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Natural
Resources
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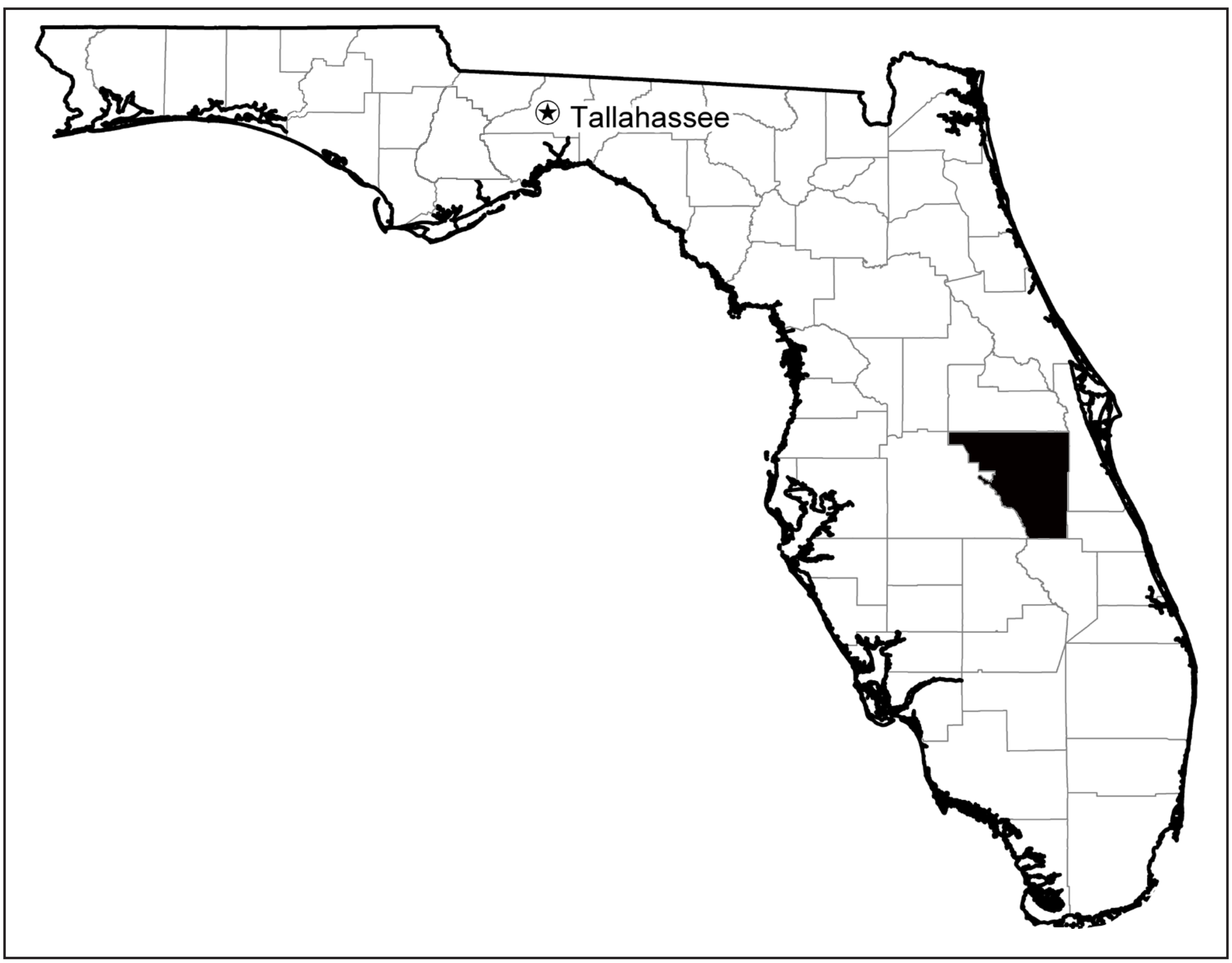
Service

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

Supplement to the Soil Survey of Osceola County Area, Florida



How To Use This Soil Survey Supplement

This document, in conjunction with the Web Soil Survey, supplements the Soil Survey of Osceola County Area, Florida, published in 1979. Find a map of your area of interest on the **Index to Map Sheets** or on the Web Soil Survey, which is online at http://websoilsurvey.nrcs.usda.gov. The updated maps include delineations for approximately 200,000 more acres than were released in 1979. Note the map unit symbols in the area. Turn to the **Contents** in this supplement. The **Contents** lists the map units by symbol and name and shows the page where each map unit is described. Also see the **Contents** for sections of this publication that may address your specific needs.

Advancements in technology and increases in the intensity and variety of land uses have produced a need for updated soils information. In preparation for this publication, the correlation for Osceola County was revised in 2008 and amended in 2011. This publication and the Web Soil Survey include the recorrelated map unit legend and updated information regarding major soil properties and the use and management of the soils. In some cases, the name of the map unit and the name of the soil series have changed from the first publication. The map unit symbols and map delineations have not changed.

Web Soil Survey

The latest detailed soil maps and updated tabular data, including soil properties and interpretations, are available on the Web Soil Survey at http://websoilsurvey.nrcs.usda.gov.

Archived Soil Survey

Comprehensive descriptions of the detailed soil map units and additional information about the soils in the survey area are archived in the original Soil Survey of Oscoloa County Area, Florida. Archived soil surveys are available from many libraries, from the local office of the Natural Resources Conservation Service, and from the USDA Service Center in Kissimmee, Florida.

This document 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 Natural Resources Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. The survey was made cooperatively by the Natural Resources Conservation Service and the University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations, and Soil Science Department. It is part of the technical assistance furnished to the Osceola Soil and Water Conservation District. The Osceola County Board of Commissioners contributed financially to accelerate the completion of fieldwork for the soil survey.

Major fieldwork for the Soil Survey of Osceola County Area, Florida, was completed in 1976. Fieldwork for the Deseret Ranch was completed in 2008. Soil names and descriptions were approved in 1976, revised in 2008, and amended in 2011. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2009. The maps for the survey were developed using ESRI ArcGIS Maplex Extension utilizing imagery at 1:24,000 from 2005 to 2008 aerial photography.

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Issued May 2011

Preface

Soil surveys contain information that affects land use planning in survey areas. They include predictions of soil behavior for selected land uses. The surveys highlight soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

Soil surveys are designed for many different users. Farmers, ranchers, foresters, and agronomists can use the surveys 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 surveys to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the surveys to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. 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 the original soil survey. The location of each map unit is shown on the detailed soil maps. Each soil in the survey area is described, and information on specific uses is given. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Supplement to the Soil Survey of
Osceola County Area, Florida

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Fieldwork by Howard Yamataki, Doug Lewis, Martin Figueroa,
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United States Department of Agriculture,
Natural Resources Conservation Service,
in cooperation with
the University of Florida,
Institute of Food and Agricultural Sciences,
Agricultural Experiment Stations, and
Soil Science Department

This supplement provides information to update the original soil survey of Osceola County Area, Florida, which was issued April 1979 (USDA, 1979). The original tables and maps are not included in this document. Updated maps with new background imagery are linked to the index to map sheets in this document. Updated tables and new digital maps are also available from the Web Soil Survey at http://websoilsurvey.nrcs.usda.gov. The tables were generated from the NRCS National Soil Information System (NASIS) and are also available from the NRCS Soil Data Mart at http://soildatamart.nrcs.usda.gov.

OSCEOLA COUNTY is in the central part of peninsular Florida (fig. 1). It is bordered on the north by Orange County, on the east by Brevard and Indian River Counties, on the south by Okeechobee County, and on the west by Polk County.

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observe the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dig 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 biological activity.

The soils and miscellaneous areas in a survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind or segment of the landscape. By observing the soils and miscellaneous areas in a survey area and relating their position to specific segments of the landscape, soil scientists

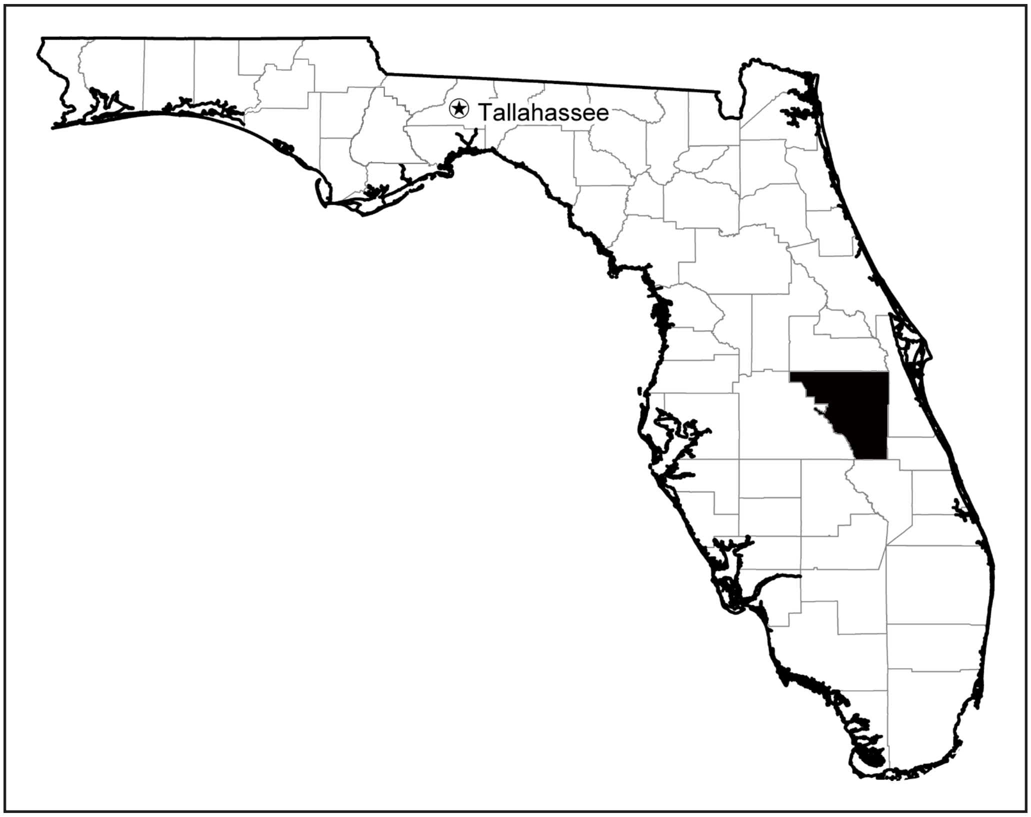


Figure 1.—Location of Osceola County in Florida.

develop a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientists to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate 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-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists record the characteristics of the soil profiles that they study. They note color, texture, size, and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in a survey area and determining their properties, the soil scientists assign 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. Soil taxonomy, 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 classify and name the soils in a survey area, they compare 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 interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are 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 are 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 predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists locate and identify the significant natural bodies of soil in a survey area, they draw 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.

The descriptions, names, and delineations of the soils in a survey area do not always fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. 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 other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties 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, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. The soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Candler sand, 0 to 5 percent slopes, is a phase of the Candler series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

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

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. No associations were mapped in Osceola County.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. No undifferentiated groups were mapped in Osceola County.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits is an example.

Table 1 gives the acreage and proportionate extent of each map unit in the survey area. Other tables available on the Web Soil Survey 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.

Table 1.—Acreage and Proportionate Extent of the Soils

Map symbol	Map unit name	Acres	Percent
1	Adamsville sand	5,220	0.5
2	Adamsville variant fine sand, 0 to 5 percent slopes	1,017	0.1
3	Ankona fine sand	1,155	0.1
4	Arents, 0 to 5 percent slopes	3,795	0.4
5	Basinger fine sand	44,637	4.6
6	Basinger fine sand, depressional	47,191	4.9
7	Candler sand, 0 to 5 percent slopes	6,033	0.6
8	Candler sand, 5 to 12 percent slopes	2,147	0.2
9	Cassia fine sand	6,380	0.7
10	Delray loamy fine sand, depressional	9,697	1.0
11	EauGallie fine sand	42,853	4.4
12	Floridana fine sand, depressional	6,579	0.7
13	Gentry fine sand	4,387	0.5
14	Holopaw fine sand	6,577	0.7
15	Hontoon muck	24,676	2.6
16	Immokalee fine sand	70,229	7.3
17	Kaliga muck	10,205	1.1
18	Lokosee fine sand	10,867	1.1
19	Malabar fine sand	27,596	2.9
20	Malabar fine sand, depressional	4,898	0.5
21	Malabar-Pineda complex	6,250	0.6
22	Myakka fine sand	122,954	12.8
23	Myakka-Urban land complex	6,055	0.6
24	Narcoossee fine sand	4,004	0.4
25	Nittaw muck	8,967	0.9
26	Oldsmar fine sand	7,763	0.8
27	Ona fine sand	6,935	0.7
28	Paola sand, 0 to 5 percent slopes	478	>0.1
29	Parkwood loamy fine sand, occasionally flooded	1,431	0.1
30	Pineda fine sand	5,915	0.6
31	Pits	528	>0.1
32	Placid fine sand, depressional	38,664	4.0
33	Placid variant fine sand	589	>0.1
34	Pomello fine sand, 0 to 5 percent slopes	13,640	1.4
35	Pomona fine sand	8,035	0.8
36	Pompano fine sand	8,762	0.9
37	Pompano fine sand, depressional	12,152	1.3
38	Riviera fine sand	11,534	1.2
39	Riviera fine sand, depressional	11,631	1.2
40	Samsula muck	27,882	2.9
41	Satellite sand	3,601	0.4
42	Smyrna fine sand	188,635	19.6
43	St. Lucie fine sand, 0 to 5 percent slopes	2,541	0.3
44	Tavares fine sand, 0 to 5 percent slopes	6,293	0.7
45	Wabasso fine sand	9,515	1.0
46	Wauchula fine sand	2,024	0.2
47	Winder loamy fine sand	5,770	0.6
48	Placid-Riviera-Samsula complex, frequently flooded	7,915	0.8
99	Water	97,698	10.1
Total		964,300	100.0

1—Adamsville sand

The Adamsville component makes up 90 percent of the map unit. Slopes range from 0 to 2 percent. This component is on rises on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is high. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 33 inches during June, July, August, September, October, and November. The content of organic matter in the surface horizon is about 1 percent. This component is in ecological site R155XY008FL, Upland Hardwood Hammocks. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

The minor components in this map unit are Narcoossee (3 percent), Parkwood (3 percent), Riviera (2 percent), and Tavares (2 percent) soils.

2—Adamsville variant fine sand, 0 to 5 percent slopes

The Adamsville variant component makes up 90 percent of the map unit. Slopes range from 0 to 5 percent. This component is on rises on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 33 inches during June, July, August, September, October, and November. The content of organic matter in the surface horizon is about 1 percent. This component is in ecological site R155XY008FL, Upland Hardwood Hammocks. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

The minor components in this map unit include Basinger (2 percent), Gentry (2 percent), Placid (2 percent), Pompano (2 percent), and Riviera (2 percent) soils.

3—Ankona fine sand

The Ankona component makes up 90 percent of the map unit. Slopes range from 0 to 2 percent. This component is on flats on marine terraces on coastal plains. The parent material consists of sandy marine deposits over loamy marine deposits. Depth to a root-restrictive layer, ortstein, is 32 to 36 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is high. Available water capacity to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 12 inches during June, July, August, and September. The content of organic matter in the surface horizon is about 3 percent. This component is in ecological site R155XY003FL, South Florida Flatwoods. Nonirrigated land capability classification is 4w. This soil does not meet hydric criteria.

The minor components in this map unit include EauGallie (2 percent), Immokalee (2 percent), Myakka (2 percent), Oldsmar (2 percent), and Pompano (2 percent) soils.

4—Arents, 0 to 5 percent slopes

Arents make up 100 percent of the map unit. Slopes range from 0 to 5 percent. This component is on fills and rises on marine terraces on coastal plains. The parent material consists of altered marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is high. Available water capacity to a depth of

60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 27 inches during June, July, August, September, October, and November. The content of organic matter in the surface horizon is about 0 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

5—Basinger fine sand

The Basinger component makes up 85 percent of the map unit. Slopes range from 0 to 2 percent. This component is on marine terraces on coastal plains. It is on flats and in drainageways. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is very high. Available water capacity to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 6 inches during June, July, August, September, October, and November. The content of organic matter in the surface horizon is about 1 percent. This component is in ecological site R155XY011FL, Slough. Nonirrigated land capability classification is 4w. This soil meets hydric criteria.

The minor components in this map unit include Placid (5 percent), Pompano (5 percent), and Smyrna (5 percent) soils.

6—Basinger fine sand, depressional

The Basinger, depressional, component makes up 85 percent of the map unit. Slopes range from 0 to 2 percent. This component is in depressions on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is very high. Available water capacity to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at the surface during June, July, August, September, October, November, and December. The content of organic matter in the surface horizon is about 1 percent. This component is in ecological site R155XY010FL, Freshwater Marshes and Ponds. Nonirrigated land capability classification is 7w. This soil meets hydric criteria.

The minor components in this map unit include Myakka (4 percent), Placid (4 percent), Pompano (4 percent), and Smyrna (3 percent) soils.

7—Candler sand, 0 to 5 percent slopes

The Candler component makes up 90 percent of the map unit. Slopes range from 0 to 5 percent. This component is on ridges on marine terraces on coastal plains. The parent material consists of eolian or sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water capacity to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. The content of organic matter in the surface horizon is about 1 percent. This component is in ecological site R155XY002FL, Longleaf Pine-Turkey Oak Hills. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

The minor components in this map unit include a Candler soil that has a slope of 5 to 12 percent (3 percent) and Cassia (3 percent), Pomello (2 percent), and Tavares (2 percent) soils.

8—Candler sand, 5 to 12 percent slopes

The Candler component makes up 95 percent of the map unit. Slopes range from 5 to 12 percent. This component is on ridges on marine terraces on coastal plains. The parent material consists of eolian or sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water capacity to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. The content of organic matter in the surface horizon is about 1 percent. This component is in ecological site R155XY002FL, Longleaf Pine-Turkey Oak Hills. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

The minor components in this map unit include a Candler soil with a slope of 0 to 5 percent.

9—Cassia fine sand

The Cassia component makes up 95 percent of the map unit. Slopes range from 0 to 2 percent. This component is on rises on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 30 inches during June, July, August, September, October, November, and December. The content of organic matter in the surface horizon is about 1 percent. This component is in ecological site R155XY001FL, Sand Pine Scrub. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

The minor components in this map unit include Myakka (3 percent) and Pomello (2 percent) soils.

10—Delray loamy fine sand, depressional

The Delray, depressional, component makes up 90 percent of the map unit. Slopes range from 0 to 2 percent. This component is in depressions on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately high. Available water capacity to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at the surface during June, July, August, September, October, November, and December. The content of organic matter in the surface horizon is about 4 percent. This component is in ecological site R155XY010FL, Freshwater Marshes and Ponds. Nonirrigated land capability classification is 7w. This soil meets hydric criteria.

The minor components in this map unit include Floridana (4 percent), Holopaw (3 percent), and Kaliga (3 percent) soils.

11—EauGallie fine sand

The EauGallie component makes up 90 percent of the map unit. Slopes range from 0 to 2 percent. This component is on flats on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 12 inches during June, July, August, and September. The content of organic matter in the surface horizon is about 5 percent. This component is in ecological site R155XY003FL, South Florida Flatwoods. Nonirrigated land capability classification is 4w. This soil does not meet hydric criteria.

The minor components in this map unit include Basinger (2 percent), Immokalee (2 percent), Malabar (2 percent), Myakka (1 percent), Oldsmar (1 percent), Smyrna (1 percent), and Wabasso (1 percent) soils.

12—Floridana fine sand, depressional

The Floridana, depressional, component makes up 90 percent of the map unit. Slopes range from 0 to 2 percent. This component is in depressions on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately low. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at the surface during June, July, August, September, October, November, and December. The content of organic matter in the surface horizon is about 11 percent. This component is in ecological site R155XY010FL, Freshwater Marshes and Ponds. Nonirrigated land capability classification is 7w. This soil meets hydric criteria.

The minor components in this map unit include Delray (3 percent), Gentry (3 percent), Kaliga (2 percent), and Nittaw (2 percent) soils.

13—Gentry fine sand

The Gentry component makes up 90 percent of the map unit. Slopes range from 0 to 2 percent. This component is on flood plains on marine terraces on coastal plains and in drainageways on marine terraces. The parent material consists of loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately low. Available water capacity to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is occasionally flooded. It is frequently ponded. A seasonal zone of water saturation is at the surface during June, July, August, September, October, November, and December. The content of organic matter in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7w. This soil meets hydric criteria.

The minor components in this map unit include Delray (2 percent), Floridana (2 percent), Kaliga (1 percent), Malabar (1 percent), Nittaw (1 percent), Pineda (1 percent), Riviera (1 percent), and Winder (1 percent) soils.

14—Holopaw fine sand

The Holopaw component makes up 90 percent of the map unit. Slopes range from 0 to 2 percent. This component is on marine terraces on coastal plains. It is in drainageways and on flats. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is high. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 6 inches during June, July, August, September, October, and November. The content of organic matter in the surface horizon is about 3 percent. This component is in ecological site R155XY012FL, Wetland Hardwood Hammocks. Nonirrigated land capability classification is 4w. This soil meets hydric criteria.

The minor components in this map unit include Delray (3 percent), Malabar (3 percent), Oldsmar (2 percent), and Riviera (2 percent) soils.

15—Hontoon muck

The Hontoon component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is in depressions on marine terraces on coastal plains. The parent material consists of herbaceous organic material. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is high. Available water capacity to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at the surface in all months. The content of organic matter in the surface horizon is about 80 percent. This component is in ecological site R155XY010FL, Freshwater Marshes and Ponds. Nonirrigated land capability classification is 7w. This soil meets hydric criteria.

The minor components in this map unit include Kaliga (4 percent), Placid (3 percent), and Samsula (3 percent) soils.

16—Immokalee fine sand

The Immokalee component makes up 90 percent of the map unit. Slopes range from 0 to 2 percent. This component is on flatwoods on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 12 inches during June, July, August, and September. The content of organic matter in the surface horizon is about 2 percent. This component is in ecological site R155XY003FL, South Florida Flatwoods. Nonirrigated land capability classification is 4w. This soil does not meet hydric criteria.

The minor components in this map unit include Ankona (2 percent), Basinger (2 percent), Myakka (2 percent), Pomello (2 percent), and Smyrna (2 percent) soils.

17—Kaliga muck

The Kaliga component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is in depressions on marine terraces on coastal plains. The parent material consists of herbaceous organic material over stratified loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately low. Available water capacity to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at the surface in all months. The content of organic matter in the surface horizon is about 64 percent. Nonirrigated land capability classification is 7w. This soil meets hydric criteria.

The minor components in this map unit include Delray (2 percent), Hontoon (2 percent), Nittaw (2 percent), Placid (2 percent), and Samsula (2 percent) soils.

18—Lokosee fine sand

The Lokosee component makes up 85 percent of the map unit. Slopes range from 0 to 2 percent. This component is in drainageways on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 12 inches during June, July, August, and September. The content of organic matter in the surface horizon is about 1 percent. This component is in ecological site R155XY012FL, Wetland Hardwood Hammocks. Nonirrigated land capability classification is 4w. This soil does not meet hydric criteria.

The minor components in this map unit include EauGallie (3 percent), Holopaw (3 percent), Oldsmar (3 percent), Pineda (3 percent), and Riviera (3 percent) soils.

19—Malabar fine sand

The Malabar component makes up 90 percent of the map unit. Slopes range from 0 to 2 percent. This component is in drainageways on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 6 inches during June, July, August, September, October, and November. The content of organic matter in the surface horizon is about 3 percent. This component is in ecological site R155XY011FL, Slough. Nonirrigated land capability classification is 4w. This soil meets hydric criteria.

The minor components in this map unit include Delray (2 percent), Pineda (2 percent), Pompano (2 percent), Riviera (2 percent), and Winder (2 percent) soils.

20—Malabar fine sand, depressional

The Malabar, depressional, component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is in depressions on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately low. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at the surface during June, July, August, September, October, November, and December. The content of organic matter in the surface horizon is about 3 percent. This component is in ecological site R155XY010FL, Freshwater Marshes and Ponds. Nonirrigated land capability classification is 7w. This soil meets hydric criteria.

The minor components in this map unit include Basinger (2 percent), Gentry (2 percent), Holopaw (2 percent), Kaliga (2 percent), Lokosee (2 percent), Placid (2 percent), Pompano (2 percent), and Riviera (1 percent) soils.

21—Malabar-Pineda complex

The Malabar component makes up 55 percent of the map unit. Slopes range from 0 to 2 percent. This component is on marine terraces on coastal plains. It is in drainageways and on flats. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 6 inches during June, July, August, September, October, and November. The content of organic matter in the surface horizon is about

3 percent. This component is in ecological site R155XY011FL, Slough. Nonirrigated land capability classification is 4w. This soil meets hydric criteria.

The Pineda component makes up 35 percent of the map unit. Slopes range from 0 to 2 percent. This component is in drainageways on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 6 inches during June, July, August, September, October, and November. The content of organic matter in the surface horizon is about 3 percent. This component is in ecological site R155XY011FL, Slough. Nonirrigated land capability classification is 3w. This soil meets hydric criteria.

The minor components in this map unit include Basinger (5 percent) and Riviera (5 percent) soils.

22—Myakka fine sand

The Myakka component makes up 85 percent of the map unit. Slopes range from 0 to 2 percent. This component is on flatwoods on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water capacity to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 12 inches during June, July, August, and September. The content of organic matter in the surface horizon is about 5 percent. This component is in ecological site R155XY003FL, South Florida Flatwoods. Nonirrigated land capability classification is 4w. This soil does not meet hydric criteria.

The minor components in this map unit include Cassia (3 percent), EauGallie (3 percent), Immokalee (3 percent), Ona (2 percent), Pomello (2 percent), and Smyrna (2 percent) soils.

23—Myakka-Urban land complex

The Myakka component makes up 50 percent of the map unit. Slopes range from 0 to 2 percent. This component is on flatwoods on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water capacity to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 12 inches during June, July, August, and September. The content of organic matter in the surface horizon is about 5 percent. Nonirrigated land capability classification is 4w. This soil does not meet hydric criteria.

The Urban land component makes up 40 percent of the map unit. Urban land consists of areas that are mostly covered by streets, parking lots, buildings, and other structures. Urban land is a miscellaneous area.

The minor components in this map unit include Immokalee (5 percent) and Smyrna (5 percent) soils.

24—Narcoossee fine sand

The Narcoossee component makes up 90 percent of the map unit. Slopes range from 0 to 2 percent. This component is on marine terraces on coastal plains. It is on rises and knolls. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is high. Available water capacity to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 33 inches during June, July, August, September, October, and November. The content of organic matter in the surface horizon is about 2 percent. This component is in ecological site R155XY008FL, Upland Hardwood Hammocks. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

The minor components in this map unit include Adamsville (3 percent), Myakka (3 percent), Smyrna (2 percent), and Tavares (2 percent) soils.

25—Nittaw muck

The Nittaw component makes up 90 percent of the map unit. Slopes range from 0 to 2 percent. This component is in depressions on marine terraces on coastal plains. The parent material consists of clayey marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately low. Available water capacity to a depth of 60 inches is high. Shrink-swell potential is high. This soil is occasionally flooded. It is frequently ponded. A seasonal zone of water saturation is at the surface in all months. The content of organic matter in the surface horizon is about 55 percent. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

The minor components in this map unit include Floridana (3 percent), Gentry (3 percent), Kaliga (2 percent), and Winder (2 percent) soils.

26—Oldsmar fine sand

The Oldsmar component makes up 85 percent of the map unit. Slopes range from 0 to 2 percent. This component is on flatwoods on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 12 inches during June, July, August, and September. The content of organic matter in the surface horizon is about 2 percent. This component is in ecological site R155XY003FL, South Florida Flatwoods. Nonirrigated land capability classification is 4w. This soil does not meet hydric criteria.

The minor components in this map unit include Ankona (3 percent), EauGallie (3 percent), Immokalee (3 percent), Myakka (3 percent), and Smyrna (3 percent) soils.

27—Ona fine sand

The Ona component makes up 85 percent of the map unit. Slopes range from 0 to 2 percent. This component is on flats on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 12 inches during June, July, August, and September. The content of organic matter in the surface horizon is about 3 percent. This component is in ecological site R155XY003FL, South Florida Flatwoods. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

The minor components in this map unit include Basinger (3 percent), EauGallie (3 percent), Myakka (3 percent), Placid (3 percent), and Smyrna (3 percent) soils.

28—Paola sand, 0 to 5 percent slopes

The Paola component makes up 90 percent of the map unit. Slopes range from 0 to 5 percent. This component is on ridges on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is very high. Available water capacity to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. The content of organic matter in the surface horizon is about 1 percent. This component is in ecological site R155XY001FL, Sand Pine Scrub. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

The minor components in this map unit include Pomello (4 percent), Satellite (3 percent), and St. Lucie (3 percent) soils.

29—Parkwood loamy fine sand, occasionally flooded

The Parkwood, occasionally flooded, component makes up 90 percent of the map unit. Slopes range from 0 to 2 percent. This component is on flats on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is high. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 12 inches during June, July, August, and September. The content of organic matter in the surface horizon is about 4 percent. This component is in ecological site R155XY012FL, Wetland Hardwood Hammocks. Nonirrigated land capability classification is 3w. This soil meets hydric criteria. Typically, the calcium carbonate equivalent within a depth of 40 inches does not exceed 15 percent.

The minor components in this map unit include Malabar (2 percent), Pompano (2 percent), Riviera (2 percent), Wabasso (2 percent), and Winder (2 percent) soils.

30—Pineda fine sand

The Pineda component makes up 90 percent of the map unit. Slopes range from 0 to 2 percent. This component is on flats on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 6 inches during June, July, August, September, October, and November. The content of organic matter in the surface horizon is about 3 percent. This component is in ecological site R155XY012FL, Wetland Hardwood Hammocks. Nonirrigated land capability classification is 3w. This soil meets hydric criteria.

The minor components in this map unit include Delray (3 percent), Floridana (3 percent), Malabar (2 percent), and Riviera (2 percent) soils.

31—Pits

The Pits component makes up 95 percent of the map unit. Pits are open excavations from which soil and, commonly, the underlying material have been removed, exposing either rock or other material. The Pits component is a miscellaneous area.

The minor components in this map unit include Arents (5 percent).

32—Placid fine sand, depressional

The Placid, depressional, component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is in depressions on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is high. Available water capacity to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at the surface during June, July, August, September, October, November, and December. The content of organic matter in the surface horizon is about 3 percent. This component is in ecological site R155XY010FL, Freshwater Marshes and Ponds. Nonirrigated land capability classification is 7w. This soil meets hydric criteria.

The minor components in this map unit include Basinger, depressional (3 percent), Delray (3 percent), Gentry (3 percent), Ona (2 percent), Pompano (2 percent), and Samsula (2 percent) soils.

33—Placid variant fine sand

The Placid variant component makes up 85 percent of the map unit. Slopes range from 0 to 2 percent. This component is on flats on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is high. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 30 inches during June, July, August, September, October, and November. The content of organic matter in the surface horizon is about 3 percent. This component is in ecological site R155XY008FL, Upland Hardwood Hammocks. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

The minor components in this map unit include Adamsville (4 percent), Basinger (4 percent), Ona (4 percent), and Placid (3 percent) soils.

34—Pomello fine sand, 0 to 5 percent slopes

The Pomello component makes up 85 percent of the map unit. Slopes range from 0 to 5 percent. This component is on marine terraces on coastal plains. It is on ridges and knolls. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is high. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 33 inches during July, August, September, October, and November. The content of organic matter in the surface horizon is about 1 percent. This component is in ecological site R155XY002FL, Longleaf Pine-Turkey Oak Hills. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

The minor components in this map unit include Cassia (3 percent), Immokalee (3 percent), Myakka (3 percent), Smyrna (3 percent), and St. Lucie (3 percent) soils.

35—Pomona fine sand

The Pomona component makes up 88 percent of the map unit. Slopes range from 0 to 2 percent. This component is on rises on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 12 inches during June, July, August, and September. The content of organic matter in the surface horizon is about 3 percent. This component is in ecological site R155XY003FL, South Florida Flatwoods. Nonirrigated land capability classification is 4w. This soil does not meet hydric criteria.

The minor components in this map unit include Ankona (2 percent), Basinger (2 percent), EauGallie (2 percent), Myakka (2 percent), Oldsmar (2 percent), and Wabasso (2 percent) soils.

36—Pompano fine sand

The Pompano component makes up 90 percent of the map unit. Slopes range from 0 to 2 percent. This component is in drainageways on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is high. Available water capacity to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 6 inches during June, July, August, September, October, and November. The content of organic matter in the surface horizon is about 3 percent. This component is in ecological site R155XY011FL, Slough. Nonirrigated land capability classification is 4w. This soil meets hydric criteria.

The minor components in this map unit include Basinger, depressional (3 percent); Holopaw (3 percent); Malabar (2 percent); and Riviera (2 percent) soils.

37—Pompano fine sand, depressional

The Pompano, depressional, component makes up 92 percent of the map unit. Slopes are 0 to 1 percent. This component is in depressions on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is high. Available water capacity to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at the surface during June, July, August, September, October, November, and December. The content of organic matter in the surface horizon is about 3 percent. This component is in ecological site R155XY010FL, Freshwater Marshes and Ponds. Nonirrigated land capability classification is 7w. This soil meets hydric criteria.

The minor components in this map unit include Basinger, depressional (2 percent); Malabar, depressional (2 percent); Placid (2 percent); and Riviera, depressional (2 percent) soils.

38—Riviera fine sand

The Riviera component makes up 90 percent of the map unit. Slopes range from 0 to 2 percent. This component is on flats on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water capacity to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 6 inches during June, July, August, September, October, and November. The content of organic matter in the surface horizon is about 1 percent. This component is in ecological site R155XY012FL, Wetland Hardwood Hammocks. Nonirrigated land capability classification is 3w. This soil meets hydric criteria.

The minor components in this map unit include Gentry (2 percent), Holopaw (2 percent), Malabar (2 percent), Pineda (2 percent), Wabasso (1 percent), and Winder (1 percent) soils.

39—Riviera fine sand, depressional

The Riviera, depressional, component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is in depressions on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately low. Available water capacity to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at the surface during June, July, August, September, October, November, and December. The content of organic matter in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7w. This soil meets hydric criteria.

The minor components in this map unit include Floridana (3 percent), Gentry (3 percent), Wabasso (2 percent), and Winder (2 percent) soils.

40—Samsula muck

The Samsula component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is in depressions on marine terraces on coastal plains. The parent material consists of herbaceous organic material over sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is high. Available water capacity to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at the surface in all months. The content of organic matter in the surface horizon is about 65 percent. This component is in ecological site R155XY010FL, Freshwater Marshes and Ponds. Nonirrigated land capability classification is 7w. This soil meets hydric criteria.

The minor components in this map unit include Basinger, depressional (3 percent); Hontoon (3 percent); Kaliga (2 percent); and Placid (2 percent) soils.

41—Satellite sand

The Satellite component makes up 85 percent of the map unit. Slopes range from 0 to 2 percent. This component is on marine terraces on coastal plains. It is on rises and knolls. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is very high. Available water capacity to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 27 inches during June, July, August, September, October, and November. The content of organic matter in the surface horizon is about 1 percent. This component is in ecological site R155XY002FL, Longleaf Pine-Turkey Oak Hills. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

The minor components in this map unit include Adamsville (3 percent), Cassia (3 percent), Immokalee (3 percent), Myakka (2 percent), Pomello (2 percent), and St. Lucie (2 percent) soils.

42—Smyrna fine sand

The Smyrna component makes up 85 percent of the map unit. Slopes range from 0 to 2 percent. This component is on flats on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 12 inches during June, July, August, and September. The content of organic matter in the surface horizon is about 4 percent. This component is in ecological site R155XY003FL, South Florida Flatwoods. Nonirrigated land capability classification is 4w. This soil does not meet hydric criteria.

The minor components in this map unit include Basinger (3 percent), EauGallie (3 percent), Immokalee (3 percent), Myakka (3 percent), and Placid (3 percent) soils.

43—St. Lucie fine sand, 0 to 5 percent slopes

The St. Lucie component makes up 85 percent of the map unit. Slopes range from 0 to 5 percent. This component is on ridges on marine terraces on coastal plains. The parent material consists of eolian or sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is very high. Available water capacity to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. The content of organic matter in the surface horizon is about 1 percent. This component is in ecological site R155XY001FL, Sand Pine Scrub. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

The minor components in this map unit include Cassia (3 percent), Immokalee (3 percent), Myakka (3 percent), Pomello (3 percent), and Smyrna (3 percent) soils.

44—Tavares fine sand, 0 to 5 percent slopes

The Tavares component makes up 90 percent of the map unit. Slopes range from 0 to 5 percent. This component is on ridges on marine terraces on coastal plains. The parent material consists of eolian or sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is very high. Available water capacity to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 57 inches during June, July, August, September, October, November, and December. The content of organic matter in the surface horizon is about 1 percent. This component is in ecological site R155XY002FL, Longleaf Pine-Turkey Oak Hills. Nonirrigated land capability classification is 3s. This soil does not meet hydric criteria.

The minor components in this map unit include Adamsville (5 percent) and Candler (5 percent) soils.

45—Wabasso fine sand

The Wabasso component makes up 88 percent of the map unit. Slopes range from 0 to 2 percent. This component is on flats on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water capacity to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 12 inches during June, July, August, and September. The content of organic matter in the surface horizon is about 6 percent. This component is in ecological site

R155XY003FL, South Florida Flatwoods. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

The minor components in this map unit include EauGallie (3 percent), Myakka (3 percent), Riviera (3 percent), and Wauchula (3 percent) soils.

46—Wauchula fine sand

The Wauchula component makes up 90 percent of the map unit. Slopes range from 0 to 2 percent. This component is on flatwoods on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water capacity to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 12 inches during June, July, August, and September. The content of organic matter in the surface horizon is about 3 percent. This component is in ecological site R155XY003FL, South Florida Flatwoods. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

The minor components in this map unit include EauGallie (2 percent), Myakka (2 percent), Ona (2 percent), Smyrna (2 percent), and Wabasso (2 percent) soils.

47—Winder loamy fine sand

The Winder component makes up 90 percent of the map unit. Slopes range from 0 to 2 percent. This component is on flats on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at a depth of 6 inches during June, July, August, September, October, and November. The content of organic matter in the surface horizon is about 4 percent. This component is in ecological site R155XY003FL, South Florida Flatwoods. Nonirrigated land capability classification is 3w. This soil meets hydric criteria.

The minor components in this map unit include Gentry (4 percent), Holopaw (3 percent), and Riviera (3 percent) soils.

48—Placid-Riviera-Samsula complex, frequently flooded

The Placid, frequently flooded, component makes up 45 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains on marine terraces on coastal plains. The parent material consists of sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is high. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at the surface during June, July, August, September, and October. The content of organic matter in the surface horizon is about 3 percent. This component is in ecological site R155XY010FL, Freshwater Marshes and Ponds. Nonirrigated land capability classification is 7w. This soil meets hydric criteria.

The Riviera, frequently flooded, component makes up 28 percent of the map unit. Slopes range from 0 to 2 percent. This component is on flood plains on marine terraces on coastal plains. The parent material consists of sandy and loamy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water capacity to a depth of 60 inches is low. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at the surface during June, July, August, September, and October. The content of organic matter in the surface horizon is about 1 percent. This component is in ecological site R155XY012FL, Wetland Hardwood Hammocks. Nonirrigated land capability classification is 3w. This soil meets hydric criteria. Typically, the calcium carbonate equivalent within a depth of 40 inches does not exceed 3 percent.

The Samsula, frequently flooded, component makes up 18 percent of the map unit. Slopes are 0 to 1 percent. This component is on marine terraces on coastal plains. It is in depressions on flood plains. The parent material consists of herbaceous organic material over sandy marine deposits. Depth to a root-restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is high. Available water capacity to a depth of 60 inches is high. Shrink-swell potential is low. This soil is frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at the surface in all months. The content of organic matter in the surface horizon is about 65 percent. This component is in ecological site R155XY010FL, Freshwater Marshes and Ponds. Nonirrigated land capability classification is 7w. This soil meets hydric criteria.

The minor components in this map unit include Floridana (3 percent), Nittaw (3 percent), and Winder (3 percent) soils.

99—Water

The Water component makes up 100 percent of the map unit. Water includes streams, lakes, and, ponds that in most years are covered with water at least during the period warm enough for plants to grow; many areas are covered throughout the year. The Water is a miscellaneous area.

Rangeland and Improved Pastureland

By Chad George, state rangeland management specialist; Mimi Williams, plant materials specialist; and Rick Robbins, soil scientist

Land, as characterized by specific physical characteristics, and the vegetation that can occur on it are classified in ecological sites. An understanding of ecological sites is the basis for understanding the capacity of a given area to produce a distinctive kind and amount of forage. The range of these distinct combinations of soil and vegetation are described by the Natural Resources Conservation Service (NRCS) using a system of ecological site descriptions. Information regarding ecological site descriptions can be found in section II of the "Field Office Technical Guide," which is available at the local office of NRCS or online at http://efotg.sc.egov.usda.gov/efotg_locator.aspx?map=FL.

The current relationship between soils and vegetation was ascertained during the soil survey; thus, ecological sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of rangeland plants. Soil reaction, pH, and seasonal high water table are also important in Florida.

The existing native vegetation in Florida reflects vegetation prior to European settlement. This vegetation evolved under the influence of natural fires, droughts, migratory grazing, wildlife species, and Native Americans. About 400 years ago, the first domesticated cattle to be introduced into the United States were brought into the area that is now Florida by European settlers. Although the impact of these early "free range" cattle on natural communities is not well documented, the cattle undoubtedly changed the natural grazing pressures, rates, and lengths. Later agricultural practices, such as fencing, suppressing fire, clearing land, and other practices implemented during the "redomestication" of cattle in Florida, are known to have made a significant impact on the natural communities.

Rangeland, grazed forestland, naturalized pastureland, and improved pastureland all provide forage for livestock in the survey area.

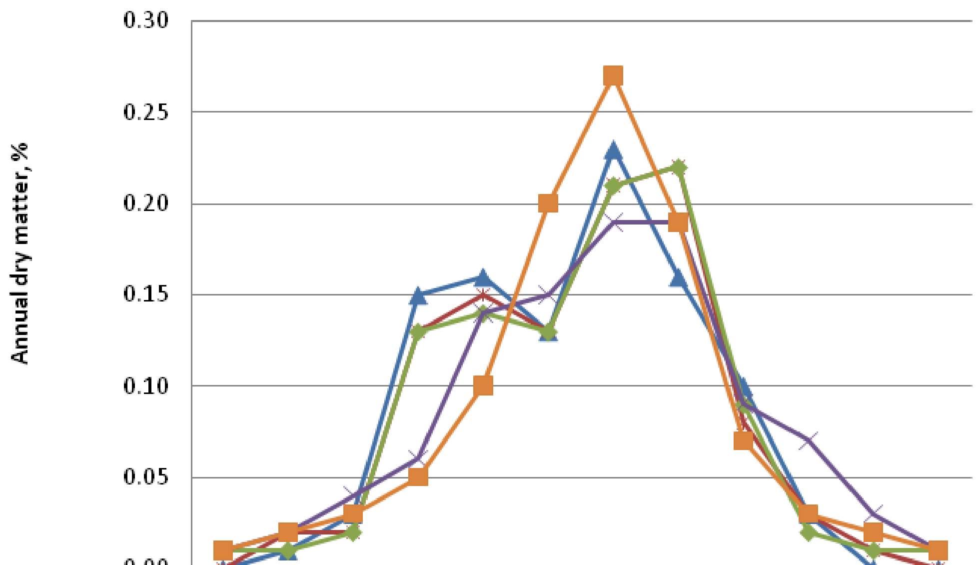
Rangeland is land on which the native vegetation is predominantly composed of native grasses, grasslike plants, forbs, and shrubs suitable for grazing and browsing. These sites receive no regular or frequent cultural treatment (e.g., mowing, fertilizer, etc.). Composition and production of the plant community are determined by soil, climate, topography, and overstory canopy. Over time, the combination of plants best suited to a particular soil and climate become dominant. Although natural plant communities are not static, they may vary only slightly from year to year and place to place. These dominant plant communities are the basis for characterizing ecological sites and establishing rangeland ecological site names. Currently, seven recognized ecological sites are classified as rangeland in Osceola County. These sites are named Sand Pine Scrub, Longleaf Pine-Turkey Oak Hills, South Florida Flatwoods, Upland Hardwood Hammocks, Freshwater Marshes and Ponds, Slough, and Wetland Hardwood Hammocks. Descriptions of these ecological sites are in the section "Rangeland Ecological Site Descriptions."

Grazed forestland is forestland that is currently used for livestock grazing.

Naturalized pastureland is forestland that is used primarily for the production of forage for grazing by livestock rather than for the production of wood products. Overstory trees are removed or managed to promote the native and introduced understory vegetation. This vegetation is managed for its forage value through the use of grazing management principles.

Improved pastureland is grazing land that is permanently producing introduced or domesticated native forage species, that receives varying degrees of periodic cultural treatment to enhance forage quality and yields, and that is primarily harvested by grazing animals.

A Forage Suitability Group (FSG) is a group of similar soils that contain certain characteristics that support improved or domesticated grasses. Statewide soil-suitability groups are currently in development. Soil properties that affect soil moisture, such as duration of ponding and duration and depth of a seasonal high water table, are the most influential properties affecting suitability of improved forages. Recommendations regarding production and management of forage species are available from the University of Florida, Institute of Food and Agricultural Sciences (UF/IFAS), at http://agronomy.ifas.ufl.edu/foragesofflorida/index.php. Warm-season perennials grasses are commonly used for pastureland in Florida. Examples include bahiagrass *(Paspalum notatum),* bermudagrass *(Cynodon dactylon),* stargrass *(C. nlemfuensis),* and limpograss, also known as hemarthria *(Hemarthria altissima)* (fig. 2).



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bahiagrass	0.00	0.01	0.03	0.15	0.16	0.13	0.23	0.16	0.10	0.03	0.00	0.00
Bermudagrass	0.00	0.02	0.02	0.13	0.15	0.13	0.21	0.22	0.08	0.03	0.01	0.00
Limpograss (Hemarthria)	0.01	0.01	0.02	0.13	0.14	0.13	0.21	0.22	0.09	0.02	0.01	0.01
Stargrass	0.01	0.02	0.04	0.06	0.14	0.15	0.19	0.19	0.09	0.07	0.03	0.01
Native Warm Season Grasses	0.01	0.02	0.03	0.05	0.10	0.20	0.27	0.19	0.07	0.03	0.02	0.01

Figure 2.—Growth curves for improved and native grasses in Florida.

Total Annual Production

Total production is the amount of forage that can be expected to grow on well managed grazing land. It is measured as pounds of air-dry vegetation per acre. For rangeland, total production is expressed in three categories: favorable, normal, and unfavorable years (table 2). In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, temperature and rainfall are near the recorded historical monthly averages. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture due to low rainfall or drought conditions.

Table 2.—Production Yields for Florida Ecological Sites

Site ID	Ecological Site Name*	Favorable	Normal	Unfavorable
R155XY001FL	Sand Pine Scrub	3,500	2,500	1,500
R155XY002FL	Longleaf Pine-Turkey Oak	3,500	2,500	1,500
R155XY003FL	South Florida Flatwoods	6,000	4,500	3,000
R155XY008FL	Upland Hardwood Hammocks	4,500	3,500	2,500
R155XY010FL	Freshwater Marshes and Ponds	10,000	8,500	6,500
R155XY011FL	Slough	8,000	6,500	5,000
R155XY012FL	Wetland Hardwood Hammocks	3,500	2,750	2,250

* See the section "Rangeland Ecological Site Descriptions."

Table 3 shows, for each soil that supports rangeland vegetation, the ecological site and the potential annual production of vegetation in favorable, normal, and unfavorable years. An explanation of the column headings in the table follows.

An *ecological site* is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of a site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production. Descriptions of ecological sites are provided in the "Field Office Technical Guide," which is available in local offices of the Natural Resources Conservation Service or online.

Total dry-weight production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. Yields are adjusted to a common percent of air-dry moisture content.

Table 3.—Rangeland Productivity

Map unit symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb/ac	*Lb/ac*	*Lb/ac*
1—Adamsville sand				
Adamsville	Upland Hardwood Hammocks	4,500	3,500	2,500
2—Adamsville variant fine sand, 0 to 5 percent slopes				
Adamsville variant	Upland Hardwood Hammocks	4,500	3,500	2,500
3—Ankona fine sand				
Ankona	South Florida Flatwoods	6,000	4,500	3,000
5—Basinger fine sand				
Basinger	Slough	8,000	6,500	5,000
6—Basinger fine sand, depressional				
Basinger, depressional	Freshwater Marshes And Ponds	10,000	8,500	6,500
7—Candler sand, 0 to 5 percent slopes				
Candler	Longleaf Pine-turkey Oak Hills	3,500	2,500	1,500
8—Candler sand, 5 to 12 percent slopes				
Candler	Longleaf Pine-turkey Oak Hills	3,500	2,500	1,500
9—Cassia fine sand				
Cassia	Sand Pine Scrub	3,500	2,500	1,500
10—Delray loamy fine sand, depressional				
Delray, depressional	Freshwater Marshes And Ponds	10,000	8,500	6,500
11—EauGallie fine sand				
Eaugallie	South Florida Flatwoods	6,000	4,500	3,000
12—Floridana fine sand, depressional				
Floridana, depressional	Freshwater Marshes And Ponds	10,000	8,500	6,500
14—Holopaw fine sand				
Holopaw	Wetland Hardwood Hammocks	3,500	2,750	2,250
15—Hontoon muck				
Hontoon	Freshwater Marshes And Ponds	10,000	8,500	6,500
16—Immokalee fine sand				
Immokalee	South Florida Flatwoods	6,000	4,500	3,000
18—Lokosee fine sand				
Lokosee	Wetland Hardwood Hammocks	3,500	2,750	2,250
19—Malabar fine sand				
Malabar	Slough	8,000	6,500	5,000
20—Malabar fine sand, depressional				
Malabar, depressional	Freshwater Marshes And Ponds	10,000	8,500	6,500
21—Malabar-Pineda complex				
Malabar	Slough	8,000	6,500	5,000
Pineda	Slough	8,000	6,500	5,000
22—Myakka fine sand				
Myakka	South Florida Flatwoods	6,000	4,500	3,000
24—Narcoossee fine sand				
Narcoossee	Upland Hardwood Hammocks	4,500	3,500	2,500
26—Oldsmar fine sand				
Oldsmar	South Florida Flatwoods	6,000	4,500	3,000
27—Ona fine sand				
Ona	South Florida Flatwoods	6,000	4,500	3,000
28—Paola sand, 0 to 5 percent slopes				
Paola	Sand Pine Scrub	3,500	2,500	1,500

Table 3.—Rangeland Productivity—Continued

Map unit symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb/ac	*Lb/ac*	*Lb/ac*
29—Parkwood loamy fine sand, occasionally flooded				
Parkwood, occasionally flooded	Wetland Hardwood Hammocks	3,500	2,750	2,250
30—Pineda fine sand				
Pineda	Wetland Hardwood Hammocks	3,500	2,750	2,250
32—Placid fine sand, depressional				
Placid, depressional	Freshwater Marshes And Ponds	10,000	8,500	6,500
33—Placid variant fine sand				
Placid variant	Upland Hardwood Hammocks	4,500	3,500	2,500
34—Pomello fine sand, 0 to 5 percent slopes				
Pomello	Longleaf Pine-turkey Oak Hills	3,500	2,500	1,500
35—Pomona fine sand				
Pomona	South Florida Flatwoods	6,000	4,500	3,000
36—Pompano fine sand				
Pompano	Slough	8,000	6,500	5,000
37—Pompano fine sand, depressional				
Pompano, depressional	Freshwater Marshes And Ponds	10,000	8,500	6,500
38—Riviera fine sand				
Riviera	Wetland Hardwood Hammocks	3,500	2,750	2,250
40—Samsula muck				
Samsula	Freshwater Marshes And Ponds	10,000	8,500	6,500
41—Satellite sand				
Satellite	Longleaf Pine-turkey Oak Hills	3,500	2,500	1,500
42—Smyrna fine sand				
Smyrna	South Florida Flatwoods	6,000	4,500	3,000
43—St. Lucie fine sand, 0 to 5 percent slopes				
St. Lucie	Sand Pine Scrub	3,500	2,500	1,500
44—Tavares fine sand, 0 to 5 percent slopes				
Tavares	Longleaf Pine-turkey Oak Hills	3,500	2,500	1,500
45—Wabasso fine sand				
Wabasso	South Florida Flatwoods	6,000	4,500	3,000
46—Wauchula fine sand				
Wauchula	South Florida Flatwoods	6,000	4,500	3,000
47—Winder loamy fine sand				
Winder	South Florida Flatwoods	6,000	4,500	3,000
48—Placid-Riviera-Samsula complex, frequently flooded				
Placid, frequently flooded	Freshwater Marshes And Ponds	10,000	8,500	6,500
Riviera, frequently flooded	Wetland Hardwood Hammocks	3,500	2,750	2,250
Samsula, frequently flooded	Freshwater Marshes And Ponds	10,000	8,500	6,500

Production on improved pastureland is expressed as a range because the actual production can vary greatly due to weather. Also, production on improved pastureland can vary due to management practices and other factors that affect the health and vigor of the plants. Examples of management practices include weed control and applications of fertilizer and lime. Table 4 shows forage suitability groups and anticipated production yields in Osceola County for commonly used improved grasses.

Table 4.—Production Yields for Improved Pasture Sites

Improved Forage	Forage Suitability Groups*	Production (lb/ac)
Bahiagrass	1, 2, 5	3,000–8,000
Bermudagrass	1, 2**, 5	10,000–18,000
Stargrass	1, 2	8,000–12,000
Limpograss (hemarthria)	3, 4***	16,000–20,000

* Specific soils groupings are described in the section “Improved Pasture.”

** Soils in forage suitability group 2 are not typically suited to bermudagrass, but Jiggs bermudagrass may be recommended by UF/IFAS for use on some soils in this group.

*** Muck soils may only be suited for planting if previously drained.

Grazing Management

Grazing management on rangeland and improved pastureland requires a basic knowledge of soils in an area, an accurate assessment of current conditions, an understanding of production potential, and an awareness of the short- and long-term goals. Effective management for both rangeland and pastureland conserves soil moisture, enhances water quality, reduces downstream nutrient loading, improves the yield and quality of forage for livestock and wildlife, enhances recreational opportunities, and protects the soil resource. Grazing land managers need to remain vigilant regarding the state of vegetation cover. Changes to the vegetation cover can occur gradually and are commonly overlooked, resulting in detrimental effects to the rangeland and pastureland.

Managers of rangeland and improved pastureland should evaluate the type of plant community that best supports the ranch and then apply management based on ecological principles to achieve the overall production goals. The desired plant community should fit the capabilities of the land both for native and improved pastureland.

Common management practices include a prescribed grazing plan that accounts for ecological sites and improved pastures, stock-water development, and fences. Such practices as herbaceous weed control, brush management, and prescribed burning are commonly used to manipulate vegetative composition and structure and thereby achieve the desired plant community goal.

Grazing land management includes four major considerations:

- *Grazing distribution,* which is achieved by managing livestock to graze all parts of the grazing unit equally.
- *Selective grazing,* which occurs because animals graze preferred plants to balance their diets. If selective grazing occurs repeatedly, the preferred plants can be overgrazed.

- *Proper stocking rates,* which are achieved by balancing animal numbers with total forage production.
- *Rest periods,* during which grazed plants are given enough time to recover and maintain growth.

An important principle of management is that production of forage is controlled by rainfall and soil nutrients and composition of forage species is controlled by grazing management. Determining the best initial stocking rates can be very complex and should take into account season of use, livestock species used, seasonality of production, and management inputs. Plants can be impacted not only by grazing but also by trampling, spoilage, waste, and wildlife. Because of the combination of these loses, a “harvest efficiency” of 25 to 35 percent of the annual production by grazing land is actually available to livestock. A safe initial stocking rate for livestock should be calculated on the basis of 25 percent of the total annual growth by weight of vegetation. For example, a 25 percent harvest efficiency for vegetative regrowth properties on a site with production of 4,500 pounds per acre would result in 1,125 pounds per acre of available forage.

Stocking rates are most often documented in animal units (AU/Y) for rangeland and animal unit months (AUM/Ac) for pastureland. These terms refer to the amount of forage produced per year or month, respectively, to support an animal unit (AU). An animal unit is a cow (approximately 1,000 pounds) and a calf at side for 6 months. One animal unit day (AUD) is the amount of forage needed to support 1 animal unit for 1 day, or 26 pounds of forage. One animal unit month (AUM) is the amount of forage needed to support 1 animal unit for 1 month, or 790 pounds of forage. One animal unit (AU) is the amount of forage needed to support 1 animal unit for 1 year, or 9,490 pounds of forage.

To calculate stocking rates, first determine the forage per acre available for grazing. Second, multiply by the number of acres to determine the total available forage for stocking. Third, take the total available forage for stocking and divide by the applicable AU, AUM, or AUD to determine the appropriate stocking rate for the given length of time.

In the following example, the stocking rates per year, month, and day are determined for 100 acres that produce 4,500 pounds per acre with a harvest efficiency of 25 percent.

1) 4,500 lb/ac production x .25 efficiency = 1,125 lb/ac available for grazing
2) 1,125 lb/ac x 100 ac = 112,500 lbs total available forage
3) 112,500 lbs/ac ÷ 9,490 lbs/AU = 12 AUY
4) 112,500 lbs/ac ÷ 790 lbs/AUM = 142 AUM
5) 112,500 lbs/ac ÷ 26 lbs/AUD = 4,326 AUD

For more information on rangeland and pastureland production or for assistance in designing a comprehensive grazing management plan, contact the local office of the Natural Resources Conservation Service at a USDA Service Center.

Rangeland Ecological Site Descriptions

The seven recognized rangeland ecological sites in Osceola County are:

- Sand Pine Scrub,
- Longleaf Pine-Turkey Oak Hills,
- South Florida Flatwoods,
- Upland Hardwood Hammocks,
- Freshwater Marshes and Ponds,
- Slough, and
- Wetland Hardwood Hammocks.

Rangeland ecological site descriptions are identified using an 11 character ID and a proper name. In the ID, the “R” indicates that the ecological site is a rangeland site. The next three numbers identify the Major Land Resource Area. The fifth and sixth characters identify the major land resource unit subdivision, where applicable. The next three characters identify the ecological site number, and the final two identify the state.

The following descriptions include a list of plants that are characteristic of the site. Detailed ecological site descriptions are available at the local office of the Natural Resources Conservation Service at a USDA Service Center.

R155XY001FL, Sand Pine Scrub.—This site is generally on upland, well drained soils, including Cassia, Paola, and St. Lucie soils. Because of doughtiness, it has limited potential for producing and sustaining native forage vegetation. Typically, this site supports an association of sand pine *(Pinus clausa),* sand live oak *(Quercus geminata),* bluejack oak *(Quercus incana),* saw palmetto *(Serenoa repens),* and other shrubs. On sites that have a higher water table, sand pine can become less common and gallberry *(Ilex glabara)* becomes more prominent. Important forage species include creeping bluestem *(Schizachyrium scoparium* var. *stoloniferum),* chalky bluestem *(Andropogon virginicus* var. *glaucus),* lopsided indiangrass *(Sorghastrum secundum),* and beaked panicum *(Panicum amarum).* Areas of this site are important habitat to many threatened wildlife species, including the Florida scrub jay *(Aphelocoma coerulescens),* gopher tortoise *(Gopherus polyphemus),* and the short-tail skink.

R155XY002FL, Longleaf Pine-Turkey Oak Hills.—This site commonly supports an association of scattered longleaf pines *(Pinus palustris)* and turkey oaks *(Quercus laevis).* This site is generally on droughty, acid, sandy soils. Areas of this site are commonly degraded by overgrazing, by the suppression of fires leading to increased oak canopy, and by heavy logging pressure. The overuse results from the small size of the areas and because the areas provide shade during the summer. The vegetative understory consists of lopsided indiangrass, green silkyscale *(Anthaenantia villosa),* creeping bluestem, chalky bluestem, and other associated forbs and legumes. Wildlife species associated with this site include Florida scrub jay, gopher tortoise, and the red-cockaded woodpecker *(Picoides borealis).*

R155XY003FL, South Florida Flatwoods.—This site is primarily on nearly level, poorly drained, coarse textured soils that typically have a spodic horizon. The plant community is generally dominated by scattered slash pine or loblolly pine trees. In places, longleaf pine is common. The plant community includes a shrubby understory of saw palmetto, gallberry, and other woody plants. The primary vegetation community mainly consists of creeping bluestem, purple bluestem *(Andropogon glomeratus* var. *glaucopsis),* or South Florida bluestem (also known as Florida little bluestem, *Schizachyrium rhizomatum)* in the wetter areas and lopsided indiangrass and creeping bluestem in the dryer areas. Continuous improper grazing and annual burning can cause these sites to become heavily dominated by saw palmetto and wiregrass *(Aristida stricta* var. *beyrichiana)* with a subsequent decrease in desirable bluestems and indiangrass. Key wildlife species associated with this site include Florida panther *(Puma concolor coryi),* deer, turkey, and quail.

R155XY008FL, Upland Hardwood Hammocks.—This site is generally comprised of a mixture of hardwood species, such as hophornbeam *(Ostrya virginiana),* hawthorn *(Crataegus* spp.), dogwood *(Cornus* spp.), magnolia *(Magnolia* spp.), hickory *(Carya* spp.), maple *(Acer* spp.), sweetgum *(Liquidambar styraciflua),* live oak *(Quercus virginicus),* laurel oak *(Quercus laurifolia),* and water oak *(Quercus nigra).* In places, the canopy cover exceeds 60 percent, which drastically reduces the quality and quantity of forage. In areas where this site is in excellent condition, the vegetative community consists of indiangrass, switchgrass *(Panicum virgatum),* longleaf woodoats *(Chasmanthium laxum* var. *sessiliflorum),* and several species of bluestem. Key wildlife species associated with this site include the Florida black bear *(Ursus americanus floridanus),* eastern indigo snake *(Drymarchon corais couperi),* Florida panther, turkey, and deer.

R155XY010FL, Freshwater Marshes and Ponds.—This site consists of open grassland that is primarily dominated by maidencane *(Panicum hemitomon),* blue maidencane *(Amphicarpum mulenbergianum),* cutgrass *(Leerisa hexandra),* and purple bluestem *(Andropogon glaucopsis).* Areas of this site are inundated during the wet season, resulting in a potential for producing large amounts of vegetative forage. Livestock generally only graze these areas in dry periods when the water table drops and allows access to aquatic vegetation. If prolonged grazing is allowed, these areas deteriorate to sawgrass *(Cladium jamaicense),* pickerelweed *(Pontederia cordata),* Florida willow *(Salix floridana),* and primrose-willow *(Ludwigia* spp.). Key wildlife species associated with this site include the crested caracara *(Caracara cheriway),* Florida sandhill crane *(Grus canadensis pratenis),* alligator *(Alligator mississippiensis),* Everglades snail kite *(Rostrhamus sociabilis),* wood stork *(Mycteria americana),* and Florida panther.

R155XY011FL, Slough.—This site is on nearly level, poorly drained, coarse textured, mineral soils. These areas generally have bad drainage and a dominant vegetative plant community. The plant community commonly consists of blue maidencane (also known as perennial goobergrass, *Amphicarpum muhlenbergianum),* chalky bluestem, toothachegrass *(Ctenium aromaticum),* and south Florida bluestem. If continuous improper grazing is allowed, this site deteriorates to a complex of threeawns *(Aristida* spp.) and sand cordgrass *(Spartina bakeri).* Key wildlife species associated with this site include Florida panther and Florida sandhill crane.

R155XY012FL, Wetland Hardwood Hammocks.—This site is primarily on somewhat poorly drained and poorly drained soils. It is primarily comprised of a woody plant community. Trees associated with this community include laurel oak, live oak, and water oak and scattered cabbage palms, red maple *(Acer rubrum),* sweetgum, and cypress *(Taxodium* spp.). Due to the high density of the tree canopy, the potential for herbaceous production is low. If the site is properly managed, the herbaceous vegetation commonly consists of longleaf woodoats, eastern gamagrass *(Tripsacum dactyloides),* switchgrass, purple bluestem, maidencane, and blue maidencane. Key wildlife species associated with this site include Florida black bear and Florida panther.

Improved Pasture

Bahiagrass, bermudagrass, stargrass, and limpograss (hemarthria) are the main improved forages established on pastureland in Osceola County. Although there is some overlap in sites suited for certain grass species, key soil identifiers do exist. For more information on the suitability of specific species and cultivars for specific sites and soils, contact the local UF/IFAS extension agent and the Natural Resources Conservation Service. Some soils may support other improved species, depending on current management and past hydrological alterations, such as ditching. Planting rates, planting dates, production values, and other information regarding the grasses are available on the following UF/IFAS Web sites.

Bahiagrass
http://agronomy.ifas.ufl.edu/foragesofflorida/detail.php?sp=Bahiagrass&type=G

Bermudagrass
http://agronomy.ifas.ufl.edu/foragesofflorida/detail.php?sp=Bermudagrass&type=G

Jiggs Bermudagrass
http://edis.ifas.ufl.edu/pdffiles/AG/AG31400.pdf

Stargrass
http://agronomy.ifas.ufl.edu/foragesofflorida/detail.php?sp=Stargrass&type=G

Limpograss (Hemarthria)
http://agronomy.ifas.ufl.edu/foragesofflorida/detail.php?sp=Limpograss&type=G

Forage suitability groups for pasture sites in Osceola County have been developed based on several soil characteristics. The most important characteristics in the determination of the groups are duration of ponding and flooding, depth to a seasonal high water table, and slope. Although many soil characteristics affect forage production, the most important for determining site suitability on undrained soils are hydrology and functionality of water and soil. Drained areas of the soils listed in the groupings have different limitations, production potentials, and recommended forage species depending on the extent to which the hydrology has been altered.

Forage Suitability Group 1.—Dominantly very deep, nearly level and gently sloping, somewhat poorly drained and moderately well drained soils that have a seasonal high water table at a depth of 1 to 3.5 feet below the surface during wet periods. The content of organic matter in the surface layer is dominantly low or very low (0.5 to 2 percent). Reaction in the subsoil ranges from extremely acid to slightly acid (pH 3.6 to 6.5). Where present, diagnostic subsurface horizons are enriched with organic matter.

The soils in group 1 include Adamsville, Adamsville variant, Cassia, Narcoossee, Placid, Pomello, Satellite, and Tavares soils.

Forage Suitability Group 2.—Dominantly very deep, nearly level, poorly drained and very poorly drained, sandy soils on flats. The seasonal high water table ranges from the surface to 0.5 foot below the surface during wet periods. The surface layer and subsoil are dominantly sand or fine sand. Some of the soils are underlain by loamy materials. Generally, the content of organic matter in the surface layer ranges from low to moderate (0.5 to 5 percent). Unless the soil is limed, reaction in the subsoil ranges from extremely acid to slightly acid (pH 3.6 to 6.5). Diagnostic subsurface horizons are enriched with organic matter, loamy material, or both.

The soils in group 2 include Basinger, EauGallie, Holopaw, Immokalee, Lokosee, Malabar, Myakka, Oldsmar, Ona, Pineda, Pomona, Riviera, Smyrna, Wabasso, Wauchula, and Winder soils.

Forage Suitability Group 3.—Dominantly very deep, level or nearly level, very poorly drained, sandy soils in depressions or on flood plains. The seasonal high water table is above the surface, and the soils are ponded for long or very long duration during wet periods. The surface layer and subsoil are dominantly sand or fine sand. Some of the soils are underlain by loamy materials. Generally, the content of organic matter in the surface layer ranges from low to very high (1 to 15 percent). Unless the soil is limed, reaction in the subsoil ranges from extremely acid to slightly acid (pH 3.6 to 6.5). Diagnostic subsurface horizons are enriched with organic matter, loamy material, or both.

The soils in group 3 include Basinger, depressional; Delray, depressional; Floridana, depressional; Malabar, depressional; Parkwood, occasionally flooded; Placid, depressional; Pompano, depressional; and Riviera, frequently flooded, soils.

Forage Suitability Group 4.—Dominantly very deep, level, very poorly drained, organic soils (muck) in depressions. The seasonal high water table is above the surface, and the soils are ponded for long or very long duration during wet periods. The surface and subsoil consist of highly decomposed organic matter. Generally, the content of organic matter in the surface layer is very high (20 to 95 percent). Unless the soil is limed, reaction in the subsoil ranges from extremely acid to neutral (pH 3.6 to 7.3). Subsurface horizons are either organic or are underlain with sand or fine sand.

The soils in group 4 include Hontoon and Samsula soils.

Forage Suitability Group 5.—Dominantly very deep, nearly level and gently sloping, excessively drained soils on ridges. The depth to the seasonal high water table is more than 6 feet during wet periods. The surface and subsoil are sand or fine sand. Generally, the content of organic matter in the surface layer is very low or low (less than 2 percent). Unless the soil is limed, reaction in the subsoil ranges from extremely acid to moderately acid (pH 3.6 to 5.5). Typically, the soils do not have a subsurface horizon.

The soils in group 5 include Candler, St. Lucie, and Paola soils.

Formation and Classification of the Soils

This section summarizes the major factors of soil formation and describes the system of soil classification. The classification of each soil in the survey area is shown in the table “Taxonomic Classification of the Soils” at the end of this section. The Official Soil Series Descriptions, including the range of important characteristics of the soils, for the series in this survey area are online at http://soils.usda.gov/technical/classification/osd/. Characteristics of the soil and the material in which it formed are identified for each soil series. A pedon, a small three-dimensional area of soil, which is typical of the series is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (Soil Survey Staff, 1999).

Formation of the Soils

Soil is produced by the action of soil-forming processes on materials deposited or accumulated by geologic agencies. The characteristics of the soil at any given point are determined by the physical and mineralogical composition of the parent materials; the climate under which the soil material has accumulated and existed since accumulation; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time the forces of soil development have acted on the soil material.

Climate and vegetation are the active factors of soil formation. They act on parent material that has accumulated through the weathering of rocks and slowly change it into a natural body that has genetically related horizons. The effects of climate and vegetation are conditioned by relief. Parent material also affects the kind of profile that can be formed and, in extreme cases, determines it almost entirely. Finally, time is needed for the changing of the parent material into a soil profile. The time may be long or short, but some time is always required for differentiation of horizons. Generally, a long time is required for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects that few generalizations can be made regarding the effects of any one unless conditions are specified for the other four.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999 and 2010). 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. The categories are described in the following paragraphs.

ORDER. Twelve 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 aquic, 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 Alaquods (*Al*, meaning low content of iron, plus *aquod*, the suborder of the Spodosols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Alaquods.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, 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, thickness 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 Alaquods.

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.

Table 5.—Taxonomic Classification of the Soils

Soil name	Family or higher taxonomic classification
Adamsville	Hyperthermic, uncoated Aquic Quartzipsamments
Adamsville variant	Hyperthermic, uncoated Aquic Quartzipsamments
Ankona	Sandy, siliceous, hyperthermic, ortstein Arenic Ultic Alaquods
Arents	Hyperthermic Arents
Basinger	Siliceous, hyperthermic Spodic Psammaquents
Candler	Hyperthermic, uncoated Lamellic Quartzipsamments
Cassia	Sandy, siliceous, hyperthermic Oxyaquic Alorthods
Delray	Loamy, siliceous, superactive, hyperthermic Grossarenic Argiaquolls
EauGallie	Sandy, siliceous, hyperthermic Alfic Alaquods
Floridana	Loamy, siliceous, superactive, hyperthermic Arenic Argiaquolls
Gentry	Loamy, siliceous, active, hyperthermic Arenic Argiaquolls
Holopaw	Loamy, siliceous, active, hyperthermic Grossarenic Endoaqualfs
Hontoon	Dysic, hyperthermic Typic Haplosaprists
Immokalee	Sandy, siliceous, hyperthermic Arenic Alaquods
Kaliga	Loamy, siliceous, dysic, hyperthermic Terric Haplosaprists
Lokosee	Loamy, siliceous, subactive, hyperthermic Grossarenic Endoaqualfs
Malabar	Loamy, siliceous, active, hyperthermic Grossarenic Endoaqualfs
Myakka	Sandy, siliceous, hyperthermic Aeric Alaquods
Narcoossee	Sandy, siliceous, hyperthermic Oxyaquic Alorthods
Nittaw	Fine, smectitic, hyperthermic Typic Argiaquolls
Oldsmar	Sandy, siliceous, hyperthermic Alfic Arenic Alaquods
Ona	Sandy, siliceous, hyperthermic Typic Alaquods
Paola	Hyperthermic, uncoated Spodic Quartzipsamments
Parkwood	Coarse-loamy, siliceous, superactive, hyperthermic Mollic Endoaqualfs
Pineda	Loamy, siliceous, active, hyperthermic Arenic Glossaqualfs
Placid	Sandy, siliceous, hyperthermic Typic Humaquepts
Placid variant	Sandy, siliceous, hyperthermic Quartzipsammentic Haplumbrepts
Pomello	Sandy, siliceous, hyperthermic Oxyaquic Alorthods
Pomona	Sandy, siliceous, hyperthermic Ultic Alaquods
Pompano	Siliceous, hyperthermic Typic Psammaquents
Riviera	Loamy, siliceous, active, hyperthermic Arenic Glossaqualfs
Samsula	Sandy or sandy-skeletal, siliceous, dysic, hyperthermic Terric Haplosaprists
Satellite	Hyperthermic, uncoated Aquic Quartzipsamments
Smyrna	Sandy, siliceous, hyperthermic Aeric Alaquods
St. Lucie	Hyperthermic, uncoated Typic Quartzipsamments
Tavares	Hyperthermic, uncoated Typic Quartzipsamments
Wabasso	Sandy over loamy, siliceous, semiactive, hyperthermic Alfic Alaquods
Wauchula	Sandy over loamy, siliceous, active, hyperthermic Ultic Alaquods
Winder	Fine-loamy, siliceous, superactive, hyperthermic Typic Glossaqualfs

References

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://soils.usda.gov/technical/

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Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://soils.usda.gov/technical/

United States Department of Agriculture. 1979. Soil survey of Osceola County Area, Florida.

Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the “National Soil Survey Handbook” (available in local offices of the Natural Resources Conservation Service or on the Internet).

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.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

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 depletions. See Redoximorphic features.

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.

Claypan. A dense, compact, slowly permeable subsoil layer that contains much more clay than the overlying materials, from which it is separated by a sharply defined boundary. A claypan is commonly hard when dry and plastic and sticky when wet.

Climax plant community. 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 textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g., direct gravitational action) and by local, unconcentrated runoff.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas 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 or miscellaneous areas are somewhat similar in all areas.

Concretions. See Redoximorphic features.

Conglomerate. A coarse grained, clastic sedimentary rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

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.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the “Soil Survey Manual.”

Drainageway. A general term for a course or channel along which water moves in draining an area. A term restricted to relatively small, linear depressions that at some time move concentrated water and either do not have a defined channel or have only a small defined channel.

Dune. A low mound, ridge, bank, or hill of loose, windblown granular material (generally sand), either barren and capable of movement from place to place or covered and stabilized with vegetation but retaining its characteristic shape.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eolian deposit. Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand or loess.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.

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.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

Flood plain. The nearly level plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers or streams; produced by stream or river action.

Footslope. The concave surface at the base of a hillslope. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

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.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Ground water. Water filling all the unblocked pores of the material below the water table.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

Hill. A generic term for an elevated area of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline. Slopes are generally more than 15 percent. The distinction between a hill and a mountain is arbitrary and may depend on local usage.

Hillslope. A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill.

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 uppercase letter represents the major horizons. Numbers or lowercase 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.

L horizon.—A layer of organic and mineral limnic materials, including coprogenous earth (sedimentary peat), diatomaceous earth, and marl.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

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 overlying soil material. 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, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it 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 potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

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.

Iron depletions. See Redoximorphic features.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

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.

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.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Map unit. A map unit is a collection of areas defined and named the same in terms of their soil components or miscellaneous (nonsoil) areas or both. Each map unit differs in some respect from all others in a survey area, and each has a symbol that uniquely identifies the map unit on a soil map. Each individual polygon, point, or line so identified on the map is referred to as a delineation.

Map unit component. A distinct kind of soil, generally a phase of a taxonomic unit, or miscellaneous (nonsoil) area within a soil map unit. Components can be categorized as either major or minor. The names of major components are used to name the map unit. Each component of a map unit has a unique set of soil properties that differentiates it from other components within the same map unit. Each is assigned a designated range in proportionate extent (percent) within the map unit.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal proportions; formed primarily under freshwater lacustrine conditions but also formed in more saline environments.

Masses. See Redoximorphic features.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

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. A kind of map unit that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or 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. 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).

Mountain. A generic term for an elevated area of the land surface, rising more than 1,000 feet (300 meters) above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range. Mountains are formed primarily by tectonic activity and/or volcanic action but can also be formed by differential erosion.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. See Redoximorphic features.

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. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

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 movement of water through the soil.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Plateau (geomorphology). A comparatively flat area of great extent and elevation; specifically, an extensive land region that is considerably elevated (more than 100 meters) above the adjacent lower lying terrain, is commonly limited on at least one side by an abrupt descent, and has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Pore linings. See Redoximorphic features.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

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.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed as 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 degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly 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

Redoximorphic concentrations. See Redoximorphic features.

Redoximorphic depletions. See Redoximorphic features.

Redoximorphic features. Redoximorphic features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are created by these processes. The reduced iron and manganese ions may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in redoximorphic features that are defined as follows:

1. Redoximorphic concentrations.—These are zones of apparent accumulation of iron-manganese oxides, including:
   A. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; *and*
   B. Masses, which are noncemented concentrations of substances within the soil matrix; *and*
   C. Pore linings, i.e., zones of accumulation along pores that may be either coatings on pore surfaces or impregnations from the matrix adjacent to the pores.
2. Redoximorphic depletions.—These are zones of low chroma (chromas less than those in the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:
   A. Iron depletions, i.e., zones that contain low amounts of iron and manganese oxides but have a clay content similar to that of the adjacent matrix; *and*
   B. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coatings or skeletans).
3. Reduced matrix.—This is a soil matrix that has low chroma *in situ* but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

Reduced matrix. See Redoximorphic features.

Relief. The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.

Riser. The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, steplike landforms, such as successive stream terraces.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

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.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sedimentary rock. A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

Series, soil. A group of soils that have profiles that are almost alike. All the soils of a given series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock that formed by the hardening of a deposit of clay, silty clay, or silty clay loam and that has a tendency to split into thin layers.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The convex, erosional surface near the top of a hillslope. A shoulder is a transition from summit to backslope.

Side slope (geomorphology). A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel. Side slopes are dominantly colluvium and slope-wash sediments.

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.

Siltstone. An indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which silt predominates over clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

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.

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.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

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 and by the passage of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Strath terrace. A type of stream terrace; formed as an erosional surface cut on bedrock and thinly mantled with stream deposits (alluvium).

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. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Terrace (conservation). An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geomorphology). A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.

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.”

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

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.

Tread. The flat to gently sloping, topmost, laterally extensive slope of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural steplike landforms, such as successive stream terraces.

Upland. An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.

Weathering. All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth’s surface by atmospheric or biologic agents or by circulating surface waters but involving essentially no transport of the altered material.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

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