (saturated)	Bulk density (field moisture)	Water content: 1/10 bar	1/3 bar	15 bar
	Cm										Cm/hr	G/cm3	-----Pct (wt)-----		
Tomoka muck: (S78FL-108-020)	0-23	Oa1	---	---	---	---	---	---	---	---	---	---	---	---	---
	23-53	Oa2	---	---	---	---	---	---	---	---	---	---	---	---	---
	53-162	IIC1	0.0	0.1	1.5	66.9	3.0	71.5	16.1	12.4	---	---	---	---	---
Zolfo fine sand: (S78F10-108-022)	0-13	Ap	0.0	0.9	13.5	79.1	2.1	95.6	3.0	1.4	97.1	1.24	6.9	4.6	1.2
	13-48	A21	0.0	0.9	12.8	79.7	2.2	95.6	2.8	1.6	43.8	1.40	5.0	3.1	0.8
	48-79	A22	0.0	0.8	11.5	80.9	2.6	95.8	2.5	1.7	33.3	1.49	4.6	2.8	0.5
	79-168	A23	0.1	1.0	12.0	82.2	2.3	97.6	1.7	0.7	34.8	1.52	3.6	1.9	0.3
	168-175	B21h	0.0	0.4	10.1	84.3	1.9	96.7	1.6	---	---	---	---	---	---
	175-203	B22h	0.0	0.3	7.2	85.0	1.3	93.8	2.2	4.0	0.6	1.54	24.5	19.7	2.7

TABLE 19.--CHEMICAL ANALYSES OF SELECTED SOILS

Soil name and sample number	Depth	Horizon	Extractable bases					Extractable acidity	Cation exchange capacity	Base saturation	Organic carbon	Electrical conductivity	pH			Pyrophosphate extractable			Citrate dithionite extractable	
			Ca	Mg	Na	K	Sum						H_2O (1:1)	$CaCl_2$ (1:2)	KCl (1:1)	C	Fe	Al	Al	Fe
	Cm		--Milliequivalents/100 grams of soil--							Pct	Pct	Mmho /cm				Pct	Pct	Pct	Pct	Pct
Adamsville fine sand: (S78FL-109-014)	0-20	Ap	0.32	0.05	0.04	0.04	0.45	5.36	5.81	8	0.75	0.02	5.3	4.4	4.2	--	--	--	--	--
	20-48	C1	0.08	0.05	0.09	0.01	0.23	3.60	3.83	6	0.42	0.12	5.2	4.6	4.5	--	--	--	--	--
	48-76	C2	0.01	0.02	0.01	0.01	0.05	1.76	1.81	3	0.10	0.02	5.3	4.6	4.4	--	--	--	--	--
	76-112	C3	0.02	0.02	0.02	0.01	0.07	1.90	1.97	4	0.04	0.03	5.1	4.4	4.4	--	--	--	--	--
	112-135	C4	0.03	0.04	0.07	0.01	0.15	2.78	2.93	5	0.10	0.11	4.5	4.2	4.2	--	--	--	--	--
	135-203	C5	0.03	0.03	0.04	0.01	0.11	2.92	3.03	4	0.01	0.10	4.6	4.3	4.2	--	--	--	--	--
Adamsville Variant fine sand: (S78FL-109-023)	0-25	A1	7.85	0.59	0.13	0.09	8.66	1.07	9.73	89	2.07	0.19	7.3	7.0	6.8	--	--	--	--	--
	25-58	C1	5.14	0.30	0.09	0.01	5.54	0.91	6.45	86	0.40	0.10	7.8	7.5	7.5	--	--	--	--	--
	58-89	C2	4.45	0.26	0.09	0.01	4.81	1.07	5.88	82	0.28	0.12	8.0	7.4	7.3	--	--	--	--	--
	89-117	C3	4.03	0.24	0.11	0.01	4.39	0.62	5.01	88	0.17	0.13	8.0	7.5	7.5	--	--	--	--	--
	117-170	C4	2.25	0.17	0.21	0.01	2.64	0.78	3.42	77	0.12	0.25	7.6	7.3	7.3	--	--	--	--	--
	170-203	C5	4.55	0.26	0.28	0.01	5.10	2.39	7.49	68	0.29	0.26	7.4	7.1	7.0	--	--	--	--	--
Astatula fine sand: (S78FL-109-011)	0-13	A1	1.15	0.24	0.04	0.04	1.47	4.14	5.61	26	1.15	0.08	5.8	4.7	4.4	--	--	--	--	--
	13-36	C1	0.22	0.10	0.02	0.02	0.36	2.04	2.40	15	0.30	0.03	5.8	4.7	4.4	--	--	--	--	--
	36-79	C2	0.12	0.09	0.03	0.01	0.25	1.56	1.81	14	0.17	0.03	5.5	4.5	4.3	--	--	--	--	--
	79-140	C3	0.03	0.07	0.03	0.02	0.15	1.15	1.30	12	0.09	0.04	5.3	4.4	4.2	--	--	--	--	--
	140-203	C3	0.01	0.07	0.01	0.01	0.10	0.81	0.91	11	0.06	0.02	5.4	4.6	4.4	--	--	--	--	--
Bluff sandy clay loam: (S78FL-109-006)	8-0	Oa	68.63	2.58	7.18	0.56	78.95	28.29	107.24	74	22.17	5.40	6.1	5.9	5.7	--	--	--	--	--
	0-15	A1	33.53	0.55	0.23	0.08	34.39	12.59	46.98	73	5.90	0.40	6.5	6.4	5.8	--	--	--	--	--
	15-33	B21ca	31.20	0.42	0.98	0.03	32.63	7.28	39.91	82	0.98	0.75	7.6	7.4	7.1	--	--	--	0.16	0.08
	33-56	B22gca	34.65	0.27	0.35	0.02	35.29	6.95	42.24	84	0.67	0.36	8.1	7.6	7.3	--	--	--	0.26	0.05
	56-127	B3gca	31.70	0.34	0.83	0.02	32.89	5.48	38.37	86	0.47	0.50	8.1	7.6	7.3	--	--	--	0.24	0.03
	127-203	Cg	8.08	0.12	0.13	0.03	8.36	2.08	10.44	80	0.08	0.18	7.2	6.4	7.3	--	--	--	--	--
Cassia fine sand: (S78FL-109-029)	0-8	A1	0.19	0.09	0.02	0.01	0.31	0.51	0.82	38	0.44	0.03	4.6	3.6	3.1	--	--	--	--	--
	8-46	A2	0.01	0.02	0.02	0.02	0.07	0.41	0.48	15	0.05	0.02	5.1	4.0	3.7	--	--	--	--	--
	46-71	B21h	0.03	0.08	0.06	0.02	0.19	9.77	9.96	2	0.61	0.06	4.6	3.7	3.6	0.92	0.01	0.20	0.02	0.12
	71-81	B22h	0.04	0.06	0.02	0.02	0.14	10.56	10.70	1	0.79	0.04	4.8	4.0	3.8	0.88	0.02	0.20	0.02	0.18
	81-190	A'2	0.01	0.03	0.01	0.01	0.06	2.65	2.71	2	0.17	0.03	5.0	4.1	4.0	--	--	--	--	--
	190-203	B'2h	0.01	0.02	0.02	0.01	0.06	9.54	9.60	1	0.39	0.03	4.9	4.2	4.1	0.71	0.02	0.33	0.04	0.41

TABLE 19.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Extractable bases: Ca	Extractable bases: Mg	Extractable bases: Na	Extractable bases: K	Extractable bases: Sum	Extractable acidity	Cation exchange capacity	Base saturation	Organic carbon	Electrical conductivity	pH: H_2O (1:1)	pH: $CaCl_2$ (1:2)	pH: KCl (1:1)	Pyrophosphate extractable: C	Pyrophosphate extractable: Fe	Pyrophosphate extractable: Al	Citrate dithionite extractable: Al	Citrate dithionite extractable: Fe
	Cm		--Milliequivalents/100 grams of soil--							Pct	Pct	Mmho /cm				Pct	Pct	Pct	Pct	Pct
Durbin muck: (S78FL-109-019)	0-15	Oa1	30.10	84.34	81.02	10.18	205.64	35.30	240.94	85	20.29	192.00	4.0	4.1	3.9	--	--	--	--	--
	15-64	Oa2	31.10	62.43	57.42	4.70	155.65	39.74	195.39	80	21.22	96.25	4.6	4.7	4.5	--	--	--	--	--
	64-150	Oa3	34.23	45.97	38.06	2.22	120.48	45.78	166.26	72	27.63	51.25	5.0	4.9	4.8	--	--	--	--	--
	150-203	IIC	3.85	1.18	0.70	0.07	5.80	8.18	13.98	41	1.69	1.20	4.3	4.1	3.8	--	--	--	--	--
EauGallie fine sand: (S78FL-109-033)	0-15	Ap	0.61	0.29	0.04	0.02	0.96	9.10	10.06	10	1.10	0.05	4.6	2.8	2.7	--	--	--	--	--
	15-25	A21	0.23	0.12	0.07	0.03	0.45	2.57	3.02	15	0.38	0.03	4.5	3.5	3.0	--	--	--	--	--
	25-43	A22	1.72	0.66	0.08	0.03	2.49	0.87	3.36	74	0.65	0.02	4.9	3.5	3.3	--	--	--	--	--
	43-51	B21h	1.59	0.42	0.08	0.03	2.12	24.20	26.32	8	3.20	0.04	4.7	3.6	3.5	2.43	0.03	0.29	0.05	0.27
	51-58	B22h	0.10	0.06	0.03	0.03	0.22	29.94	30.16	1	1.57	0.09	5.0	4.1	4.1	1.63	0.02	0.48	0.04	0.42
	58-81	B3	1.66	0.90	0.08	0.01	2.65	11.20	13.85	19	0.93	0.04	5.7	4.6	4.6	--	--	--	--	--
	81-114	A'2	0.25	0.07	0.05	0.00	0.37	0.27	0.64	58	0.06	0.04	5.9	5.2	5.6	--	--	--	--	--
	114-135	B1g	4.80	0.90	0.25	0.03	5.98	1.38	7.36	81	0.04	0.08	6.7	5.6	5.9	--	--	--	0.05	0.01
	135-147	B2tg	7.82	1.27	0.34	0.06	9.49	7.23	16.72	57	0.04	0.09	6.8	5.8	6.0	--	--	--	0.05	0.01
	147-203	Cg	3.22	0.33	0.18	0.03	3.76	0.55	4.31	87	0.04	0.15	6.9	6.2	6.2	--	--	--	--	--
Ellzey fine sand: (S79FL-109-034)	0-30	Ap	5.06	0.74	0.19	0.15	6.14	4.52	10.66	58	0.96	0.33	6.3	5.9	5.8	--	--	--	--	--
	30-48	A21	1.03	0.21	0.13	0.07	1.44	3.52	4.96	29	0.31	0.12	6.2	5.3	5.1	--	--	--	--	--
	48-68	A22	1.04	0.08	0.10	0.02	1.24	2.04	3.28	38	0.06	0.09	6.0	5.5	5.2	--	--	--	--	--
	68-76	B11ir	1.05	0.29	0.15	0.06	1.55	0.72	2.27	68	0.07	0.15	5.6	5.2	5.0	0.02	0.13	0.01	0.28	0.07
	76-84	B12ir	0.98	0.25	0.15	0.06	1.44	3.33	4.77	30	0.15	0.11	5.5	5.1	4.7	0.00	0.15	0.00	0.42	0.06
	84-94	B13ir	1.41	0.49	0.19	0.09	2.18	4.33	6.51	33	0.08	0.14	5.2	4.8	4.5	0.02	0.15	0.00	0.49	0.06
	94-104	B21t	1.30	0.74	0.19	0.12	2.35	5.60	7.95	30	0.15	0.18	4.9	4.5	4.3	--	--	--	1.24	0.11
	104-147	B22t	1.70	0.99	0.25	0.13	3.07	4.40	7.47	41	0.10	0.28	4.9	4.5	4.4	--	--	--	0.05	0.12
	147-162	B3	1.91	1.32	0.20	0.07	3.50	1.73	5.23	67	0.11	0.22	5.2	4.9	4.6	--	--	--	--	--
	162-203	C	1.15	0.82	0.16	0.07	2.20	1.33	3.53	62	0.14	0.10	5.4	4.9	4.6	--	--	--	--	--
Fripp fine sand: (S78FL-109-027)	0-2	A11	2.60	1.23	0.19	0.09	4.11	7.22	11.33	36	3.14	0.28	4.7	3.9	3.9	--	--	--	--	--
	2-10	A12	0.19	0.16	0.06	0.02	0.43	0.58	1.01	43	0.34	0.11	4.9	4.2	4.1	--	--	--	--	--
	10-23	C1	0.18	0.13	0.04	0.01	0.36	0.32	0.68	53	0.13	0.05	5.4	4.5	4.3	--	--	--	--	--
	23-122	C2	0.18	0.11	0.03	0.05	0.37	0.76	1.13	33	0.06	0.03	5.6	4.7	4.7	--	--	--	--	--
	122-203	C3	0.17	0.10	0.05	0.02	0.34	0.22	0.56	61	0.02	0.04	5.8	4.9	4.9	--	--	--	--	--

TABLE 19.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Extractable bases					Extractable acidity	Cation exchange capacity	Base saturation	Organic carbon	Electrical conductivity	pH			Pyrophosphate extractable			Citrate dithionite extractable	
			Ca	Mg	Na	K	Sum						H_2O (1:1)	$CaCl_2$ (1:2)	KCl (1:1)	C	Fe	Al	Al	Fe
	Cm		--Milliequivalents/100 grams of soil--							Pct	Pct	Mmho /cm				Pct	Pct	Pct	Pct	Pct
Holopaw fine sand:																				
(S77FL-109-008)	2-0	Oa	6.09	1.27	0.90	0.15	8.41	50.00	58.41	14	19.57	0.57	4.0	3.5	3.2	--	--	--	--	--
	0-18	A11	0.46	0.07	0.00	0.01	0.54	6.26	6.80	8	0.82	0.05	5.1	4.3	4.2	--	--	--	--	--
	18-33	A12	0.32	0.05	0.00	0.00	0.37	4.76	5.13	7	0.50	0.05	5.4	4.6	4.4	--	--	--	--	--
	33-68	A21g	0.10	0.02	0.00	0.00	0.12	1.36	1.48	8	0.08	0.04	6.4	5.0	4.8	--	--	--	--	--
	68-107	A22g	0.90	0.24	0.02	0.00	1.16	2.72	3.88	30	0.11	0.04	5.7	4.4	4.1	--	--	--	0.04	0.04
	107-135	A23g	1.09	0.28	0.06	0.00	1.43	2.44	3.87	37	0.11	0.04	5.7	4.3	4.0	--	--	--	0.04	0.04
	135-183	B2tg	3.83	1.07	0.20	0.01	5.11	5.91	11.02	46	0.11	0.05	5.4	4.1	3.6	--	--	--	0.08	0.04
	183-203	Cg	1.93	0.57	0.22	0.03	2.75	2.55	5.30	52	0.04	0.16	4.8	4.0	3.7	--	--	--	--	--
Hontoon muck:																				
(S78FL-109-018)	0-18	Oa1	2.35	5.79	2.01	0.66	10.81	161.15	171.95	6	54.17	2.00	3.3	2.8	2.3	--	--	--	--	--
	18-41	Oa2	3.23	6.22	1.87	0.13	11.45	263.27	274.95	4	55.20	1.10	3.5	2.8	2.1	--	--	--	--	--
	41-61	Oa3	3.60	6.24	1.87	0.12	11.83	257.08	268.91	4	59.20	1.35	3.5	2.8	2.1	--	--	--	--	--
	61-140	Oa4	2.35	4.45	1.77	0.08	8.65	187.88	196.53	4	52.71	0.90	3.4	2.8	2.3	--	--	--	--	--
	140-178	IIC1	1.35	1.10	0.49	0.02	2.96	44.27	47.23	6	8.31	0.43	4.0	3.1	2.9	--	--	--	--	--
	178-203	IIC2	0.23	0.21	0.13	0.01	0.58	21.98	22.56	2	3.03	0.16	4.2	3.5	3.4	--	--	--	--	--
Immokalee fine sand:																				
(S78FL-109-028)	0-20	A1	1.41	0.31	0.11	0.03	1.86	10.48	12.34	15	1.79	0.17	4.0	3.2	2.9	--	--	--	--	--
	20-38	A21	0.12	0.05	0.05	0.05	0.27	1.01	1.28	21	0.29	0.07	4.6	3.6	3.3	--	--	--	--	--
	38-102	A22	0.03	0.02	0.03	0.02	0.10	0.20	0.30	33	0.12	0.04	5.0	3.9	3.6	--	--	--	--	--
	102-162	B2h	0.10	0.46	0.13	0.02	0.71	14.24	14.95	5	2.31	0.16	3.8	3.1	2.7	1.96	0.00	0.07	0.02	0.05
	162-203	B3	0.05	0.31	0.10	0.01	0.47	9.97	10.44	5	0.83	0.10	4.1	3.2	2.9	0.73	0.00	0.03	0.03	0.02
Jonathan fine sand:																				
(S78FL-109-024)	0-10	A1	0.48	0.18	0.05	0.03	0.74	2.47	3.21	23	0.45	0.05	5.2	3.7	3.5	--	--	--	--	--
	10-23	A21	0.23	0.13	0.04	0.01	0.41	1.03	1.44	28	0.13	0.03	5.3	3.9	3.6	--	--	--	--	--
	23-99	A22	0.23	0.13	0.05	0.01	0.42	0.55	0.97	43	0.05	0.03	5.8	4.6	4.2	--	--	--	--	--
	99-180	A23	0.25	0.14	0.06	0.01	0.46	1.23	1.69	27	0.20	0.03	5.3	3.9	3.5	--	--	--	--	--
	180-203	B2hm	0.78	0.65	0.13	0.01	1.57	34.47	36.04	4	4.47	0.11	4.1	3.2	3.0	0.54	0.00	0.24	0.02	0.20
Manatee fine sandy loam:																				
(S77FL-109-003)	0-20	A11	19.45	2.19	1.20	0.19	23.03	25.99	49.02	47	8.65	0.70	5.3	4.8	4.5	--	--	--	--	--
	20-33	A12	10.45	3.04	11.98	0.30	25.77	4.04	29.81	86	1.81	10.80	6.3	6.1	5.9	--	--	--	--	--
	33-64	B21t	9.70	1.37	1.35	0.01	12.43	4.20	16.63	75	0.30	0.07	7.1	6.6	6.0	--	--	--	0.05	0.02
	64-86	B22tg	12.15	1.88	1.45	0.03	15.51	5.84	21.35	73	0.20	1.15	6.6	6.6	5.5	--	--	--	0.07	0.02
	86-132	B3g	6.57	0.87	0.47	0.06	7.97	3.06	11.03	72	0.08	0.46	6.6	6.5	6.1	--	--	--	--	--
	132-203	Cg	2.32	0.30	0.10	0.03	2.75	0.94	3.69	75	0.05	0.19	6.8	6.5	5.8	--	--	--	--	--

TABLE 19.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Extractable bases: Ca	Extractable bases: Mg	Extractable bases: Na	Extractable bases: K	Extractable bases: Sum	Extractable acidity	Cation exchange capacity	Base saturation	Organic carbon	Electrical conductivity	pH: H_2O (1:1)	pH: $CaCl_2$ (1:2)	pH: KCl (1:1)	Pyrophosphate extractable: C	Pyrophosphate extractable: Fe	Pyrophosphate extractable: Al	Citrate dithionite extractable: Al	Citrate dithionite extractable: Fe
	Cm		--Milliequivalents/100 grams of soil--							Pct	Pct	Mmho /cm				Pct	Pct	Pct	Pct	Pct
Moultrie fine sand: (S77FL-109-005)	0-5	A1	1.57	4.02	18.51	0.97	25.07	0.41	25.48	98	0.89	19.00	7.6	7.4	7.3	--	--	--	--	--
	5-20	A21	1.68	5.84	29.56	1.03	38.11	0.90	39.01	98	0.60	25.50	7.3	7.1	5.8	--	--	--	--	--
	20-56	A22	0.96	4.02	27.31	0.59	32.88	0.82	33.70	98	0.25	20.70	6.3	5.6	5.6	--	--	--	--	--
	56-66	B21h	1.21	4.02	18.18	0.57	23.98	2.38	26.36	91	0.50	26.10	5.1	4.9	4.7	0.16	0.02	0.08	0.06	0.02
	66-74	B22h	1.64	4.35	20.83	0.64	27.46	3.88	31.34	88	0.54	23.10	4.7	4.6	4.4	0.29	0.03	0.05	0.08	0.02
	74-119	B3	1.31	4.07	18.73	0.63	24.74	2.41	27.15	91	0.39	17.80	5.2	5.2	5.0	--	--	--	--	--
Myakka fine sand: (S78FL-109-030)	0-10	A11	1.14	2.18	0.26	0.11	3.69	33.80	37.49	10	15.61	0.23	3.6	2.9	2.4	--	--	--	--	--
	10-20	A12	0.27	0.66	0.08	0.02	1.03	7.44	8.47	12	0.57	0.07	4.1	3.0	2.6	--	--	--	--	--
	20-36	A21	0.03	0.12	0.03	0.01	0.19	1.07	1.26	15	0.02	0.04	4.6	3.4	3.1	--	--	--	--	--
	36-58	A22	0.01	0.05	0.01	0.04	0.11	0.60	0.71	15	0.08	0.02	5.0	3.6	3.3	--	--	--	--	--
	58-76	B21h	0.02	0.86	0.18	0.01	1.07	28.23	29.30	4	3.31	0.15	3.8	3.0	2.6	3.20	0.01	0.14	0.02	0.11
	76-135	B22h	0.01	0.08	0.09	0.01	0.19	23.86	24.05	1	1.74	0.08	4.2	3.4	3.3	1.84	0.00	0.25	0.01	0.23
	135-203	B3&Bh	0.01	0.30	0.03	0.02	0.36	9.44	9.80	4	0.43	0.04	4.4	3.2	3.1	--	--	--	--	--
Narcoossee fine sand, shelly substratum: (S77FL-109-009)	0-8	A1	1.06	0.72	0.07	0.15	2.00	10.49	12.49	16	0.22	0.18	4.0	3.3	2.9	--	--	--	--	--
	8-28	A2	0.08	0.07	0.00	0.01	0.16	0.61	0.77	21	0.18	0.03	5.2	3.7	3.5	--	--	--	--	--
	28-30	B21h	3.73	0.45	0.04	0.03	4.25	5.38	9.63	44	0.80	0.10	6.3	5.6	5.4	0.50	0.14	0.15	0.22	0.12
	30-36	B22h	2.28	0.28	0.02	0.03	2.61	4.81	7.42	35	0.68	0.08	6.2	5.3	5.1	0.41	0.09	0.15	0.18	0.10
	36-51	B3	3.44	0.14	0.01	0.01	3.60	0.37	3.97	91	0.27	0.11	7.5	6.8	7.3	--	--	--	--	--
	51-64	C1	2.18	0.19	0.21	0.01	2.59	0.08	2.67	97	0.09	0.29	8.0	7.3	8.0	--	--	--	--	--
	64-76	C2	3.42	0.16	0.10	0.01	3.69	0.08	3.77	98	0.07	0.16	8.0	7.7	7.9	--	--	--	--	--
	76-203	C3	3.30	0.09	0.06	0.01	3.46	0.04	3.50	99	0.02	0.25	7.7	7.3	7.8	--	--	--	--	--
Orsino fine sand: (S78FL-109-012)	0-10	A1	0.12	0.10	0.03	0.05	0.30	6.31	6.61	5	1.13	0.07	3.9	3.0	2.7	--	--	--	--	--
	10-46	A2	0.05	0.04	0.00	0.01	0.10	1.12	1.22	8	0.12	0.02	4.8	3.7	3.6	--	--	--	--	--
	46-74	B21&Bh	0.13	0.08	0.01	0.02	0.24	3.39	3.63	7	0.34	0.03	5.1	4.3	4.1	0.18	0.08	0.06	0.02	0.09
	74-112	B22&Bh	0.15	0.10	0.01	0.02	0.28	1.90	2.18	13	0.17	0.03	5.4	4.6	4.3	--	--	--	--	--
	112-150	B3	0.09	0.08	0.01	0.01	0.19	1.36	1.55	12	0.05	0.03	5.5	4.6	4.4	--	--	--	--	--
	150-203	C	0.02	0.03	0.01	0.01	0.07	0.47	0.54	13	0.00	0.02	5.9	4.9	4.6	--	--	--	--	--

TABLE 19.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Extractable bases: Ca	Extractable bases: Mg	Extractable bases: Na	Extractable bases: K	Extractable bases: Sum	Extractable acidity	Cation exchange capacity	Base saturation	Organic carbon	Electrical conductivity	pH: H2O (1:1)	pH: CaCl2 (1:2)	pH: KCl (1:1)	Pyrophosphate extractable: C	Pyrophosphate extractable: Fe	Pyrophosphate extractable: Al	Citrate dithionite extractable: Al	Citrate dithionite extractable: Fe
	Cm		--Milliequivalents/100 grams of soil--							Pct	Pct	Mmho /cm				Pct	Pct	Pct	Pct	Pct
Palm Beach sand: (S78FL-109-013)	0-8	A1	9.12	0.40	0.12	0.04	9.68	0.57	10.25	94	0.74	0.15	7.7	7.2	7.4	--	--	--	--	--
	8-25	C11	9.67	0.25	0.12	0.03	10.07	0.53	10.60	95	0.46	0.11	7.8	7.3	7.5	--	--	--	--	--
	25-71	C12	7.87	0.12	0.07	0.01	8.07	0.04	8.11	100	0.12	0.08	8.2	7.5	7.9	--	--	--	--	--
	71-203	C2	11.42	0.14	0.09	0.01	11.66	0.16	11.82	99	0.17	0.10	8.3	7.6	8.0	--	--	--	--	--
Paola fine sand: (S78FL-109-015)	0-10	A1	0.07	0.03	0.01	0.02	0.20	2.75	2.95	7	0.33	0.04	4.4	3.4	3.3	--	--	--	--	--
	10-43	A2	0.02	0.02	0.00	0.01	0.05	1.73	1.78	3	0.06	0.02	4.7	3.9	3.7	--	--	--	--	--
	43-81	B&A	0.03	0.03	0.01	0.01	0.08	2.71	2.79	3	0.26	0.03	5.0	4.5	4.4	--	--	--	--	--
	81-142	C	0.03	0.03	0.00	0.01	0.07	1.86	1.93	4	0.07	0.02	5.3	4.5	4.4	--	--	--	--	--
	142-203	C	0.02	0.03	0.00	0.01	0.06	1.59	1.65	4	0.01	0.02	5.2	4.5	4.5	--	--	--	--	--
Parkwood fine sandy loam: (S77FL-109-004)	0-15	A1	37.83	3.78	1.23	0.24	43.08	14.49	57.57	75	11.55	0.86	6.8	6.4	6.1	--	--	--	--	--
	15-25	A2	4.18	0.38	0.07	0.00	4.63	0.98	5.61	83	0.36	0.10	7.5	6.9	6.8	--	--	--	--	--
	25-46	B21tca	13.20	1.83	0.96	0.01	16.00	5.51	21.51	74	0.15	0.55	8.0	7.4	7.1	--	--	--	0.14	0.02
	46-99	B22tca	24.58	1.39	0.71	0.01	26.69	3.39	30.08	89	0.28	0.75	8.0	7.5	7.3	--	--	--	0.05	0.02
	99-140	B23tca	22.45	0.71	0.16	0.01	23.33	3.35	26.68	87	0.16	0.18	8.4	7.6	7.5	--	--	--	0.11	0.02
	140-203	Cg	13.70	0.23	0.04	0.04	14.01	1.71	15.72	89	0.07	0.14	8.4	7.7	7.5	--	--	--	--	--
Pellicer silty clay loam: (S77FL-109-010)	0-25	A1	14.58	50.60	271.12	7.42	343.72	26.75	370.47	93	10.23	118.30	3.4	3.5	4.2	--	--	--	--	--
	25-140	C1g	8.25	26.90	150.93	4.98	191.06	24.98	216.04	88	4.67	213.40	3.4	3.6	4.2	--	--	--	--	--
	140-178	C2g	8.71	12.75	71.76	2.06	95.28	12.29	107.57	89	3.00	120.00	4.3	4.4	4.1	--	--	--	--	--
	178-203	C3g	10.60	5.59	26.62	1.28	44.09	3.05	47.14	94	0.54	31.90	7.8	7.5	7.3	--	--	--	--	--
Placid fine sand: (S79FL-109-037)	0-30	Ap	2.71	0.48	0.06	0.14	3.39	4.40	7.79	44	1.42	0.06	6.2	5.6	5.6	--	--	--	--	--
	30-51	C1	0.37	0.11	0.07	0.04	0.59	1.93	2.52	23	0.46	0.08	5.5	4.9	4.6	--	--	--	--	--
	51-66	C2	0.18	0.08	0.09	0.02	0.37	1.60	1.97	19	0.28	0.06	5.4	4.9	4.8	--	--	--	--	--
	66-84	C3	0.17	0.08	0.09	0.01	0.35	2.33	2.68	13	0.15	0.08	5.2	4.9	4.9	--	--	--	--	--
	84-107	C4	0.31	0.13	0.10	0.03	0.57	2.17	2.74	21	0.14	0.10	5.4	5.0	4.9	--	--	--	--	--
	107-130	C5	1.62	0.62	0.19	0.08	2.41	1.40	3.81	63	0.15	0.19	5.7	5.7	5.2	--	--	--	--	--
	130-147	C6	2.38	0.86	0.16	0.10	3.50	1.84	5.34	66	0.13	0.15	6.1	5.8	5.8	--	--	--	0.04	0.01
	147-203	C7	2.42	0.64	0.14	0.08	3.28	1.34	4.62	71	0.13	0.16	6.5	6.5	6.3	--	--	--	0.07	0.02

TABLE 19.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Extractable bases: Ca	Extractable bases: Mg	Extractable bases: Na	Extractable bases: K	Extractable bases: Sum	Extractable acidity	Cation exchange capacity	Base saturation	Organic carbon	Electrical conductivity	pH: H_2O (1:1)	pH: $CaCl_2$ (1:2)	pH: KCl (1:1)	Pyrophosphate extractable: C	Pyrophosphate extractable: Fe	Pyrophosphate extractable: Al	Citrate dithionite extractable: Al	Citrate dithionite extractable: Fe
	Cm		--Milliequivalents/100 grams of soil--							Pct	Pct	Mmho /cm				Pct	Pct	Pct	Pct	Pct
Pomello fine sand: (S78FL-109-017)	0-10	A1	0.78	0.17	0.03	0.03	1.01	6.20	7.21	14	0.75	0.04	4.7	3.6	3.3	--	--	--	--	--
	10-48	A21	0.15	0.04	0.01	0.01	0.21	2.27	2.48	8	0.14	0.02	4.9	3.7	3.4	--	--	--	--	--
	48-89	A22	0.06	0.03	0.00	0.01	0.10	2.07	2.17	5	0.18	0.01	5.2	3.9	3.7	--	--	--	--	--
	89-102	A23	0.04	0.03	0.01	0.01	0.09	1.96	2.05	4	0.16	0.02	5.3	3.9	3.6	--	--	--	--	--
	102-114	B1	0.03	0.04	0.02	0.01	0.10	4.55	4.65	2	0.53	0.02	4.8	3.6	3.5	--	--	--	--	--
	114-130	B21h	0.02	0.03	0.01	0.01	0.07	7.86	7.93	1	2.04	0.05	4.4	3.6	3.6	1.51	0.00	0.15	0.00	0.14
	130-145	B22h	0.02	0.02	0.01	0.00	0.05	13.65	13.70	0	1.36	0.05	4.7	3.8	3.8	1.43	0.00	0.20	0.00	0.14
	145-203	B3&Bh	0.01	0.02	0.01	0.01	0.05	9.65	9.70	1	1.03	0.05	4.8	4.0	4.0	0.90	0.00	0.19	0.00	0.15
Pompano fine sand: (S77FL-109-002)	0-10	A1	14.45	7.48	2.29	0.22	24.44	9.10	33.54	73	5.61	2.35	5.6	5.6	5.4	--	--	--	--	--
	10-71	C1	0.34	0.20	0.07	0.01	0.62	0.00	0.62	100	0.04	0.16	6.6	5.9	6.2	--	--	--	--	--
	71-81	C2	0.35	0.16	0.00	0.01	0.52	0.00	0.52	100	0.06	0.08	6.6	5.9	5.9	--	--	--	--	--
	81-203	C3	3.61	0.15	0.03	0.01	3.80	0.00	3.80	100	0.04	0.15	6.9	6.6	7.6	--	--	--	--	--
Pottsburg fine sand: (S77FL-109-007)	0-15	A1	1.27	0.25	0.09	0.03	1.64	8.25	9.89	17	1.52	0.14	4.4	3.6	3.2	--	--	--	--	--
	15-33	A21	0.24	0.07	0.00	0.01	0.32	1.94	2.26	14	0.37	0.04	4.9	3.6	3.3	--	--	--	--	--
	33-51	A22	0.23	0.03	0.00	0.00	0.26	0.82	1.08	24	0.14	0.04	5.0	3.8	3.5	--	--	--	--	--
	51-152	A23	0.30	0.02	0.00	0.00	0.32	0.33	0.65	49	0.08	0.04	5.5	4.8	5.2	--	--	--	--	--
	152-168	B21h	0.99	0.17	0.17	0.00	1.33	2.31	3.64	37	0.39	0.22	5.2	4.6	4.6	--	--	--	--	--
	168-203	B22h	0.52	0.63	0.09	0.00	1.24	15.99	17.23	7	2.24	0.08	4.4	3.3	3.0	1.89	0.00	0.10	0.04	0.06
Riviera fine sand: (S78FL-109-031)	0-25	Ap	4.97	0.58	0.10	0.03	5.68	2.25	7.93	72	0.96	0.13	5.4	5.1	4.6	--	--	--	--	--
	25-38	A21	2.11	0.15	0.11	0.01	2.38	1.92	4.30	55	0.17	0.07	5.2	5.0	4.9	--	--	--	--	--
	38-58	A22	0.49	0.05	0.04	0.03	0.61	0.11	0.72	85	0.02	0.03	6.0	5.4	5.1	--	--	--	--	--
	58-71	Bt&A	10.22	0.74	0.55	0.02	11.53	2.77	14.30	81	0.08	0.15	7.2	6.2	5.6	--	--	--	0.02	0.01
	71-86	B2tg	11.90	0.82	0.72	0.03	13.47	2.77	16.24	83	0.07	0.19	7.4	6.4	6.3	--	--	--	0.03	0.02
	86-140	B3g	8.47	0.66	0.65	0.03	9.81	1.93	11.74	84	0.05	0.18	7.6	6.7	6.4	--	--	--	0.04	0.02
	140-180	IIC1g	25.70	0.90	0.74	0.08	27.42	2.53	29.95	92	0.12	0.20	8.6	7.1	6.9	--	--	--	--	--
	180-203	IIC2g	5.55	0.33	0.28	0.04	6.20	0.63	6.83	91	0.00	0.18	8.6	7.2	7.0	--	--	--	--	--
Satellite fine sand: (S77FL-109-001)	0-15	A1	10.58	1.48	0.15	0.10	12.31	9.27	21.58	57	4.08	0.19	5.6	5.1	5.1	--	--	--	--	--
	15-84	C1	0.82	0.06	0.07	0.00	0.95	0.12	1.07	89	0.02	0.18	6.1	5.7	6.6	--	--	--	--	--
	84-104	C2	1.76	0.07	0.08	0.00	1.91	0.00	1.91	100	0.01	0.20	6.6	6.0	7.4	--	--	--	--	--
	104-203	C3	1.72	0.07	0.13	0.00	1.92	0.00	1.92	100	0.02	0.31	6.8	6.3	7.3	--	--	--	--	--

TABLE 19.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Extractable bases					Extractable acidity	Cation exchange capacity	Base saturation	Organic carbon	Electrical conductivity	pH			Pyrophosphate extractable			Citrate dithionite extractable	
			Ca	Mg	Na	K	Sum						H_2O (1:1)	$CaCl_2$ (1:2)	KCl (1:1)	C	Fe	Al	Al	Fe
	Cm		--Milliequivalents/100 grams of soil--							Pct	Pct	Mmho /cm				Pct	Pct	Pct	Pct	Pct
Smyrna fine sand: (S78FL-109-032)	0-18	Ap	1.34	0.82	0.12	0.04	2.32	21.16	23.48	10	3.51	0.09	4.7	3.1	2.9	--	--	--	--	--
	18-36	A2	0.14	0.13	0.02	0.01	0.30	2.85	3.15	10	0.07	0.03	5.4	3.3	3.3	--	--	--	--	--
	36-46	B21h	0.21	0.17	0.09	0.02	0.49	29.94	30.43	2	4.02	0.06	5.1	3.5	3.3	2.73	0.02	0.38	0.03	0.33
	46-53	B22h	0.06	0.05	0.04	0.01	0.16	33.02	33.18	--	2.78	0.06	4.8	3.5	3.6	2.57	0.02	0.65	0.03	0.56
	53-81	B3h	0.01	0.01	0.06	0.04	0.12	10.73	10.85	1	0.58	0.04	5.4	4.1	4.2	0.55	0.06	0.40	0.07	0.45
	81-114	B3&Bh	0.01	0.01	0.01	0.01	0.04	5.93	5.97	1	0.41	0.04	5.0	3.8	4.1	0.41	0.02	0.19	0.05	0.14
	114-157	B3	0.03	0.03	0.04	0.01	0.11	8.62	8.73	1	0.30	0.04	5.3	4.0	4.2	--	--	--	--	--
	157-203	C	0.03	0.09	0.05	0.01	0.18	3.16	3.34	5	0.02	0.04	5.5	4.0	4.2	--	--	--	--	--
Sparr fine sand: (S78FL-109-021)	0-8	A1	0.63	0.20	0.05	0.03	0.91	9.71	10.62	8	1.24	0.09	4.7	3.8	3.4	--	--	--	--	--
	8-20	A21	0.28	0.13	0.05	0.01	0.47	4.91	5.38	9	0.54	0.08	5.4	4.4	4.3	--	--	--	--	--
	20-51	A22	0.25	0.13	0.04	0.01	0.43	3.34	3.77	11	0.32	0.07	5.4	4.6	4.4	--	--	--	--	--
	51-76	A23	0.35	0.17	0.04	0.01	0.57	2.45	3.02	23	0.17	0.07	5.4	4.6	4.5	--	--	--	--	--
	76-173	A24	0.23	0.13	0.04	0.07	0.47	0.34	0.81	58	0.12	0.06	5.8	5.1	4.6	--	--	--	--	--
	173-203	B2tg	0.45	0.25	0.07	0.03	0.80	5.43	6.23	13	0.16	0.05	5.2	4.1	4.0	--	--	--	0.26	0.18
St. Augustine fine sand: (S79FL-109-038)	0-10	A1	10.33	0.36	0.10	0.13	10.92	0.68	11.60	94	1.56	0.13	7.4	7.0	6.9	--	--	--	--	--
	10-18	C1	13.30	0.27	0.12	0.06	13.75	1.12	14.87	92	0.60	0.10	8.1	7.4	7.3	--	--	--	--	--
	18-25	C2	11.90	0.13	0.10	0.03	12.16	0.80	12.96	94	0.24	0.08	8.5	7.6	8.1	--	--	--	--	--
	25-68	C3g	7.50	0.04	0.06	0.01	7.61	0.28	7.89	96	0.04	0.05	8.9	7.8	9.0	--	--	--	--	--
	68-84	C4g	11.30	0.08	0.08	0.01	11.47	0.00	11.47	100	0.06	0.07	9.0	8.1	9.2	--	--	--	--	--
	84-203	C5g	8.68	0.12	0.09	0.02	8.91	0.12	9.03	99	0.07	0.27	8.3	7.7	8.8	--	--	--	--	--
St. Johns fine sand: (S78FL-109-026)	8-0	O1	3.33	1.29	0.32	0.20	5.14	95.76	100.90	5	38.44	1.10	4.2	3.6	3.2	--	--	--	--	--
	0-18	A11	0.73	1.04	0.36	0.10	2.23	29.80	32.03	7	5.03	0.22	3.6	2.8	2.5	--	--	--	--	--
	18-25	A12	0.58	0.40	0.16	0.02	1.16	9.49	10.65	11	1.68	0.10	3.9	3.0	2.8	--	--	--	--	--
	25-38	A2	0.35	0.18	0.10	0.01	0.64	2.22	2.86	22	0.48	0.09	4.0	3.4	3.3	--	--	--	--	--
	38-48	B21h	0.38	0.39	0.24	0.02	1.03	36.16	37.19	3	4.19	0.30	3.7	3.3	3.2	3.30	0.01	0.32	0.01	0.25
	48-71	B22h	0.50	0.42	0.23	0.01	1.16	19.80	20.96	6	2.47	0.41	3.5	3.2	3.2	2.43	0.01	0.22	0.02	0.16
	71-107	A'2	0.33	0.18	0.10	0.01	0.62	3.64	4.26	14	0.39	0.15	3.9	3.4	3.3	--	--	--	--	--
	107-127	B'21h	0.38	0.21	0.10	0.01	0.70	18.69	19.39	4	2.10	0.11	3.9	3.2	3.2	1.73	0.00	0.15	0.02	0.12
	127-167	B'22h	0.23	0.24	0.11	0.01	0.59	40.10	40.69	1	5.10	0.10	3.9	3.2	3.2	3.28	0.00	0.29	0.02	0.32
	167-203	C	0.25	0.13	0.05	0.01	0.44	5.15	5.59	8	0.82	0.03	4.5	3.6	3.6	--	--	--	--	--

TABLE 19.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Extractable bases					Extractable acidity	Cation exchange capacity	Base saturation	Organic carbon	Electrical conductivity	pH			Pyrophosphate extractable			Citrate dithionite extractable	
			Ca	Mg	Na	K	Sum						H_2O (1:1)	$CaCl_2$ (1:2)	KCl (1:1)	C	Fe	Al	Al	Fe
	Cm		--Milliequivalents/100 grams of soil--							Pct	Pct	Mmho /cm				Pct	Pct	Pct	Pct	Pct
Tavares fine sand: (S78FL-109-016)	0-13	A	0.21	0.11	0.02	0.03	0.37	6.51	6.88	5	0.77	0.05	4.2	3.3	3.1	--	--	--	--	--
	13-23	C1	0.01	0.02	0.01	0.01	0.05	3.45	3.50	1	0.32	0.04	4.6	4.0	4.0	--	--	--	--	--
	23-81	C2	0.02	0.04	0.00	0.01	0.07	1.72	1.79	4	0.24	0.02	5.4	4.5	4.4	--	--	--	--	--
	81-119	C3	0.02	0.04	0.02	0.01	0.09	1.52	1.61	6	0.03	0.04	5.2	4.5	4.4	--	--	--	--	--
	119-157	C4	0.01	0.02	0.00	0.00	0.03	1.24	1.27	2	0.00	0.01	5.7	4.6	4.6	--	--	--	--	--
	157-203	C4	0.01	0.02	0.00	0.00	0.03	1.17	1.20	3	0.00	0.01	5.7	4.9	4.8	--	--	--	--	--
Tocoi fine sand: (S79FL-109-036)	0-33	A1	4.45	0.14	0.09	0.02	4.70	8.00	12.70	37	1.67	0.03	5.0	4.8	5.0	--	--	--	--	--
	33-51	B21h	0.09	0.00	0.04	0.01	0.14	14.94	15.08	1	1.72	0.03	5.1	4.4	4.4	1.07	0.00	0.24	0.03	0.18
	51-58	B22h	0.05	0.00	0.02	0.01	0.08	14.94	15.02	1	1.38	0.01	5.1	4.5	4.5	0.88	0.00	0.24	0.04	0.22
	58-102	B3	0.04	0.00	0.05	0.00	0.09	11.34	11.43	1	0.75	0.02	5.3	4.7	4.5	--	--	--	--	--
	102-114	A2	0.03	0.02	0.01	0.00	0.06	2.80	2.86	2	0.20	0.01	5.2	4.7	4.7	--	--	--	--	--
	114-193	B2tg	0.12	0.22	0.07	0.01	0.42	8.13	8.52	5	0.17	0.04	5.0	4.3	4.4	--	--	--	0.03	0.10
	193-203	Cg	0.06	0.36	0.06	0.02	0.50	5.27	5.77	9	0.07	0.02	5.5	4.3	4.3	--	--	--	--	--
Tomoka muck: (S78FL-109-020)	0-23	Oa1	1.73	4.90	1.77	0.47	8.87	174.64	183.51	5	55.91	2.00	3.5	2.9	2.4	--	--	--	--	--
	23-53	Oa2	1.23	2.83	1.65	0.49	6.20	244.72	250.92	2	52.71	1.60	3.3	2.8	2.5	--	--	--	--	--
	53-162	IIC1	0.98	1.00	0.87	0.05	2.90	39.27	42.17	7	6.57	0.15	4.0	3.5	3.4	--	--	--	--	--
Zolfo fine sand: (S78FL-109-022)	0-13	Ap	0.48	0.17	0.04	0.03	0.72	2.47	3.19	22	0.67	0.06	5.9	4.6	4.1	--	--	--	--	--
	13-48	A21	0.30	0.14	0.04	0.01	0.49	2.06	2.55	19	0.27	0.08	6.2	5.0	4.6	--	--	--	--	--
	48-79	A22	0.33	0.16	0.04	0.01	0.54	1.03	1.57	34	0.11	0.05	6.1	5.0	4.5	--	--	--	--	--
	79-168	A23	0.23	0.12	0.03	0.01	0.39	0.55	0.94	41	0.06	0.05	6.2	5.1	4.5	--	--	--	--	--
	168-175	B21h	0.23	0.13	0.05	0.01	0.42	1.23	1.65	25	0.19	0.07	6.0	4.7	4.4	--	--	--	--	--
	175-203	B22h	0.30	0.14	0.05	0.01	0.50	11.52	12.02	4	1.40	0.05	6.3	4.4	4.3	0.95	0.01	0.40	0.04	0.29

TABLE 20.--CLAY MINERALOGY OF SELECTED SOILS

Soil name and sample numbers	Depth	Horizon	Clay minerals				
			Montmorillonite	14 angstrom intergrade	Kaolinite	Gibbsite	Quartz
	Cm		Pct	Pct	Pct	Pct	Pct
Adamsville fine sand:							
S78FL-109-014-1	0-20	Ap	0	45	13	0	42
S78FL-109-014-3	48-76	C2	0	36	17	18	29
S78FL-109-014-6	135-203	C5	0	11	50	23	15
Adamsville Variant fine sand:							
S78FL-109-023-1	0-25	A1	0	50	24	0	26
S78FL-109-023-3	58-89	C2	0	39	16	0	45
S78FL-109-023-6	170-203	C5	0	37	34	0	29
Astatula fine sand:							
S78FL-109-011-1	0-13	A1	0	59	12	18	11
S78FL-109-011-3	36-79	C2	0	51	11	23	15
S78FL-109-011-5	140-203	C3	0	51	11	21	16
Bluff sandy clay loam:							
S78FL-109-006-2	0-15	A1	94	0	2	0	4
S78FL-109-006-4	33-56	B22ca	98	0	2	0	0
S78FL-109-006-6	127-203	Cg	94	0	5	0	1
Cassia fine sand:							
S78FL-109-029-1	0-8	A1	30	0	6	0	64
S78FL-109-029-3	46-71	B21h	4	21	5	0	70
S78FL-109-029-6	190-203	B'2h	0	19	7	0	74
Durbin muck:							
S78FL-109-019-4	150-203	IIC	44	29	18	0	9
EauGallie fine sand:							
S78FL-109-033- 1	0-15	Ap	0	0	0	0	100
S78FL-109-033- 4	43-51	B21h	8	0	4	0	88
S78FL-109-033- 8	114-135	B1g	89	0	5	0	6
S78FL-109-033-10	147-203	Cg	90	0	6	0	4
Ellzey fine sand:							
S79FL-109-034-1	0-30	Ap	0	71	0	0	29
S79FL-109-034-5	76-84	B12ir	0	70	0	0	30
S79FL-109-034-7	94-104	B21t	0	72	0	0	28
S79FL-109-034-10	162-203	C	44	20	30	0	6
Fripp fine sand:							
S78FL-109-027-1	0-2	A11	44	19	13	0	24
S78FL-109-027-4	23-122	C2	30	9	7	0	54
S78FL-109-027-5	122-203	C3	36	0	8	0	56
Holopaw fine sand:							
S77FL-109-008-2	0-18	A11	0	48	16	0	36
S77FL-109-008-5	68-107	A22g	36	27	17	0	20
S77FL-109-008-7	135-183	B2tg	88	0	6	0	6
S77FL-109-008-8	183-203	Cg	93	0	6	0	1
Hontoon muck:							
S78FL-109-018-5	140-178	IIC1	39	0	5	0	56
S78FL-109-018-6	178-203	IIC2	70	0	7	0	23
Immokalee fine sand:							
S78FL-109-028-1	0-20	A1	0	0	0	0	100
S78FL-109-028-4	102-162	B2h	0	0	0	0	100
S78FL-109-028-5	162-203	B3	0	0	0	0	100
Jonathan fine sand:							
S78FL-109-024-1	0-10	A1	17	16	16	0	51
S78FL-109-024-5	180-203	B2hm	8	14	9	0	69

TABLE 20.--CLAY MINERALOGY OF SELECTED SOILS--Continued

Soil name and sample numbers	Depth	Horizon	Clay minerals				
			Montmorillonite	14 angstrom intergrade	Kaolinite	Gibbsite	Quartz
	Cm		Pct	Pct	Pct	Pct	Pct
Manatee fine sandy loam:							
S77FL-109-003-1	0-20	A11	88	0	0	0	12
S77FL-109-003-3	33-64	B21t	96	0	2	0	2
S77FL-109-003-6	132-203	Cg	95	0	4	0	1
Moultrie fine sand:							
S77FL-109-005-1	0-5	A1	56	0	32	0	12
S77FL-109-005-5	66-74	B22h	0	0	25	0	25
S77FL-109-005-6	74-119	B3	0	0	22	0	19
Myakka fine sand:							
S78FL-109-030-1	0-10	A11	0	0	0	0	100
S78FL-109-030-5	58-76	B21h	0	0	0	0	100
S78FL-109-030-7	135-203	B3&Bh	0	0	0	0	100
Narcoossee fine sand, shelly substratum:							
S77FL-109-009-1	0-8	A1	0	39	35	0	26
S77FL-109-009-3	28-30	B21h	0	0	0	0	100
S77FL-109-009-6	51-64	C1	42	0	8	0	50
S77FL-109-009-8	76-203	C3	23	0	6	6	71
Orsino fine sand:							
S78FL-109-012-1	0-10	A1	33	17	17	0	33
S78FL-109-012-3	46-74	B21&Bh	20	51	16	0	13
S78FL-109-012-6	150-203	C	6	49	10	0	35
Palm Beach sand:							
S78FL-109-013-1	0-8	A1	50	16	22	0	12
S78FL-109-013-3	25-71	C12	67	0	15	0	18
S78FL-109-013-4	71-203	C2	39	0	11	0	50
Paola fine sand:							
S78FL-109-015-1	0-10	A1	44	22	13	0	21
S78FL-109-015-3	43-81	B&A	tr	40	23	0	37
S78FL-109-015-5	142-203	C	5	57	14	0	24
Parkwood fine sandy loam:							
S77FL-109-004-1	0-15	A1	96	0	1	0	3
S77FL-109-004-3	25-46	B21tca	98	0	1	0	1
S77FL-109-004-6	140-203	Cg	93	0	5	0	2
Pellicer silty clay loam:							
S77FL-109-010-2	25-140	C1g	64	0	30	0	6
S77FL-109-010-3	140-178	C2g	68	0	25	0	7
S77FL-109-010-4	178-203	C3g	76	0	20	0	4
Placid fine sand:							
S79FL-109-037-1	0-30	Ap	32	26	0	0	42
S79FL-109-037-7	130-147	C6	34	30	26	0	10
S79FL-109-037-8	147-203	C7	63	14	12	0	12
Pomello fine sand:							
S78FL-109-017-1	0-10	A1	0	9	6	0	85
S78FL-109-017-6	114-130	B21h	0	0	0	0	100
S78FL-109-017-8	145-203	B3&Bh	0	0	0	0	100
Pompano fine sand:							
S77FL-109-002-1	0-10	A1	0	28	12	0	60
S77FL-109-002-3	71-81	C2	53	0	3	0	44
S77FL-109-002-4	81-203	C3	25	0	0	0	75
Pottsburg fine sand:							
S77FL-109-007-1	0-15	A1	0	0	0	0	100
S77FL-109-007-3	33-51	A22	0	0	2	0	98
S77FL-109-007-5	152-168	B21h	0	0	0	0	100

TABLE 20.--CLAY MINERALOGY OF SELECTED SOILS--Continued

Soil name and sample numbers	Depth	Horizon	Clay minerals				
			Montmorillonite	14 angstrom intergrade	Kaolinite	Gibbsite	Quartz
	Cm		Pct	Pct	Pct	Pct	Pct
Riviera fine sand:							
S78FL-109-031-1	0-25	Ap	76	0	11	0	13
S78FL-109-031-4	58-71	Bt&A	90	0	5	0	5
S78FL-109-031-7	140-180	IIC1g	89	0	9	0	2
S78FL-109-031-8	180-203	IIC2g	90	0	7	0	3
Satellite fine sand:							
S77FL-109-001-3	84-104	C2	63	0	5	0	32
S77FL-109-001-4	104-203	C3	51	0	3	0	48
Smyrna fine sand:							
S78FL-109-032-1	0-18	Ap	0	0	0	0	100
S78FL-109-032-3	36-46	B21h	0	5	4	0	91
S78FL-109-032-8	157-203	C	66	0	28	0	6
Sparr fine sand:							
S78FL-109-021-1	0-8	A1	0	60	18	0	22
S78FL-109-021-4	51-76	A23	0	33	21	35	11
S78FL-109-021-6	173-203	B2tg	0	28	42	19	11
St. Augustine fine sand:							
S79FL-109-038-1	0-10	A1	84	0	13	0	3
S79FL-109-038-5	68-84	C4g	85	0	12	0	3
S79FL-109-038-6	84-203	C5g	79	0	13	0	8
St. Johns fine sand:							
S78FL-109-026-2	0-18	A11	0	6	0	0	94
S78FL-109-026-5	38-48	B21h	21	11	13	0	55
S78FL-109-026-8	107-127	B'21h	tr	12	10	0	78
S78FL-109-026-10	167-203	C	0	0	0	0	100
Tavares fine sand:							
S78FL-109-016-1	0-13	A	11	45	10	0	34
S78FL-109-016-3	23-81	C2	5	39	6	0	51
S78FL-109-016-6	157-203	C4	6	6	3	0	85
Tocoi fine sand:							
S79FL-109-036-1	0-33	A1	32	22	0	0	46
S79FL-109-036-3	51-58	B22h	27	60	0	0	13
S79FL-109-036-6	114-193	B2tg	34	32	17	0	17
S79FL-109-036-7	193-203	Cg	51	14	25	0	10
Tomoka muck:							
S78FL-109-020-3	53-162	IIC1	18	30	8	0	44
Zolfo fine sand:							
S78FL-109-022-1	0-13	Ap	0	43	7	18	32
S78FL-109-022-3	48-79	A22	0	42	12	23	23
S78FL-109-022-6	175-203	B22h	0	30	25	15	30

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). NP means nonplastic]

Soil name, sample number, horizon, and depth in inches	FDOT report number	Classification		Mechanical analysis*							Liquid limit	Plasticity index	Moisture** density	
				Percentage smaller than--			Percentage smaller than--							
		AASHTO***	Unified (estimated)	No. 10	No. 40	No. 200	0.05 mm	0.02 mm	0.005 mm	0.002 mm			Maximum dry density	Optimum moisture
											Pct		Lb/ft³	Pct
Adamsville fine sand: (S78FL-109-014)														
C1----------------------8-30	23	A-3	SP-SM	100	100	6	4	3	1	1	-	NP	101	15
C4&C5------------------44-80	24	A-3	SP-SM	100	100	7	6	4	3	3	-	NP	102	15
Adamsville Variant fine sand: (S78FL-109-023)														
C1---------------------10-23	37	A-3	SP-SM	100	99	10	8	7	5	5	-	NP	102	15
C2&C3------------------23-46	38	A-3	SP-SM	100	99	5	4	3	2	1	-	NP	101	15
Astatula fine sand: (S78FL-109-011)														
C1&C2------------------14-80	17	A-3	SP-SM	100	100	4	2	1	0	0	-	NP	99	13
Cassia fine sand: (S78FL-109-029)														
A2----------------------3-18	46	A-3	SP	100	98	2	1	0	0	0	-	NP	98	16
A'2--------------------32-75	47	A-3	SP	100	98	2	0	0	0	0	-	NP	100	16
EauGallie fine sand: (S78FL-109-033)														
A22--------------------10-17	53	A-3	SP-SM	100	100	5	3	0	0	0	-	NP	96	17
A'2--------------------32-45	54	A-3	SP	100	100	3	2	1	0	0	-	NP	97	16
B1g--------------------45-53	55	A-2-4	SM	100	100	13	13	12	11	11	-	NP	107	15
Ellzey fine sand: (S79FL-109-034)														
A22--------------------19-27	56	A-3	SP	100	99	3	2	0	0	0	-	NP	98	17
B22t-------------------41-58	57	A-2-4	SP-SM	100	99	11	8	4	4	4	-	NP	105	14
Fripp fine sand: (S78FL-109-027)														
C2----------------------9-48	44	A-3	SP	100	100	2	2	2	2	2	-	NP	95	17
Holopaw fine sand: (S77FL-109-008)														
A21g-------------------13-27	12	A-3	SP-SM	100	100	5	4	2	0	0	-	NP	100	16
A22g-------------------27-42	13	A-3	SP-SM	100	100	10	8	5	5	4	-	NP	106	13
B2tg-------------------53-72	14	A-2-4	SM	100	100	15	13	10	7	7	-	NP	109	14
Immokalee fine sand: (S78FL-109-028)														
A22--------------------15-40	45	A-3	SP	100	97	2	0	0	0	0	-	NP	96	17
Johnathan fine sand: (S78FL-109-024)														
A1&A22------------------4-39	39	A-3	SP	100	100	1	0	0	0	0	-	NP	94	18
A23--------------------39-71	40	A-3	SP-SM	100	100	5	4	4	4	4	-	NP	94	18
Moultrie fine sand: (S77FL-109-005)														
A22-------------------- 8-22	9	A-3	SP	100	99	4	3	2	1	0	-	NP	98	16
Myakka fine sand: (S78FL-109-030)														
A22--------------------14-23	48	A-3	SP-SM	100	99	5	4	4	2	1	-	NP	96	16
B22h-------------------30-53	49	A-3	SP-SM	100	100	7	0	0	0	0	-	NP	100	15

See footnotes at end of table.

TABLE 21.--ENGINEERING INDEX TEXT DATA--Continued

Soil name, sample number, horizon, and depth in inches	FDOT report number	Classification		Mechanical analysis*							Liquid limit	Plasticity index	Moisture** density	
				Percentage smaller than--			Percentage smaller than--							
		AASHTO***	Unified (estimated)	No. 10	No. 40	No. 200	0.05 mm	0.02 mm	0.005 mm	0.002 mm			Maximum dry density	Optimum moisture
											Pct		Lb/ft3	Pct
Narcoossee fine sand, shelly substratum: (S77FL-109-009)														
A2----------------------3-11	15	A-3	SP	100	96	2	0	0	0	0	-	NP	96	12
C1&C2-------------------20-30	16	A-3	SP	100	99	2	2	0	0	0	-	NP	98	16
Orsino fine sand: (S78FL-109-012)														
A2----------------------4-18	18	A-3	SP	100	98	2	1	0	0	0	-	NP	96	17
B2&Bh-------------------18-44	19	A-3	SP-SM	100	98	5	4	2	0	0	-	NP	103	13
C-----------------------59-80	20	A-3	SP	100	98	2	1	0	0	0	-	NP	98	16
Palm Beach fine sand: (S78FL-109-013)														
C1----------------------3-28	21	A-3	SP	100	64	4	3	2	1	1	-	NP	101	15
C2---------------------28-80	22	A-1-a	SP	80	26	1	1	0	0	0	-	NP	103	16
Paola fine sand: (S78FL-109-015)														
A2----------------------4-17	25	A-3	SP	100	100	2	0	0	0	0	-	NP	94	17
B&A--------------------17-32	26	A-3	SP	100	100	3	2	1	0	0	-	NP	99	16
C----------------------32-80	27	A-3	SP	100	100	4	3	1	0	0	-	NP	99	17
Parkwood loamy fine sand: (S77FL-109-004)														
B21tca-----------------10-18	7	A-2-4	SM	100	100	21	19	16	14	9	-	NP	109	16
Placid fine sand: (S79FL-109-037)														
C2---------------------20-26	62	A-3	SP	100	100	4	3	1	0	0	-	NP	101	16
C7---------------------58-80	63	A-3	SP-SM	100	100	8	7	6	5	3	-	NP	102	15
Pomello fine sand: (S78FL-109-017)														
A2----------------------4-35	30	A-3	SP	100	100	2	1	0	0	0	-	NP	98	17
B2h--------------------45-57	31	A-3	SP-SM	100	100	9	7	5	4	1	-	NP	101	15
Pompano fine sand: (S77FL-109-002)														
C1----------------------4-28	3	A-3	SP	100	100	1	0	0	0	0	-	NP	94	16
C3---------------------32-80	4	A-3	SP	100	100	1	0	0	0	0	-	NP	93	18
Riviera fine sand: (S78FL-109-031)														
A22--------------------15-23	50	A-2-4	SM	100	99	14	9	3	1	0	-	NP	101	14
Satellite fine sand: (S77FL-109-001)														
C1&C2-------------------6-33	1	A-3	SP	100	100	1	0	0	0	0	-	NP	95	16
C3---------------------41-80	2	A-3	SP	100	100	2	0	0	0	0	-	NP	93	17
Smyrna fine sand: (S78FL-109-032)														
B3&Bh------------------21-32	52	A-3	SP-SM	100	100	8	6	4	1	1	-	NP	102	15
Sparr fine sand: (S78FL-109-021)														
A21&A22-----------------3-20	32	A-3	SP-SM	100	100	8	6	3	1	0	-	NP	97	16
A23&A24----------------20-68	33	A-3	SP-SM	100	100	7	7	4	3	2	-	NP	99	16
B2tg-------------------68-80	34	A-2-4	SM	100	100	19	18	16	13	12	-	NP	110	14

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 analysis*							Liquid limit	Plasticity index	Moisture** density	
				Percentage smaller than--			Percentage smaller than--							
		AASHTO***	Unified (estimated)	No. 10	No. 40	No. 200	0.05 mm	0.02 mm	0.005 mm	0.002 mm			Maximum dry density	Optimum moisture
											Pct		Lb/ft^3	Pct
St. Augustine fine sand:														
(S79FL-109-038)														
C3g---------------------10-27	64	A-3	SP	100	98	2	1	1	1	1	-	NP	105	11
St. Johns fine sand:														
(S78FL-109-026)														
A2----------------------10-15	43	A-3	SP-SM	100	100	6	4	2	0	0	-	NP	99	13
Tavares fine sand:														
(S78FL-109-016)														
C2&C3-------------------9-47	28	A-3	SP	100	98	3	0	0	0	0	-	NP	101	14
C4---------------------47-80	29	A-3	SP	100	98	2	1	0	0	0	-	NP	98	16
Tocoi fine sand:														
(S79FL-109-036)														
B21h-------------------13-20	60	A-2-4	SP-SM	100	100	11	9	5	3	2	-	NP		
B2tg-------------------45-76	61	A-2-4	SM	100	100	14	13	11	10	9	-	NP		
Zolfo fine sand:														
(S78FL-109-022)														
A21----------------------5-19	35	A-3	SP	100	99	4	0	0	0	0	-	NP	101	15
A22&A23----------------19-66	36	A-3	SP	100	98	3	3	1	0	0	-	NP	98	16

*Mechanical analyses according to AASHTO designation T88-78(1). Results by this procedure differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method and the various grain-sized fractions are calculated on the basi 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(1).

***Based on AASHTO Designation M 145-73(1).

TABLE 22.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Adamsville	Hyperthermic, uncoated Aquic Quartzipsamments
Adamsville Variant	Hyperthermic, uncoated Aquic Quartzipsamments
Astatula	Hyperthermic, uncoated Typic Quartzipsamments
Bakersville	Sandy, siliceous, hyperthermic Cumulic Humaquepts
Bluff	Fine-loamy, siliceous, hyperthermic Typic Haplaquolls
Cassia	Sandy, siliceous, hyperthermic Typic Haplohumods
Durbin	Euic, hyperthermic Typic Sulfihemists
EauGallie	Sandy, siliceous, hyperthermic Alfic Haplaquods
Ellzey	Sandy, siliceous, hyperthermic Arenic Ochraqualfs
Floridana	Loamy, siliceous, hyperthermic Arenic Argiaquolls
Fripp	Thermic, uncoated Typic Quartzipsamments
Holopaw	Loamy, siliceous, hyperthermic Grossarenic Ochraqualfs
Hontoon	Dysic, hyperthermic Typic Medisaprists
Immokalee	Sandy, siliceous, hyperthermic Arenic Haplaquods
Jonathan	Sandy, siliceous, hyperthermic, ortstein Typic Haplohumods
Manatee	Coarse-loamy, siliceous, hyperthermic Typic Argiaquolls
Moultrie	Siliceous, hyperthermic Spodic Psammaquents
Myakka	Sandy, siliceous, hyperthermic Aeric Haplaquods
Narcoossee	Sandy, siliceous, hyperthermic Entic Haplohumods
Ona	Sandy, siliceous, hyperthermic Typic Haplaquods
Orsino	Hyperthermic, uncoated Spodic Quartzipsamments
Palm Beach	Hyperthermic, uncoated Typic Quartzipsamments
Paola	Hyperthermic, uncoated Spodic Quartzipsamments
Parkwood	Coarse-loamy, siliceous, hyperthermic Mollic Ochraqualfs
Pellicer	Fine, montmorillonitic, nonacid, hyperthermic Typic Sulfaquents
Placid	Sandy, siliceous, hyperthermic Typic Humaquepts
Pomello	Sandy, siliceous, hyperthermic Arenic Haplohumods
Pomona	Sandy, siliceous, hyperthermic Ultic Haplaquods
Pompano	Siliceous, hyperthermic Typic Psammaquents
Pottsburg	Sandy, siliceous, thermic Grossarenic Haplaquods
Riviera	Loamy, siliceous, hyperthermic Arenic Glossaqualfs
Samsula	Sandy or sandy-skeletal, siliceous, dysic, hyperthermic Terric Medisaprists
Satellite	Hyperthermic, uncoated Aquic Quartzipsamments
Smyrna*	Sandy, siliceous, hyperthermic Aeric Haplaquods
Sparr	Loamy, siliceous, hyperthermic Grossarenic Paleudults
St. Augustine	Sandy, siliceous, hyperthermic Udalfic Arents
St. Johns	Sandy, siliceous, hyperthermic Typic Haplaquods
Tavares	Hyperthermic, uncoated Typic Quartzipsamments
Terra Ceia	Euic, hyperthermic Typic Medisaprists
Tisonia	Clayey, montmorillonitic, euic, thermic Typic Sulfihemists
Tocoi	Sandy, siliceous, hyperthermic Ultic Haplaquods
Tomoka	Loamy, siliceous, dysic, hyperthermic Terric Medisaprists
Wabasso	Sandy, siliceous, hyperthermic Alfic Haplaquods
Wesconnett	Sandy, siliceous, thermic Typic Haplaquods
Winder	Fine-loamy, siliceous, hyperthermic Typic Glossaqualfs
Zolfo*	Sandy, siliceous, hyperthermic Grossarenic Entic Haplohumods

* 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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