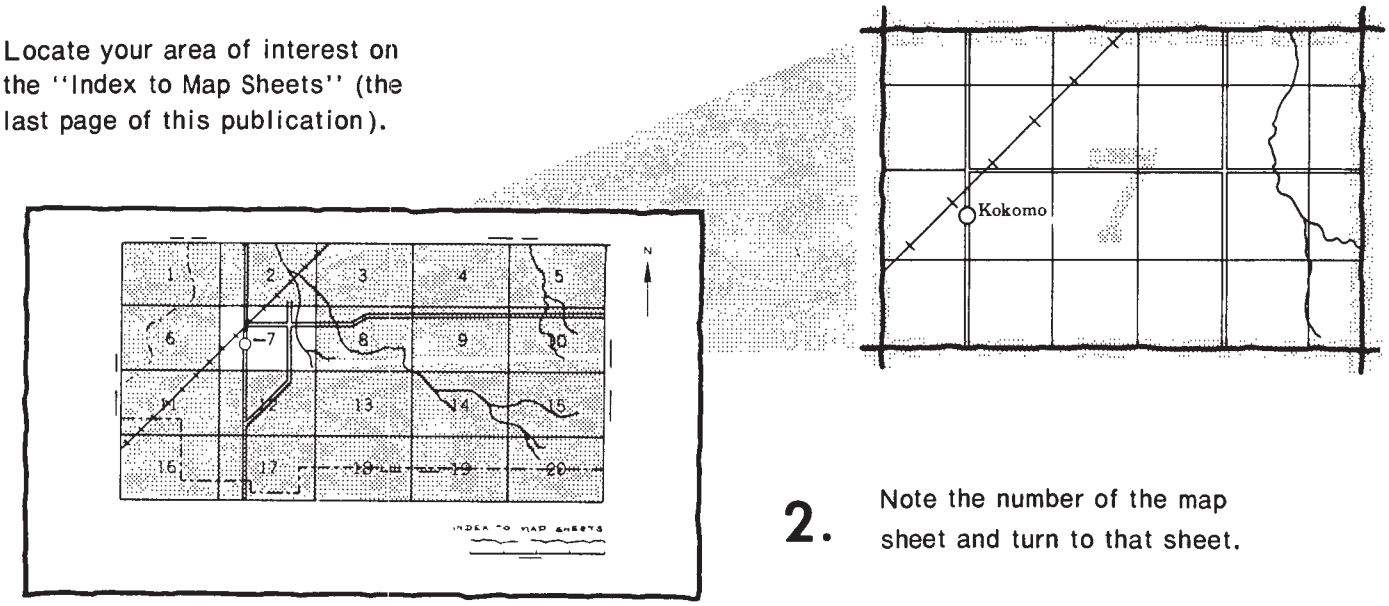
SOIL SURVEY OF
Monroe County, Arkansas

United States Department of Agriculture
Soil Conservation Service

In cooperation with
Arkansas Agricultural Experiment Station

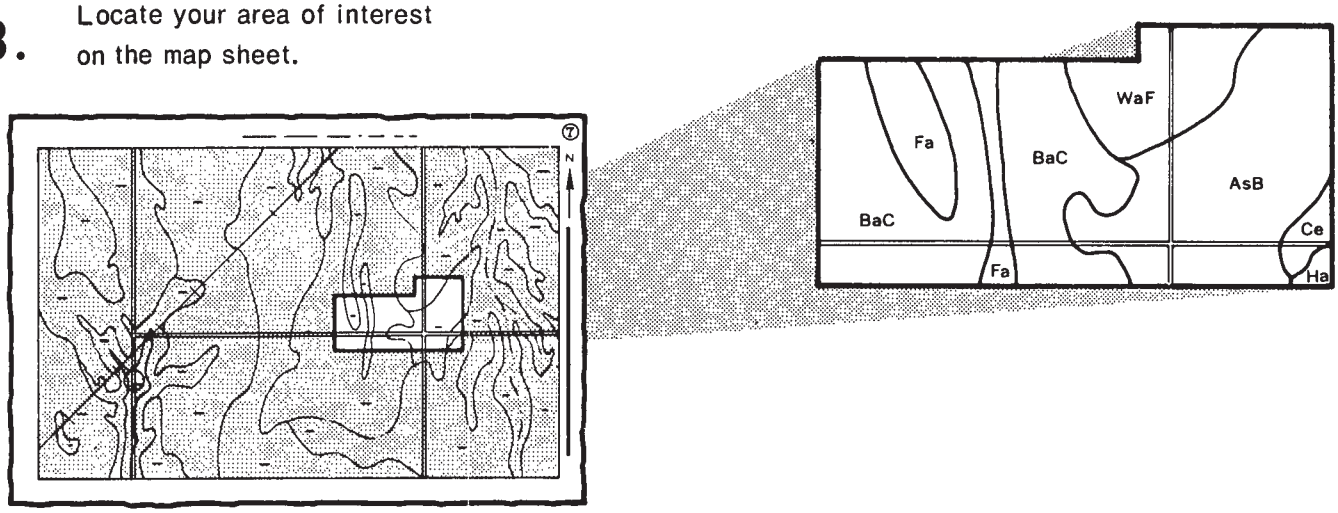
HOW TO USE

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

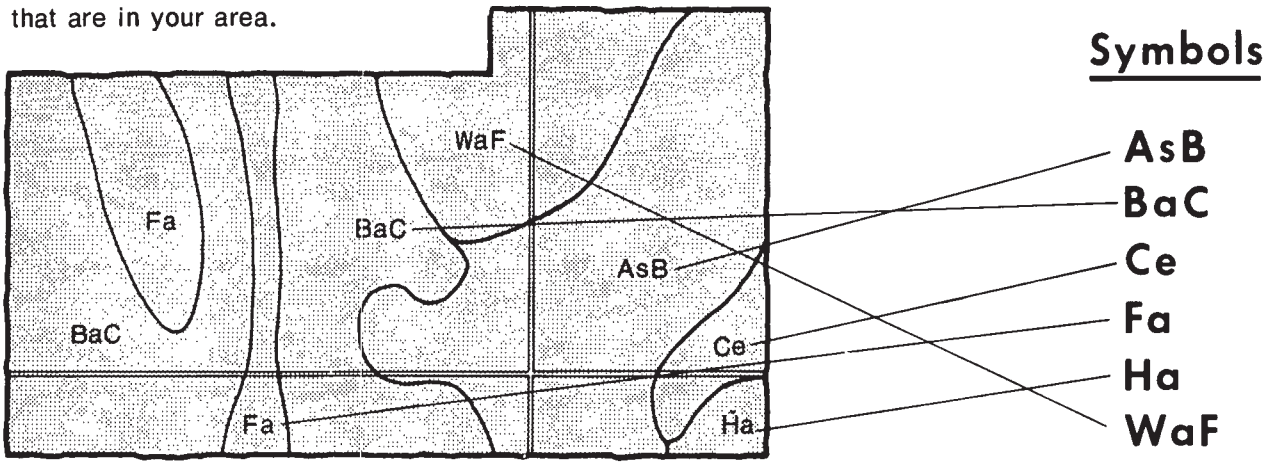


2. Note the number of the map sheet and turn to that sheet.

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

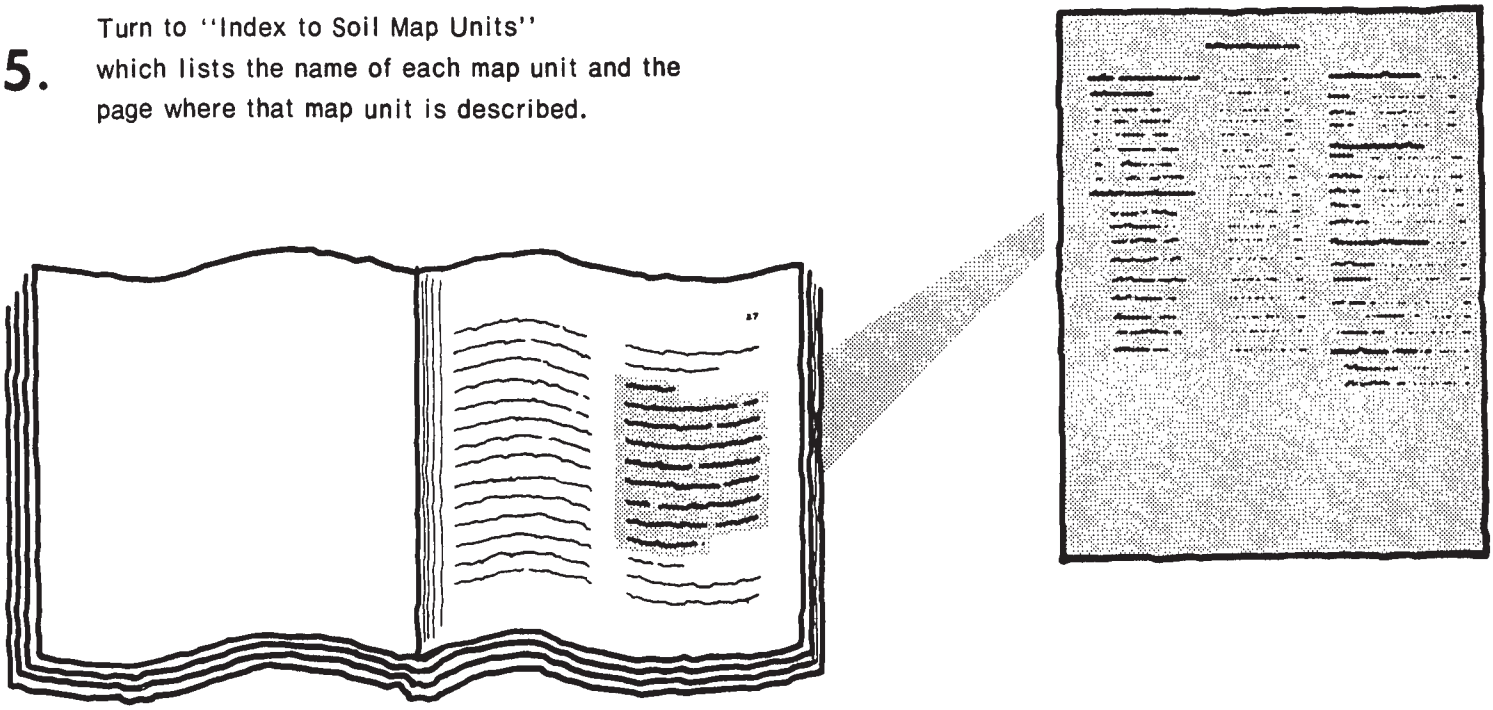


4. List the map unit symbols that are in your area.

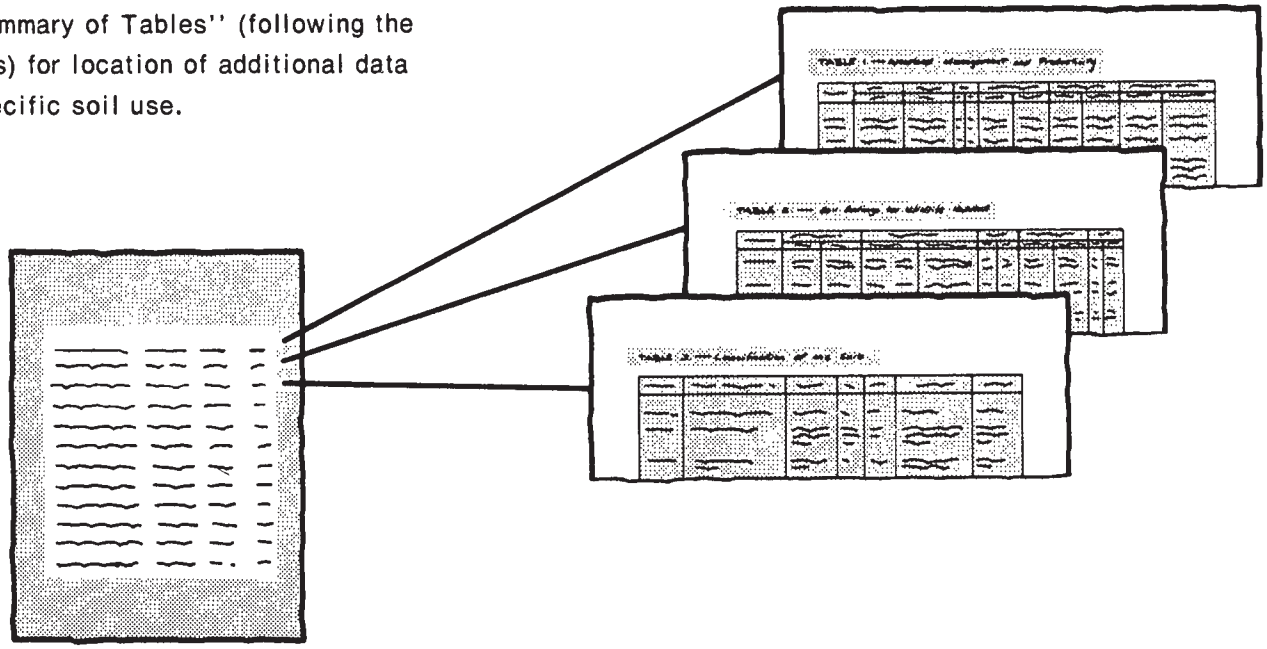


THIS SOIL SURVEY

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



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



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

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all who need the information, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1967-72. Soil names and descriptions were approved in 1974. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1972. This survey was made cooperatively by the Soil Conservation Service and the Arkansas Agricultural Experiment Station. It is part of the technical assistance furnished to the Monroe County Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps could cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: Rice growing in Foley silt loam.

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Issued June 1978

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Foreword

I would like to introduce the Soil Survey of Monroe County, Arkansas. You will find herein much basic information useful for any land planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land use will have on the environment.

This soil survey has been prepared for many different users. Farmers, foresters, or agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community decisionmakers, engineers, developers, builders, or homebuyers can use it to plan use of land, select sites for construction, develop proper performance. Conservationists, recreationists, teachers, students, or specialists in wildlife management, waste disposal, or pollution control can use the soil survey to help understand, protect, and enhance the environment.

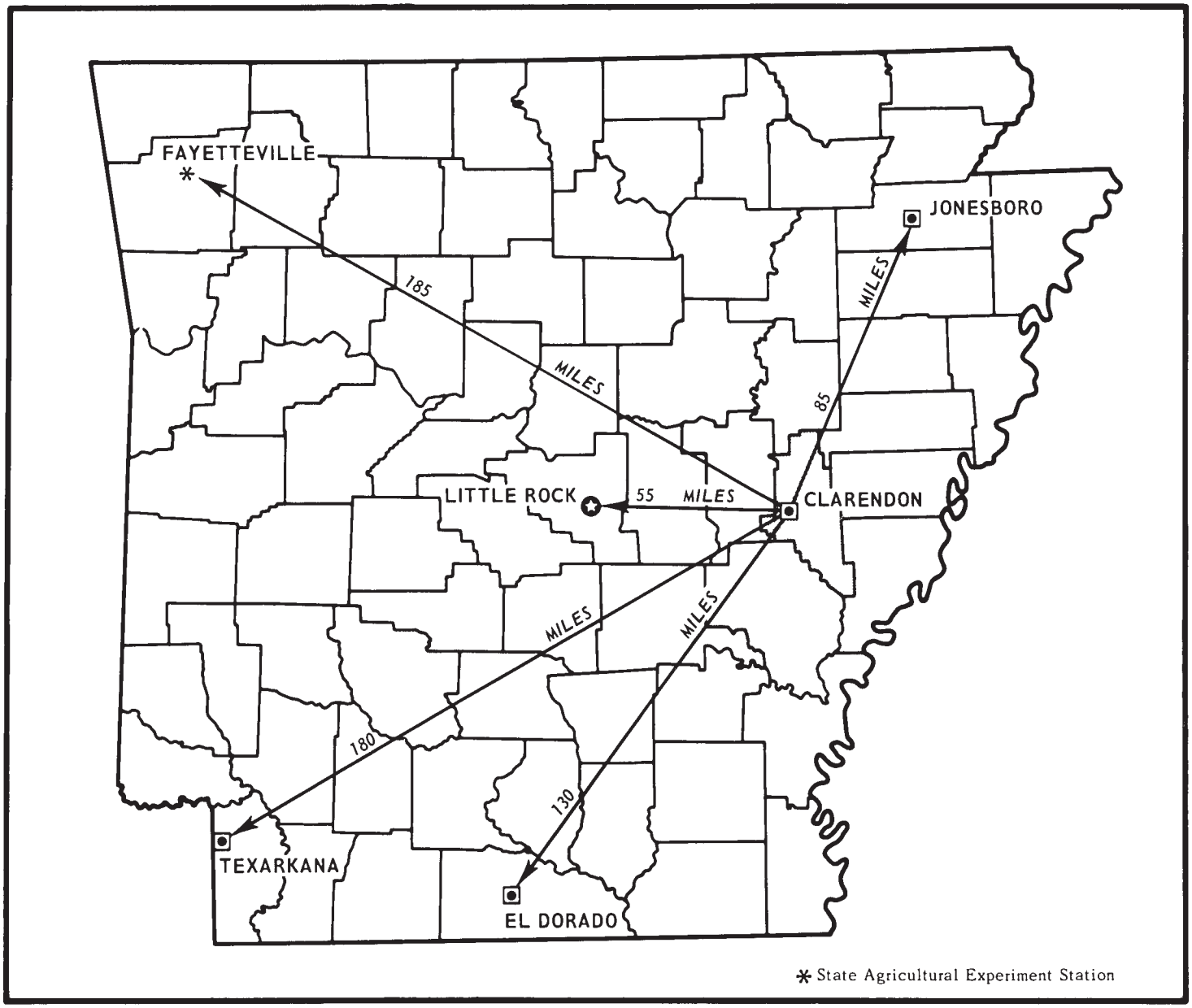
Why do you need soil information? Many people assume that soils are all more or less alike. They are unaware that great differences in soil properties can occur within even short distances.

Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for building or roads. Very clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. It also shows, on the general soil map, the location of broad areas of soils; the location of each kind of soil is shown on detailed soil maps at the back. The publication provides descriptions of each kind of soil in the survey area, and much information is given about each soil for specific uses. If you need additional information or assistance in using this publication, please call your local office of the Soil Conservation Service or the Cooperative Extension Service.

I believe that this soil survey will help you to have a better environment and a better life. The widespread use of this information will greatly assist all of us in the conservation, development, and productive use of our soil, water, and related resources.

State Conservationist
Soil Conservation Service



Location of Monroe County in Arkansas.

SOIL SURVEY OF MONROE COUNTY, ARKANSAS

By George R. Maxwell, Cornelius Harris, and Warren A. Gore, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in cooperation with the Arkansas Agricultural Experiment Station

Introduction

Monroe County is in the east-central part of Arkansas (see facing page). It is roughly triangular in shape and has an area of about 388,672 acres, or 607 square miles. It is about 22 miles wide at its greatest width. The maximum length is about 38 miles.

The county is bounded on the east by St. Francis, Lee, and Phillips Counties, on the south by Phillips and Arkansas Counties, on the west by Arkansas, Prairie, and Woodruff Counties, and Woodruff County is adjacent on the north. White River forms part of the boundary between Monroe County and Arkansas County. The Cache River forms part of the boundary between Monroe County and Prairie County.

In 1970 the population was 15,657. Clarendon, the county seat, had a population of 2,563. Brinkley, with a population of 5,275, is an important trading center. Holly Grove, Monroe, and Blacton are small trading centers.

The economy of the county is based on farming. Except for a few manufacturing plants in and near Clarendon and Brinkley, most of the businesses provide farm services.

General Nature of the County

The farming, physiography and drainage, and climate of Monroe County is discussed in this section.

Uplands, where the soils formed in thick layers of windblown sediment, make up about 40 percent of the county. Bottom land along White and Cache Rivers divides the upland area from north to south.

Most of the upland soils are suitable for cultivation or improved pasture. Excess water is a moderate to very severe hazard on most level tracts, as is erosion on the sloping parts.

About 60 percent of the county is bottom land and associated lakes and rivers. The soils in this area are suited to farming. Except for a few large wooded tracts, such as the White River National Wildlife Refuge and the Dagmar Game Management area, a few river islands and cutoff points, nearly all of the area is cultivated. Excess water drains away slowly or is ponded and is a moderate to very severe hazard over the area. Erosion is insignificant except in a few areas.

Elevation ranges from about 222 feet at a point on the Prairie-Monroe County line and about 3 miles northwest of Roe to about 140 feet where White River crosses the southern boundary of the county.

Most of the soils in the county contain moderate to high amounts of plant nutrients and some are among the most fertile in the state. The bottom land area is part of the combined flood plains of the White and Cache Rivers. Except for about 1,500 acres in the southeast corner of the county that is protected by a levee, the area is subject to frequent flooding. The floods are mainly between January and June. In most years the flooded soils dry early enough so that warm-season crops can be grown.

Farming

Farming in Monroe County spread from the better drained parts of the uplands to the higher parts of the natural levees, and then gradually to the poorly drained flats. According to the 1969 Census of Agriculture, about 226,827 acres, or 58 percent of the county, is in farms. The rest is woodland, cities and towns, state and federally owned land, and transportation and utility facilities. The early economy was based on the plantation system, and cotton was the main cash crop.

Farming is still the principal means of livelihood, but cropping systems have become more diversified. Since acreage allotments were placed on cotton, the importance of that crop has declined. As machinery has replaced livestock as a source of power, corn and other feed crops have also declined in importance. Soybeans and small grain have increased in importance.

Most farming in Monroe County is of a general nature. Soybeans, cotton, and wheat are the main crops (table 1), and some rice and grain sorghum are grown. Beef cattle are raised on some farms. Over much of the county, improved crop varieties, improved drainage outlets, flood

control measures on some flood plains, and other improved management techniques have led to rapid expansion of farming into the wetter areas and reduction of woodland.

Farms in Monroe County, as in most of eastern Arkansas, are decreasing in number and increasing in size. Between 1964 and 1969, the number of farms decreased from 884 to 680, but the average size increased from 262 acres to 333 acres.

Farms of 260 acres or more increased from 233 in 1964 to 262 in 1969. Farms smaller than 260 acres decreased in number. Those of less than 100 acres decreased in number the most—from 487 in 1964 to 265 in 1969. Those larger than 1,000 acres decreased from 57 to 51. In 1969, 259 were operated by full owners, 210 were operated by part owners, and 211 farms were operated by tenants. Of these operators, 286 held jobs off the farm, and 156 of these worked off the farm 100 days or more.

The number of livestock in the county has been decreasing for several years (table 2). Most beef cattle are of good grade, and milk cows are kept mainly for home use.

Farm-related industrial enterprises in the county include cotton gins and warehouses and grain and soybean elevators and driers served by railway, truck, and barge line facilities; and farm equipment and supply companies.

Most of the farms are small enough so that the family can do most of the work, using outside labor only during peak seasons. The larger farms are operated using laborers supervised by the owner, manager, or tenant. Tenants pay a fixed rent or a percentage of the crop for use of the land. Most of the land is farmed by operators who have sufficient modern equipment to farm efficiently. Most farmers fertilize according to the needs of the crop, and many use chemicals for weed control.

Physiography and Drainage

The geological deposits of Monroe County are alluvium and loess. Generally, alluvium is in the western part of the county and loess is in the eastern part. The alluvial sediment is more than 200 feet thick over consolidated material. The loess is 2 to 20 feet thick over unconsolidated old alluvium. Bedrock probably is at a depth of many hundreds of feet throughout the county.

The alluvium is a mixture of minerals from throughout the Mississippi River Basin. It is derived from many kinds of soils, rocks, and unconsolidated sediments from many states.

The topography of the county can be divided into two main areas. These are the level to gently undulating bottom lands, and the level to nearly level upland plains above gently to moderately sloping escarpments.

The topography of the bottom land ranges from broad flats to areas of alternating swales and low ridges. Except along a few streambanks, differences in elevation are minor. Slopes generally are less than 1 percent, but they are as much as 3 percent on the sides of low ridges.

The upland plain is predominantly level to nearly level, and slopes are less than 3 percent. Scattered low ridges and escarpments along drainageways have slopes of 3 to 12 percent.

The drainage in the county generally is southwestward through a system of natural and improved drainageways and connecting artificial channels. The county is well supplied with drainageways and lakes. The major drainageways are the White and Cache Rivers and Bayou De View. Other drainageways are Roc Roe Bayou, Cut Bluff Slough, Sandy Slough, Indian Bay, Maddox Bay, Big Creek, Big Cypress Creek, and many small bayous and creeks.

The many streams, as well as Indian Bay, Maddox Bay and others, furnish an abundant supply of surface water for recreation, farming, and industry. The supply of ground water is abundant. Wells 10 inches in diameter, drilled to a depth of about 120 feet, furnish good to fair quality water at a rate of about 1,500 to 1,800 gallons per minute. In the vicinity of Roe the depth to ground water has increased with continued use.

Climate

Monroe County lies between the Arkansas and Mississippi Rivers in east-central Arkansas. The county is relatively flat. The relatively treeless and predominantly cultivated countryside offers little hindrance to wind, and surface wind velocity may be somewhat greater than in more rugged, wooded terrain. The data in table 3 are the results of a climatic summary of temperature and precipitation at Brinkley. They are representative of Monroe County.

The climate of Monroe County, like all of Arkansas, is one of generally warm summers and mild winters. Although there are outbreaks of artic weather, these cold spells generally are of short duration, and winters are relatively free of severe cold and snow. Outdoor work can be done much of the winter.

The most abrupt and violent weather changes are in spring. Strong frontal passages are often accompanied by turbulent weather and high intensity rains.

Summers are long, warm and frequently hot, and highly humid because of the moisture brought in from the Gulf of Mexico. Evaporation from the streams, lakes, marshes, and flooded rice fields contributes to the high humidity. Annual average relative humidity is about 70 percent. Uncomfortably high temperature and humidity is likely from mid-May to mid-September.

In fall, days are warm and nights are cool. This is the driest, least humid season and is commonly the most pleasant. Prewinter cold fronts and sharp drops in temperature occur late in October and in November, but these generally are not accompanied by significant turbulence as are the front passages in spring. Dry air masses are most likely in the fall, when the day-to-night temperature range is the greatest.

The county has a wide range of temperature extremes. Average temperatures in winter are normally above freezing, but nighttime temperatures are occasionally in the teens, and temperatures below zero have been recorded. Normally, 65 days or more have a temperature of 90 degrees F or higher, mainly in July and August. The temperature can be expected to reach 100 degrees or higher for about 6 days in most years. Minimum summer temperatures are generally in the 65 degrees to 75 degrees range. Only a few cold fronts reach the area in summer, and rarely do they bring dry air masses into the county.

The precipitation averages nearly 50 inches a year and is generally adequate for most crops. It is fairly evenly distributed throughout the year. March, April, and May are the wettest months, and normally have nearly 16 inches of rainfall. June through October is the driest period, but about 3 inches of rainfall can be expected in each of these months in a normal year. Warm frontal systems, or those associated with a wintery low pressure system approaching from the southern plains or the Gulf of Mexico, are the most reliable sources of moisture. A single storm can bring as much as 2 to 5 inches or more of rainfall. Snowfall averages only about 2 to 4 inches per year and is a negligible source of moisture. Normally, snow melts within a few hours, and it frequently melts as it falls. Sleet and freezing rain are infrequent but can cause serious damage to evergreen trees and shrubs and disrupt transportation and utility service, otherwise they are of little significance. Convective clouds occur almost daily in summer, but rain received from these is erratic and poorly distributed. In some years droughts that are severe enough to injure seedlings and shallow rooted crops occur in spring and early in summer. In most years at least one drought, lasting 15 days or more, occurs in the period of June through September. Such droughts cause severe crop damage or crop failure on such soils as Foley, Lafe, and Bonn.

During the hottest part of the summer, evaporation of soil moisture can average about one-third inch per day, and extended periods of high temperatures and maximum sunshine can deplete a large amount of soil moisture. A 1-inch summer rain can be dissipated in 2 or 3 days. In winter and spring, low evaporation and transpiration rates and high rainfall cause wetness and local flooding. In low-lying areas crop planting is sometimes delayed up to several weeks during a wet period. The normally drier weather in late summer and fall is favorable for harvesting but may reduce the growth of pasture plants and cause difficulty in establishing a stand of fall-seeded crops.

Occasionally, late frost will damage crops planted early, and they may have to be replanted. Rarely do frosts come early enough in fall to impair the quality or reduce the yield of crops.

The growing season is long. Normally, the 7-month period from April through October is free from vegetation-damaging low temperatures. Sunshine averages slightly more than 70 percent of the possible amount. The average date of the last freezing temperature in spring is March 24, and the first in fall is November 2.

The prevailing wind is from the south at an average velocity of about 9 miles per hour. Although thunderstorms are common, particularly in summer, severe thunderstorms and tornados are far less common. Thunderstorms with damaging winds and hail may occur 3 or 4 times in a 10-year period. Tornados occur only 1 or 2 times in a 10-year period, which is far below the frequency in the tornado alley areas to the west.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are located, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes, the size of streams and the general pattern of drainage, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has been changed very little by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Soil series commonly are named for towns or other geographic features near the place where they were first observed and mapped. Gore and Grenada, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in characteristics.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Grenada silt loam, 0 to 1 percent slopes, is one of several phases within the Grenada series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accu-

rately. The soil map in the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a named soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series, and some have little or no soil. Two such kinds of mapping units are shown on the soil map of Monroe County: soil complexes and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally the name of a soil complex consists of the names of the dominant soils joined by a hyphen. Foley-Calhoun-Bonn complex is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. Commerce soils, frequently flooded, is an undifferentiated soil group in this county.

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. Existing ratings of suitabilities and limitations (interpretations) of the soils are field tested and modified as necessary during the course of the survey, and new interpretations are added to meet local needs. This is done mainly through field observations of behavior of different kinds of soil for different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and other information available from state and local specialists. For example, data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so to be readily useful to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation. Presenting the detailed information in an organized, understandable manner is the purpose of this publication.

General Soil Map

The general soil map at the back of this publication shows, in color, the soil associations described in this survey. Each soil association is a unique natural landscape unit that has a distinctive pattern of soils and relief and drainage features. It normally consists of one or more soils of major extent and some soils of minor extent, and it is named for the major soils. The kinds of soil in one association may occur in other soil associations, but in a different pattern.

The map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas of the county for general kinds of land use. From the map, areas that are generally suitable for certain kinds of farming or other land uses can be identified. Likewise, areas with soil properties distinctly unfavorable for certain land uses can be located.

Because of the small scale of the map, it does not show the kind of soil at a specific site. Thus, this is not a suitable map for planning the management of a farm or field or for selecting the exact location of a road, building, or similar structure because the kinds of soils in any one soil association ordinarily differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

1. Dubbs-Bosket-Dundee Association

Well drained and somewhat poorly drained, level and gently undulating soils that have a loamy surface layer and subsoil; on bottom land

This association is mainly in the central part of the county. It consists of level and gently undulating, loamy soils on older natural levees. The gently undulating areas are swales that alternate with low ridges. The ridges rise 2 to 5 feet above the swales. Generally, the Dubbs and Bosket soils are on the higher areas, and Dundee soils are on the lower areas.

This association occupies about 16 percent of the county. Dubbs soils make up about 40 percent of the association; Bosket soils, 15 percent; Dundee soils, 15 percent; and the remaining 30 percent is mainly Amagon, Bonn, Calhoun, and Foley soils.

Dubbs soils are well drained. The surface layer is brown silt loam. The upper part of the subsoil is brown silty clay loam and is mottled in the lower part. The lower part of the subsoil is strong brown silt loam that extends to a depth of about 47 inches. The underlying material is strong brown and pale brown stratified layers of loamy fine sand and sand that extend to a depth of 72 inches or more.

Bosket soils are well drained. The surface layer is dark brown fine sandy loam. The next layer is dark yellowish brown fine sandy loam. The subsoil is brown and dark yellowish brown sandy clay loam that extends to a depth

of about 38 inches. The underlying material is brown fine sandy loam that extends to a depth of 72 inches or more.

Dundee soils are somewhat poorly drained. The surface layer is dark grayish brown and grayish brown silt loam and is mottled in the lower part. The upper part of the subsoil is grayish brown, mottled silty clay loam; and the lower part is grayish brown, mottled sandy clay loam. The underlying material is light brownish gray, mottled loamy fine sand that extends to a depth of 72 inches or more.

This association is one of the major cotton farming areas. Except for a few patches of hardwood trees along drainageways, nearly all of the acreage is cultivated. The Dundee soils need surface drainage for efficient farm management. The main crops are cotton and soybeans; but grain sorghum, winter small grain, and pasture plants are also grown. Truck crops are also suited.

Most farms range from 10 to 600 acres in size. About 70 percent of the farms are operated by owners; the rest are operated by renters.

Dubbs and Bosket soils have slight to moderate limitations for residences, other buildings, and highways; and Dundee soils have moderate to severe limitations for these uses. Bosket and Dubbs soils have slight to moderate limitations for septic tank absorption fields, and Dundee soils have severe limitations for this use because of seasonal high water table and a slow percolation rate.

2. Jackport-Foley-Bonn Association

Poorly drained, level soils that have a loamy surface layer and a loamy and clayey subsoil; on broad upland flats

This association extends from north to south in the central part of the county. It consists of broad flats broken by broad depressions. Natural drainageways in the association consist of slow-flowing, intermittent streams. The soils in this association are intermingled, but generally the Jackport soils are in the broad depressions.

This association occupies about 25 percent of the county. Jackport soils make up about 30 percent of the association; Foley soils, 15 percent; and Bonn soils, 10 percent. The remaining 45 percent is mainly Bosket, Calhoun, Crowley, Dubbs, Dundee, Lafe, and Mhoon soils and water areas.

Jackport soils are poorly drained. The surface layer is dark grayish brown silty clay loam. The upper part of the subsoil is olive gray, mottled clay; the middle part is grayish brown, mottled clay; and the lower part is olive gray, mottled silty clay that extends to a depth of 72 inches or more.

Foley soils are poorly drained. The surface layer is brown silt loam. The subsurface layer is grayish brown, mottled silt loam. The subsoil is gray and olive gray, mottled silty clay loam. The underlying material is light olive gray, mottled fine sandy loam that extends to a depth of 72 inches or more.

Bonn soils are poorly drained. The surface layer is dark grayish brown silt loam. The subsurface layer is gray, mottled silt loam. The upper part of the subsoil is gray and grayish brown, mottled silt loam in some places and silt loam and silty clay loam mixed with material that moved down from the subsurface layer in others. The lower part of the subsoil is olive gray, mottled silty clay loam. The underlying material is grayish brown, mottled silt loam that extends to a depth of 72 inches or more.

Soils in this association are suited to farming. Most of the area is cultivated. The main crops are soybeans and rice, but winter small grain is also grown. Soils in this association need surface drainage if they are to be managed efficiently. Warm-season plants die during droughts. Intermingled throughout the association are areas of soils that have a high concentration of sodium and magnesium near the surface.

Most farms range from 10 to 1,500 acres in size and are highly mechanized. About 60 percent of the farms are operated by owners, and the rest are operated by renters.

Because of wetness, a seasonal high water table, and moderate to low bearing capacity, most of the soils have severe limitations for residences, other buildings, and highways. Because of a slow percolation rate and the seasonal high water table, they have severe limitations for septic tank absorption fields.

3. Foley-Grenada-Calloway Association

Poorly drained to moderately well drained, level to gently sloping, loamy soils on uplands

This association is in the eastern part of the county. It consists of broad flats broken by low ridges that rise 1 to 10 feet higher than the flats. Natural drainageways are mainly slow flowing, intermittent streams. Foley soils are on the lower part of flats, Grenada soils are on low ridges, and Calloway soils are on the higher flats.

This association occupies about 8 percent of the county. Foley soils make up about 35 percent of the association, Grenada soils, 30 percent, and Calloway soils, 10 percent. The remaining 25 percent is Bonn and Loring soils.

Foley soils are poorly drained. The surface layer is brown silt loam. The subsurface layer is grayish brown, mottled silt loam. The subsoil is gray and olive gray, mottled silty clay loam. The underlying material is light olive gray, mottled fine sandy loam that extends to a depth of 72 inches or more.

Grenada soils are moderately well drained. The surface layer is brown silt loam. The upper 19 inches of the subsoil is yellowish brown silty clay loam that is mottled in the lower part. Below this is a layer of gray, mottled silt loam about 3 inches thick. The lower part of the subsoil is a brittle, mottled fragipan about 36 inches thick. The upper 14 inches is mottled, grayish brown, light brownish gray, and brown silty clay loam. The lower 22 inches is dark yellowish brown, mottled silt loam. The underlying material is mottled, dark yellowish brown and brown silt loam that extends to a depth of 72 inches or more.

Calloway soils are somewhat poorly drained. The surface layer is grayish brown silt loam. The subsoil is about 56 inches thick. The upper 10 inches is yellowish brown, mottled silt loam; the next 9 inches is light brownish gray, mottled silt loam; the next 15 inches is grayish brown, mottled silty clay loam; and the next 32 inches is grayish brown, mottled silt loam. There is a brittle fragipan between depths of 16 and 72 inches.

Soils in this association are suited to farming, and most of the acreage is cultivated. Most areas of nearly level soils need surface drainage. Sloping soils need erosion control for efficient farm management. The main crops are cotton and soybeans, but rice and winter small grain are also grown.

Farms range from about 80 to 600 acres in size. About half the farms are operated by owners; the rest are operated by renters.

Because of wetness, a seasonal high water table, and low bearing capacity, most of the soils have severe limitations for residences, other buildings, and highways. Grenada soils on ridges have moderate limitations to these uses. Because of a slow percolation rate and seasonal high water table, these soils have severe limitations for septic tank absorption fields.

4. Foley-Calhoun-Grenada Association

Poorly drained and moderately well drained, level to gently sloping, loamy soils on uplands

This association is in the eastern part of the county. It consists of broad flats broken by low ridges that rise 2 to 10 feet above the flats. Natural drainageways are mainly slow flowing, intermittent streams. Foley and Calhoun soils are on the flats, and Grenada soils are on the ridges.

This association occupies about 17 percent of the county. Foley soils make up about 32 percent of the association, Calhoun soils, 18 percent, and Grenada soils, 15 percent. The remaining 35 percent is mainly Bonn, Calloway, and Loring soils.

Foley soils are poorly drained. The surface layer is brown silt loam. The subsurface layer is grayish brown, mottled silt loam. The subsoil is gray and olive gray, mottled silty clay loam. The underlying material is light olive gray, mottled fine sandy loam that extends to a depth of 72 inches or more.

Calhoun soils are poorly drained. The surface layer is dark grayish brown silt loam. The subsurface layer is gray, mottled silt loam. The subsoil is gray and light brownish and grayish brown, mottled silty clay loam and silt loam.

Grenada soils are moderately well drained. The surface layer is brown silt loam. The upper 19 inches of the subsoil is yellowish brown silty clay loam that is mottled in the lower part. Below is a layer of gray, mottled silt loam about 3 inches thick. The lower part of the subsoil is a firm, brittle, mottled fragipan about 36 inches thick. The upper 14 inches is mottled, grayish brown, light brownish gray, and brown silty clay loam. The lower 22 inches is dark yellowish brown, mottled silt loam. The underlying material is mottled, dark yellowish brown and brown silt loam that extends to a depth of 72 inches or more.

Soils in this association are suited to farming. Except for a few small scattered patches of hardwood trees, most of the acreage is cultivated. The level areas in this association need drainage, and erosion control measures are needed on slopes for efficient farm management. The main crops are soybeans and cotton. Rice is grown on level areas. Winter small grain is grown where surface drainage is adequate.

Most farms range from 200 to 400 acres in size and are highly mechanized. About 75 percent of the farms are operated by owners. The rest are operated by renters.

Because of wetness, a seasonal high water table, and moderate to low bearing capacity, most of these soils have severe limitations for residences, other buildings, and highways. The moderately well drained soils on ridges are moderately limited for these uses. Because of slow percolation rate and seasonal high water table, they have severe limitations to septic tank absorption fields.

5. Grenada-Loring Association

Moderately well drained, level to moderately sloping, loamy soils on uplands

This association is in the western and southeastern parts of the county. It consists of flats broken by low ridges that rise 1 to 10 feet higher than the flats. Natural drainageways are mainly slow flowing, intermittent streams.

This association occupies about 3 percent of the county. Grenada soils make up about 50 percent of the association; Loring soils 10 percent; and the remaining 40 percent is Bonn, Foley, Memphis, and Tichnor soils and water areas.

Grenada soils are moderately well drained. The surface layer is brown silt loam. The upper 19 inches of the subsoil is yellowish brown silty clay loam that is mottled in the lower part. Below this is a layer of gray, mottled silt loam about 3 inches thick. The lower part of the subsoil is a brittle, mottled fragipan about 36 inches thick. The upper 14 inches of it is mottled, grayish brown, light brownish gray, and brown silty clay loam. The lower 22 inches is dark yellowish brown, mottled silt loam. The underlying material is mottled, dark yellowish brown and brown silt loam that extends to a depth of 72 inches or more.

Loring soils are moderately well drained. The surface layer is brown silt loam. The upper part of the subsoil is brown silt loam and silty clay loam; the middle part is a brown, mottled in shades of brown and gray, brittle silt loam fragipan; and the lower part is brown, mottled silt loam.

Soils in this association are suited to farming, and most of the acreage is cultivated. Most of the association needs

erosion control for efficient farm management. The main crops are cotton and soybeans, but winter small grains are also grown.

Farms range from 200 to 400 acres in size. About 70 percent of the farms are operated by owners, and the rest, by renters.

Because of low bearing capacity and slope, most of these soils have moderate limitations for residences, other buildings, and highways. Because of slow percolation rate and slope, these soils have severe limitations for septic tank absorption fields.

6. Sharkey-Commerce Association

Poorly drained and somewhat poorly drained, level and gently undulating clayey and loamy soils on flood plains

This association is in the western part of the county, mainly along White and Cache Rivers, and includes part of the White River National Wildlife Refuge and part of the Dagmar Game Management Area. It consists of slack water flats and low natural levees that rise 1 to 3 feet higher than the flats. Sharkey soils are on the flats, and Commerce soils are on the low natural levees. Natural drainageways are sluggish bayous and sloughs.

This association occupies about 28 percent of the county. Sharkey soils make up about 66 percent of the association; Commerce soils, 19 percent; and the remaining 15 percent is mainly McCrory and Mhoon soils and water areas.

Sharkey soils are poorly drained. The surface layer is dark grayish brown silty clay. The subsoil is dark gray and gray, mottled clay about 38 inches thick. The underlying material is gray, mottled silty clay that extends to a depth of 72 inches or more.

Commerce soils are somewhat poorly drained. The surface layer is dark grayish brown silty clay loam. The subsoil is dark grayish brown, mottled silty clay loam. The underlying material is dark grayish brown and gray, mottled silty clay loam that extends to a depth of 72 inches or more.

Soils in this association are suited to farming. About 80 percent of the acreage, excluding the White River National Wildlife Refuge and the Dagmar Game Management Area, is cultivated. The rest is scattered patches of hardwood trees. Nearly all of this association is subject to frequent flooding, mainly between December and June. The main crop in this area is soybeans. Areas protected by levees need surface drainage if they are to be managed efficiently. The main crops in these areas are cotton, soybeans, and rice. Grain sorghums and pasture plants are also grown.

Most farms range from 50 to 2,000 acres in size and are highly mechanized. About 90 percent of the farms are operated by owners; the rest are operated by renters.

Because of wetness, seasonal high water table, and low bearing capacity, the soils in this association have severe limitations for residences, other buildings, and highways. Soils in this association have severe limitations for septic tank absorption fields because of the slow percolation rate and seasonal high water table. Limitations for nonfarm uses are more severe in the areas subject to flooding than they are in areas protected by levees.

7. Stuttgart-Crowley Association

Somewhat poorly drained and moderately well drained, level and nearly level soils that have a loamy surface layer and a clayey and loamy subsoil; on broad upland flats

This association is in the western part of the county. It consists of broad flats broken by low ridges that rise 1 to 5 feet higher than the flats. Crowley soils are on the lower part of the flats, and Stuttgart soils are on the low, generally broad ridges. Natural drainageways are mainly slow flowing, intermittent streams.

This association occupies about 3 percent of the county. Stuttgart soils make up about 50 percent of the association; Crowley soils, about 40 percent; and the remaining 10 percent is Gore and Tichnor soils and water areas.

Stuttgart soils are somewhat poorly drained to moderately well drained. The surface layer is brown and dark grayish brown, mottled silt loam. The subsurface layer is yellowish brown, mottled silt loam. The upper part of the subsoil is mottled shades of brown and gray silty clay loam. The lower part of the subsoil is brown (various shades) silt loam that extends to a depth of 72 inches or more.

Crowley soils are somewhat poorly drained. The surface layer is dark grayish brown and dark gray silt loam and is mottled in the lower part. The subsurface layer is grayish brown, mottled silt loam. The upper part of the subsoil is gray, mottled silty clay; and the lower part is gray, mottled silty clay loam that extends to a depth of 72 inches or more.

Soils in this association are suited to farming, and most of the acreage is cultivated. Most of the area needs surface drainage, if it is to be managed efficiently. The main crops are soybeans and rice. Grain sorghum also is suited, and winter small grain can be grown if surface drainage is adequate.

Farms range from 20 to 1,500 acres in size. About half the farms are operated by owners; the rest are operated by renters.

Because of wetness, seasonal high water table, and low bearing capacity, most of the association has moderate to severe limitations for residences, other buildings, and highways. Soils in this association have severe limitations for septic tank absorption fields because of the slow percolation rate and seasonal high water table.

Descriptions of the Soils

Described in this section are the soil series and mapping units in Monroe County, Arkansas. Each soil se-

ries is described in considerable detail, and then, briefly, each mapping unit in that series. Unless it is specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile; that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second, detailed and in technical terms, is for scientists, engineers, and others who need to make thorough and precise studies of soils. Unless it is otherwise stated, the colors given in the descriptions are those of a dry soil.

Before the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit and woodland group in which the mapping unit has been placed.

The acreage and proportionate extent of each mapping unit are shown in table 4. Many of the terms used in describing soil can be found in the Glossary at the end of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*9*).

Amagon Series

The Amagon series consists of poorly drained soils on broad flats and in shallow depressions on the lower part of old natural levees. These soils formed in stratified beds of loamy sediment. The native vegetation is hardwood forest, mainly water-tolerant species of oak.

In a representative profile the surface layer is dark grayish brown silt loam about 10 inches thick. It is mottled in the lower part. The subsurface layer is gray, mottled silt loam about 7 inches thick. The upper part of the subsoil is gray, mottled silt loam about 8 inches thick, and the middle part is gray, mottled silty clay loam about 27 inches thick. The lower part of the subsoil is light olive gray, mottled silt loam that extends to a depth of 72 inches or more.

Amagon soils are medium in natural fertility. Organic-matter content is low. Permeability is slow, and the available water capacity is high. These soils respond well to fertilizer, and good tilth is easy to maintain. In places a plowpan has formed beneath the plow layer. This pan restricts root penetration and movement of water through the soil.

These soils are suited to most crops commonly grown in the county. Nearly all of the acreage is cultivated.

Representative profile of Amagon silt loam in a moist, cultivated area in the SW1/4SE1/4NE1/4 sec. 25, T. 4 N., R. 3 W.:

Ap1—0 to 6 inches, dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; common roots; few small dark concretions; strongly acid; clear smooth boundary.

Ap2—6 to 10 inches, dark grayish brown (10YR 4/2) silt loam; common fine faint gray and common medium faint yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable; common roots; few small dark concretions; very strongly acid; clear wavy boundary.

A2g—10 to 17 inches, gray (10YR 5/1) silt loam; common fine distinct brown (10YR 4/3) mottles; weak medium subangular blocky structure; friable; few roots; few small dark concretions; very strongly acid; clear wavy boundary.

B1g—17 to 25 inches, gray (10YR 6/1) silt loam; common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable; few roots; few small dark concretions; very strongly acid; clear wavy boundary.

B21tg—25 to 35 inches, gray (10YR 6/1) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; plastic; common thin clay films on faces of peds; few small dark concretions; very strongly acid; clear wavy boundary.

B22tg—35 to 52 inches, gray (10YR 5/1) silty clay loam; common medium distinct light olive brown (2.5Y 5/4) mottles; moderate medium subangular blocky structure; firm; strongly acid; clear smooth boundary.

B3g—52 to 72 inches, light olive gray (5Y 6/2) silt loam; common medium distinct brown (10YR 4/3) mottles; weak medium subangular blocky structure; firm; few pores; slightly acid.

The Ap horizon is dark grayish brown or grayish brown, and the B2t horizon ranges from gray to light brownish gray. Mottles in the B2t horizon are in shades of yellow and brown. Texture is silt loam or silty clay loam. The B3 horizon ranges from gray to light brownish gray, and its texture is silt loam or silty clay loam. Except where it has been limed, the Ap horizon is strongly acid or very strongly acid. The A2 and Bt horizons are strongly acid or very strongly acid. The B3 horizon ranges from strongly acid to slightly acid.

Amagon soils are associated with Bosket, Dubbs, and Dundee soils. They are grayer throughout the B horizon than Bosket and Dubbs soils and grayer in the upper part of the B horizon than Dundee soils.

Am—Amagon silt loam. This level, poorly drained soil is on broad flats and in shallow depressions, mainly in the western part of the White River bottom land. Most areas range from 15 to 40 acres in size. Included in mapping are spots of Dundee and Foley soils.

This soil is suited to farming, but wetness is a severe hazard. Field work is delayed several days after a rain unless surface drains are installed. Under good management which includes adequate drainage, clean tilled crops that leave large amounts of residue can be safely grown year after year.

The main crops are soybeans, cotton, and rice. Grain sorghum also is suited to this soil, and winter small grain can be grown if surface drainage is adequate. Adapted pasture plants are bermudagrass, tall fescue, and white clover. Capability unit IIIw-1; woodland group 1w6.

Bonn Series

The Bonn series consists of poorly drained, level soils on upland flats. These soils formed in thick deposits of loess. Native vegetation is open stands of post oak, honey locust, hawthorn, and winged elm, and an understory of grasses.

In a representative profile the surface layer is dark grayish brown silt loam about 5 inches thick. The subsurface layer is gray, mottled silt loam about 5 inches thick. The upper part of the subsoil is 6 inches of gray, mottled silt loam mixed with material that moved down from the subsurface layer. The middle part of the subsoil is 4 inches of grayish brown, mottled silty clay loam with tongues of gray silt loam that extend down from the subsurface layer. The lower part of the subsoil is olive gray, mottled silty clay loam about 35 inches thick. The underlying material is grayish brown, mottled silt loam that extends to a depth of 72 inches or more.

Bonn soils are low in natural fertility. Content of organic matter is low. Permeability is very slow, and the available water capacity is low.

Because of the high content of sodium and magnesium, at levels toxic to most plants, these soils are poorly suited to cultivated crops. These soils are better suited to pasture and wildlife habitat than to other uses.

Bonn soils are mapped only in complex with Foley and Calhoun soils or with Lafe soils.

Representative profile of Bonn silt loam in a moist cultivated area of Lafe-Bonn complex in the NW1/4 NE1/4NW1/4 sec. 14, T. 1 S., R. 2 W.:

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; many fine roots; very strongly acid; clear smooth boundary.

A2—5 to 10 inches, gray (10YR 6/1) silt loam; common medium distinct yellowish brown (10YR 5/4, 5/6) mottles; weak medium granular structure; friable; common fine roots; few concretions; strongly acid; gradual smooth boundary.

A&B—10 to 16 inches, gray (10YR 5/1) silt loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak coarse columnar structure; friable; the A part is platy with thin lenses of silty clay loam between plates; the B material is silty clay loam and parts to moderate medium subangular blocky structure; clay films on B part; common dark concretions; few fine roots; mildly alkaline; clear wavy boundary.

B&A—16 to 20 inches, grayish brown (10YR 5/2) silty clay loam; common medium distinct dark grayish brown (10YR 4/2) mottles; moderate medium prismatic structure; friable; gray (10YR 5/1) silt loam tongues of A2 material extend through the horizon; tongues have platy structure with thin lenses of silty clay loam between plates; common clay films on faces of peds; common concretions; strongly alkaline; clear wavy boundary.

B22gt—20 to 42 inches, olive gray (5Y 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; common clay films on faces of peds; common concretions; common dark stains; strongly alkaline; gradual wavy boundary.

B23gt—42 to 55 inches, olive gray (5Y 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; common clay films on faces of peds; common streaks and pockets of light gray silt loam material on and between peds; common concretions; few dark stains; strongly alkaline; gradual wavy boundary.

Cg—55 to 72 inches, grayish brown (2.5Y 5/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few small concretions; strongly alkaline.

In this county Bonn soils are mapped only as complexes with Foley, Lafe, and Calhoun soils. These mapping units are described along with other soils in the Foley series and Lafe series.

The Ap horizon is dark gray to light brownish gray. The B2 horizon is gray, grayish brown, or olive gray. Texture of the C horizon is silt loam or fine sandy loam. The A horizon ranges from very strongly acid to neutral, the B horizon from neutral to strongly alkaline, and the C horizon from moderately alkaline to very strongly alkaline.

Bonn soils are chiefly associated with Foley, Lafe, and Calhoun soils. They have a higher content of sodium and magnesium nearer the surface than Foley soils. They are higher in sodium and magnesium throughout the B and C horizons than the Calhoun soils. They are grayer in the upper part of the B horizon than Lafe soils.

Bosket Series

The Bosket series consists of well-drained, level, and gently undulating soils on older natural levees along bayous and abandoned river channels. These soils formed in stratified beds of loamy sediment. The native vegetation is mixed hardwoods and an understory of vines and canes.

In a representative profile, the surface layer is dark brown fine sandy loam about 7 inches thick. The next layer is dark yellowish brown fine sandy loam about 6 inches thick. The subsoil is brown and dark yellowish brown sandy clay loam about 25 inches thick. The underlying material is brown fine sandy loam that extends to a depth of more than 72 inches.

Bosket soils are high in natural fertility. Content of organic matter is medium to low. Permeability is moderate, and the available water capacity is moderate. These soils respond well to fertilizer, and good tilth is easy to maintain. In places a plowpan has formed beneath the plow layer. This pan restricts root penetration and movement of water through the soil.

These soils are suited to most crops commonly grown in the county. Nearly all of the acreage is cultivated. Some areas are within the White River National Wildlife Refuge.

Representative profile of Bosket fine sandy loam, 0 to 1 percent slopes, in a moist cultivated area in NE1/4 SW1/4 NE1/4 sec. 23, T. 4 N., R. 3 W.:

Ap—0 to 7 inches, dark brown (10YR 3/3) fine sandy loam; weak fine granular structure; very friable; many fine roots; medium acid; abrupt smooth boundary.

A3—7 to 13 inches, dark yellowish brown (10YR 4/4) fine sandy loam; weak fine subangular blocky structure; friable; common fine roots; strongly acid; clear wavy boundary.

B21t—13 to 26 inches, brown (10YR 4/3) sandy clay loam; weak medium subangular blocky structure; firm; common roots; thin discontinuous clay films on faces of peds; strongly acid; clear wavy boundary.

B22t—26 to 38 inches, dark yellowish brown (10YR 4/4) sandy clay loam; moderate medium subangular blocky structure; firm; common roots; strongly acid; gradual wavy boundary.

C—38 to 72 inches, brown (7.5YR 4/4) fine sandy loam; massive; very friable; few roots; strongly acid.

The Ap horizon is very dark grayish brown or dark brown. The A3 horizon is dark yellowish brown, brown, or yellowish brown. The A3 horizon is lacking in some pedons. The Bt horizon is brown, dark yellowish brown, or dark brown. The C horizon is pale brown to brown fine sandy loam or sandy loam, but in some pedons the lower part ranges to sand. Except where the surface has been limed the soil is medium acid or strongly acid.

Bosket soils are mainly associated with Amagon, Dubbs, and Dundee soils. They are browner throughout the B horizon than Amagon and Dundee soils. Bosket soils have more sand throughout the A and B horizons than Dubbs soils.

BkA—Bosket fine sandy loam, 0 to 1 percent slopes. This level soil is generally on higher parts of natural levees. Individual areas range from 10 to 100 acres in size. The profile of this soil is the one described as representative of the series. Included in mapping are a few spots of Amagon, Dundee, and Dubbs soils and spots where the soil is similar to Bosket soils, but it has a lighter colored surface layer.

This soil is well suited to farming. Clean-tilled crops that leave large amounts of residue can be grown year after year.

The main crops are cotton and soybeans. Corn, grain sorghum, peanuts, winter small grain, and such truck crops as okra, green beans, potatoes, sweet corn, tomatoes, strawberries, and melons also are suited to this soil. Adapted pasture plants are bermudagrass and white clover. Capability unit I-1; woodland group 2o4.

BkB—Bosket fine sandy loam, gently undulating. This soil is in areas where narrow swales alternate with low ridges that rise 2 to 5 feet above the swales. The areas generally are on the tops and slopes of natural levees. Individual areas range from 10 to 50 acres in size. The profile of this soil is similar to the one described as representative of the series. Slope is less than 3 percent. Included in mapping are a few small level areas and spots of Amagon, Dubbs, and Dundee soils.

This soil is suited to farming, but runoff is slow to medium, and erosion is a moderate hazard on the upper part of slopes. Clean-tilled crops that leave large amounts of residue can be grown year after year if management is good.

The main crops are cotton and soybeans. Corn, grain sorghum, peanuts, winter small grain, and such truck crops as okra, green beans, potatoes, sweet corn, tomatoes, strawberries, and melons also are suited to this soil. Adapted pasture plants are bermudagrass and white clover. Capability unit IIe-1; woodland group 2o4.

Calhoun Series

The Calhoun series consists of poorly drained soils in level landscape and in depressions on uplands. These soils formed in thick deposits of loess. The native vegetation is hardwood forests, mainly water-tolerant oaks.

In a representative profile the surface layer is dark grayish brown silt loam about 6 inches thick. The subsurface layer is gray, mottled silt loam about 6 inches thick. The upper part of the subsoil is gray, mottled silty clay loam about 9 inches thick with tongues of gray silt loam extending down from the subsurface layer. The middle part of the subsoil is light brownish gray and grayish brown, mottled silty clay loam about 28 inches thick. The lower part of the subsoil is grayish brown silt loam that extends to a depth of 72 inches or more.

Calhoun soils are medium in natural fertility. Organic matter content is low. Permeability is slow, and the available water capacity is high. These soils respond well to fertilizer, and good tilth is easy to maintain. In places a plowpan has formed beneath the plow layer. This pan restricts root penetration and movement of water through the soil.

These soils are suited to most crops commonly grown in the county. Nearly all of the acreage is cultivated.

Representative profile of Calhoun silt loam in a moist, cultivated area in the SE1/4SE1/4SW1/4 sec. 5, T. 3 N., R. 2 W.:

Ap—0 to 6 inches, dark grayish brown (10YR 4/2) silt loam; weak medium granular structure; friable; common roots; few fine dark concretions; strongly acid; abrupt smooth boundary.

A2g—6 to 12 inches, gray (10YR 6/1) silt loam; few medium distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; common roots; few fine dark concretions; very strongly acid; clear wavy boundary.

B&A—12 to 21 inches, gray (10YR 6/1) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; common tongues of gray (10YR 6/1) silt loam about 1 inch wide at top and narrowing to about 1/2 inch at bottom terminate in cups of gray clay; common roots; continuous medium clay films on faces of peds and in pores; thin silt coating on most peds; few fine dark concretions; very strongly acid; gradual wavy boundary.

B21tg—21 to 33 inches, light brownish gray (2.5Y 6/2) silty clay loam; common medium distinct gray (10YR 6/1) and many fine faint light olive brown mottles; moderate medium subangular blocky structure; firm; few roots; thick continuous clay films; gray silt streaks in crevices and on faces of peds; few fine concretions; very strongly acid; gradual wavy boundary.

B22tg—33 to 49 inches, grayish brown (2.5Y 5/2) silty clay loam; common medium distinct brown mottles; moderate medium subangular blocky structure; firm; continuous thick clay films on faces of peds; few organic stains; very strongly acid; gradual smooth boundary.

B23tg—49 to 72 inches, grayish brown (10YR 5/2) silt loam; common medium distinct brown mottles; moderate medium subangular blocky structure; firm; continuous thick clay films on faces of peds; common organic stains on faces of peds; few dark accretions; very strongly acid.

The Ap horizon ranges from dark grayish brown to brown. The B horizon is gray, light brownish gray, or grayish brown. Except where the surface has been limed, reaction throughout the control section is very strongly acid or strongly acid.

Calhoun soils are associated wih Bonn, Calloway, Foley, Grenada, and Lafe soils. They lack the fragipan of Calloway and Grenada soils and the high content of sodium and magnesium in the middle or upper part of the B horizon of Bonn, Foley, and Lafe soils.

Ca—Calhoun silt loam. This soil is on broad upland flats. Individual areas range from about 20 to 300 acres in size. Slope is less than 1 percent. Included in mapping are spots of Bonn, Calloway, and Foley soils and poorly drained soils that have a fragipan in the subsoil.

This soil is suited to farming, but wetness is a severe hazard. Field work is delayed several days after a rain unless surface drains are installed. Clean-tilled crops that leave large amounts of residue can be safely grown year after year if this soil is adequately drained and management is good.

The main crops are soybeans and cotton. Grain sorghum and rice also are suited to this soil, and winter small grain can be grown if surface drainage is adequate. Adapted pasture plants are bermudagrass, tall fescue, and white clover. Capability unit IIIw-2; woodland group 3w9.

Calloway Series

The Calloway series consists of somewhat poorly drained, level soils on uplands. These soils formed in thick deposits of loess. Native vegetation is mixed hardwoods; dominant trees are water oak, hickory, and elm.

In a representative profile the surface layer is grayish brown silt loam about 6 inches thick. The subsoil is about 56 inches thick. The upper 10 inches is yellowish brown, mottled silt loam; the next 9 inches is light brownish gray, mottled silt loam; the next 15 inches is grayish brown, mottled silty clay loam; and the next 32 inches is grayish brown, mottled silt loam. A brittle fragipan is between depths of 25 and 72 inches.

Calloway soils are medium in natural fertility. Organic-matter content is low. Permeability is slow, and the available water capacity is moderate. These soils respond well to fertilizer, and good tilth is easy to maintain. In places a plowpan has formed beneath the plow layer. This pan restricts root penetration and movement of water through the soil.

These soils are suited to most crops commonly grown in the county. Nearly all of the acreage is cultivated.

Representative profile of Calloway silt loam in a moist, cultivated area in the SE1/4NE1/4NW1/4 sec. 17, T. 3 N., R. 2 W.:

Ap—0 to 6 inches, grayish brown (10YR 5/2) silt loam; weak fine granular structure; very friable; many fine roots; very strongly acid; clear smooth boundary.

B&A—6 to 16 inches, yellowish brown (10YR 5/4) silt loam; common medium distinct gray (10YR 6/1) mottles in the A part; weak fine subangular blocky structure; friable; few fine roots; few fine dark concretions; few pores; strongly acid; gradual wavy boundary.

A'2—16 to 25 inches, light brownish gray (10YR 6/2) silt loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak fine subangular blocky structure; friable; slightly brittle; few roots; few small concretions; strongly acid; gradual smooth boundary.

Bx1—25 to 40 inches, grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/4) and brown (10YR 5/3) mottles; weak coarse prismatic structure parting to weak fine subangular blocky; firm brittle; silt coatings along faces of prisms; common thin patchy clay films on faces of peds; common pores; few small concretions; strongly acid; gradual wavy boundary.

Bx2—40 to 72 inches, grayish brown (10YR 5/2) silt loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; brittle; common thin patchy clay films on faces of peds; common fine pores; few small concretions; strongly acid.

The Ap horizon is grayish brown, dark grayish brown, or brown. The B&A horizon is yellowish brown or dark yellowish brown silt loam or silty clay loam. The A'2 horizon is light brownish gray, grayish brown, light gray, or pale brown. In some pedons the A'2 horizon is not distinct because it is a mixture of the A'2 and Bx horizons. The Bx horizon is grayish brown or yellowish brown silt loam or silty clay loam. Depth to the fragipan ranges from 16 to 33 inches. Reaction ranges from medium acid to very strongly acid in the A and Bx1 horizons and from strongly acid to neutral below.

Calloway soils are chiefly associated with Bonn, Calhoun, Foley, Grenada, and Lafe soils. They are browner in the B horizon than Calhoun and Foley soils, and they lack the alkaline subsoil of Bonn, Foley, and Lafe soils. They are grayer in the B horizon than Grenada soils.

Cb—Calloway silt loam. This somewhat poorly drained soil is on uplands. Slopes are less than 1 percent. Individual areas range from 20 to 80 acres in size. Included in mapping are spots of Bonn, Calhoun, Foley, Grenada, and Lafe soils.

This soil is suited to farming, but wetness is a moderate hazard. Field work is delayed several days after a rain unless surface drains are installed. Clean tilled crops that leave large amounts of residue can be safely grown year after year if this soil is adequately drained and management is good.

The main crops are soybeans and cotton. Grain sorghum and rice also are suited, and winter small grain can be grown if surface drainage is adequate. Adapted pasture plants are bermudagrass, tall fescue, and white clover. Capability unit IIw-1; woodland group 2w8.

Commerce Series

The Commerce series consists of level and gently undulating, somewhat poorly drained soils on the lower parts of young natural levees. These soils formed in stratified beds of loamy sediment. The native vegetation is mixed bottom-land hardwoods.

In a representative profile the surface layer is dark grayish brown silty clay loam about 6 inches thick. The subsoil is dark grayish brown, mottled silty clay loam about 27 inches thick. The underlying material is dark grayish brown and gray, mottled silty clay loam that extends to a depth of 72 inches or more.

Commerce soils are high in natural fertility. Organic matter content is medium to low. Permeability is moderately slow, and the available water capacity is high. These soils respond well to fertilizer, and good tilth is easy to maintain. In places a plowpan has formed beneath the plow layer. This pan restricts root penetration and movement of water through the soil.

These soils are suited to most crops commonly grown in the county. Nearly all of the acreage is cultivated. Some tracts are within the Dagmar Game Management Area and the White River National Wildlife Refuge.

Representative profile of Commerce soils, frequently flooded, in a moist, cultivated field in the SE1/4 NE1/4NE1/4 section 31, T. 3 N., R. 3 W.:

Ap—0 to 6 inches, dark grayish brown (10YR 4/2) silty clay loam; weak medium subangular blocky structure; friable; many fine roots; few small dark concretions; medium acid; abrupt smooth boundary.

B21—6 to 16 inches, dark grayish brown (10YR 4/2) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; few pores; common medium dark concretions; medium acid; gradual smooth boundary.

B22—16 to 33 inches, mottled dark grayish brown (10YR 4/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; common fine roots; few fine pores; common medium hard dark concretions; medium acid; gradual smooth boundary.

C1—33 to 55 inches, mottled dark grayish brown (10YR 4/2) silty clay loam; common medium distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; firm; few medium large roots; few dark concretions; neutral; gradual smooth boundary.

C2—55 to 72 inches, gray (10YR 5/1) silty clay loam; common medium distinct yellowish brown mottles; weak coarse subangular blocky structure; firm; few large roots; few fine pores; few hard dark concretions; mildly alkaline.

The Ap horizon is dark grayish brown or grayish brown silty clay loam, fine sandy loam, or silt loam. The B horizon is dark grayish brown or grayish brown silt loam or silty clay loam. The C horizon is dark grayish brown or gray silty clay loam. The A and B horizons range from medium acid to neutral, and the C horizon is neutral or mildly alkaline.

Commerce soils are associated with Mhoon and Sharkey soils. They are browner in the uppermost part of the B horizon than both the associated soils, and they also contain less clay in the B horizon than Sharkey soils.

CF—Commerce soils, frequently flooded. This undifferentiated group of somewhat poorly drained soils is on flood plains mainly along the White River. Most areas are level, but some are gently undulating with alternating long, narrow swales and low ridges. Slopes range from 0 to about 2 percent. Most areas range from about 50 to more than 2,000 acres in size. Texture of the surface layer ranges from silty clay loam to fine sandy loam. Commerce soils make up about 70 to 95 percent of any mapped area. As much as 25 percent of some mapped areas consists of soils that have clayey subsoils. Included in mapping are spots of Mhoon and Sharkey soils and a few spots of soils with sandy surface layers.

The soils in this unit are poorly suited to farming because of the very severe hazard of frequent flooding. In most years the floods come between December and June. The soils are better suited to woodland and wildlife uses than to other uses. If the soil is plowed when too wet, clods form the silty clay loam surface layer, and seedbed preparation is somewhat difficult. With good management, warm-season crops that leave large amounts of residue can be grown most years, but planting is often delayed, and in some years part or all of the harvest is lost to floods.

The main crop is soybeans. Another suitable crop is grain sorghum. Bermudagrass is better suited for pasture than other plants. Capability unit IVw-1; woodland group 1w5.

Crowley Series

The Crowley series consists of somewhat poorly drained, level soils on broad upland flats. These soils formed in loess and the underlying clayey sediment.

In a representative profile the surface layer is silt loam about 13 inches thick. The upper 5 inches is dark grayish brown, and the lower 8 inches is dark gray and is mottled. The subsurface layer is grayish brown, mottled silt loam about 8 inches thick. The upper part of the subsoil is gray, mottled silty clay about 7 inches thick. The lower part is gray, mottled silty clay loam that extends to a depth of 72 inches or more.

Crowley soils are medium in natural fertility. Permeability is very slow, and the available water capacity is high. These soils respond well to fertilizer, and good tilth is easy to maintain.

These soils are suited to most crops commonly grown in the county. Nearly all of the acreage is cultivated.

Representative profile of Crowley silt loam in a moist, cultivated area in NE1/4NE1/4NE1/4 sec. 33, T. 1 N., R. 4 W.:

Ap1—0 to 5 inches, dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; few concretions; common fine roots; medium acid; clear smooth boundary.

Ap2—5 to 13 inches, dark gray (10YR 4/1) silt loam; common fine distinct dark brown (10YR 3/3) mottles; moderate medium subangular blocky structure; friable; common pores; few concretions; few fine roots; medium acid.

A2g—13 to 21 inches, grayish brown (10YR 5/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine roots; common pores; few concretions; very strongly acid; clear wavy boundary.

B2tg—21 to 28 inches, gray (10YR 5/1) silty clay; common medium distinct red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm; continuous clay films on faces of peds; few concretions; very strongly acid; gradual wavy boundary.

B31tg—28 to 46 inches, gray (10YR 5/1) silty clay loam; common medium faint grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; patchy clay films on faces of peds; few concretions; medium acid; gradual wavy boundary.

B32tg—46 to 72 inches, gray (10YR 6/1) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; patchy clay films on faces of peds; common concretions; mildly alkaline.

The Ap horizon ranges from dark grayish brown to dark gray. The A2 horizon is grayish brown or gray. The B2 horizon is gray or grayish brown silty clay loam or silty clay. The B3 horizon is silty clay loam or silty clay. Reaction of the Ap and A2 horizons ranges from very strongly acid to slightly acid. The B2 horizon ranges from very strongly acid to slightly acid, and the B3 horizon ranges from medium acid to moderately alkaline.

Crowley soils are associated mainly with Gore, Jackport, and Stuttgart soils. They are not as red in the upper part of the B horizon as Gore soils. Crowley soils are grayer in the B horizon than Stuttgart soils. They have red mottles in the uppermost part of the B horizon that Jackport soils lack.

Cr—Crowley silt loam. This level soil is on broad upland flats. Most areas range from 20 to 1,500 acres in size. Included in mapping are spots of Jackport and Stuttgart soils.

This soil is suited to farming, but wetness is a severe hazard. Field work is delayed several days after a rain unless drains are installed. With good management that includes adequate drainage, clean tilled crops that leave large amounts of residue can be safely grown year after year. The main crops are soybeans and rice. Grain sorghum also is suited to this soil, and winter small grain can be grown if surface drainage is adequate. Adapted pasture plants are bermudagrass, annual lespedeza, and white clover. Capability unit IIIw-3; woodland group 3w9.

Dubbs Series

The Dubbs series consists of well drained, level and gently undulating soils on older natural levees along bayous and abandoned river channels. These soils formed in stratified beds of loamy sediment. The native vegetation is bottom land hardwoods.

In a representative profile the surface layer is brown silt loam about 10 inches thick. The upper part of the subsoil is brown silt loam and silty clay loam about 26 inches thick. It is mottled in the lower part. The lower part of the subsoil is strong brown silt loam that extends to a depth of about 47 inches. The underlying material is strong brown and pale brown stratified layers of loamy fine sand and fine sand.

Dubbs soils are high in natural fertility. Content of organic matter is medium to low. Permeability is moderate, and available water capacity is high. These soils respond well to fertilizer, and good tilth is easy to maintain. In places a plowpan has formed beneath the plow layer. This pan restricts root penetration and movement of water through the soil.

These soils are suited to most crops commonly grown in the county. Some areas are within the White River National Wildlife Refuge.

Representative profile of Dubbs silt loam, 0 to 1 percent slopes, in a moist cultivated area in the NW1/4SE1/4NW1/4 sec. 19, T. 4 N., R. 2 W.:

Ap—0 to 5 inches, brown (10YR 5/3) silt loam; weak fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

A12—5 to 10 inches, brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; friable; common fine roots; neutral; clear smooth boundary.

B21t—10 to 19 inches, brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common fine roots; few thin patchy clay films on faces of peds; few small dark concretions; neutral; clear smooth boundary.

B22t—19 to 36 inches, brown (10YR 4/3) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine roots; continuous thin clay films on faces of peds; few organic stains; common fine pores; slightly acid; clear smooth boundary.

B3—36 to 47 inches, strong brown (7.5YR 5/6) silt loam; weak fine subangular blocky structure; friable; few roots; few thin patchy clay films; few organic stains; few small dark concretions; strongly acid; clear smooth boundary.

IIC1—47 to 62 inches, strong brown (7.5YR 5/6) loamy fine sand; weak fine granular structure; very friable; few pores; few fine dark concretions; strongly acid; clear smooth boundary.

IIC2—62 to 72 inches, pale brown (10YR 6/3) fine sand; single grained; very friable; few fine concretions; strongly acid.

The Ap horizon ranges from brown to dark yellowish brown, and the A12 horizon ranges from brown to yellowish brown. The B horizon is brown, strong brown, yellowish brown, or dark yellowish brown silt loam or silty clay loam. Reaction in the A and B21t horizons ranges from neutral to very strongly acid. In horizons below, reaction is slightly to strongly acid. Areas that have been irrigated for several years generally are neutral or slightly acid in the upper part of the profile.

Some areas of these soils have brown (7.5YR 4/4) color in the A12 horizon, which is outside the defined range of the series. This difference does not affect use and management of the soils.

Dubbs soils are associated with Amagon, Bosket, and Dundee soils. They are browner in the B horizon than Amagon and Dundee soils. They contain less sand and more silt in the A and B horizons than Bosket soils.

DbA—Dubbs silt loam, 0 to 1 percent slopes. This soil is generally on the higher parts of natural levees. Individual areas range from about 10 to 600 acres in size. The profile of this soil is the one described as representative of the series. Slope is less than 1 percent. Included in mapping are a few small areas of undulating soils; small spots of Amagon, Bosket, and Dundee soils; and areas where the surface layer is fine sandy loam.

This soil is well suited to farming. Clean-tilled crops that leave large amounts of residue can be grown year after year if management is good.

The main crops are cotton (fig. 1) and soybeans. Corn, grain sorghum, peanuts, winter small grain, and such truck crops as okra, green beans, potatoes, sweet corn, tomatoes, strawberries, and melons also are suited to this soil. Adapted pasture plants are bermudagrass and white clover. Capability unit I-1; woodland group 2o4.

DbB—Dubbs silt loam, gently undulating. This soil is in areas where narrow swales alternate with low ridges that rise 2 to 5 feet above the swales. The soils generally are on the tops and side slopes of natural levees. Individual areas range from 10 to 300 acres in size. Slope is less than 3 percent. The profile of this soil is similar to the one described as representative of the series. Included in mapping are a few narrow escarpments; small spots of Amagon, Bosket, and Dundee soils, and areas where the surface layer is fine sandy loam.

This soil is suited to farming, but runoff is slow to medium, and erosion is a moderate hazard on the upper part of slopes. Clean-tilled crops that leave large amounts of residue can be grown year after year if management is good.

The main crops are cotton and soybeans. Corn, grain sorghum, peanuts, winter small grain, and such crops as okra, green beans, potatoes, sweet corn, tomatoes, strawberries, and melons are suited to this soil. Adapted pasture plants are bermudagrass and white clover. Capability unit IIe-1; woodland group 2o4.

Dundee Series

The Dundee series consists of somewhat poorly drained soils on the lower part of old natural levees along bayous and abandoned river channels. These soils formed in stratified beds of loamy sediment. The native vegetation is bottom land hardwoods, mainly water tolerant oaks.

In a representative profile the surface layer is dark grayish brown and grayish brown silt loam about 10 inches thick. It is mottled in the lower part. The upper part of the subsoil is grayish brown, mottled silty clay loam about 17 inches thick. The lower part is grayish brown, mottled sandy clay loam about 13 inches thick. The underlying material is light brownish gray, mottled loamy fine sand that extends to a depth of 72 inches or more.

Dundee soils are high in natural fertility. Content of organic matter is medium to low. Permeability is moderately slow, and available water capacity is high.

These soils respond well to fertilizer, and good tilth is easy to maintain. In places a plowpan has formed beneath the plow layer. This pan restricts root penetration and movement of water through the soil.

These soils are suited to most crops commonly grown in the county. Nearly all of the acreage is cultivated.

Representative profile of Dundee silt loam, 0 to 1 percent slopes, in a moist cultivated area in the NW1/4 NW1/4 NW1/4 sec. 18, T. 2 S., R. 1 W.:

Ap—0 to 5 inches, dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; very friable; many fine roots; strongly acid; abrupt smooth boundary.

A12—5 to 10 inches, grayish brown (10YR 5/2) silt loam; common fine distinct dark brown (10YR 3/3) mottles; weak medium subangular blocky structure; friable; common roots; common dark concretions; few dark stains; strongly acid; abrupt smooth boundary.

B21tg—10 to 17 inches, grayish brown (2.5Y 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm, slightly sticky; common clay films on faces of peds; few roots; few medium and fine concretions; strongly acid; gradual smooth boundary.

B22tg—17 to 27 inches, grayish brown (2.5Y 5/2) silty clay loam; common medium prominent yellowish brown (10YR 5/6, 5/8) mottles; moderate medium subangular blocky structure; firm; plastic, slightly sticky; common clay films on faces of peds; common concretions; very strongly acid; clear smooth boundary.

B3g—27 to 40 inches, grayish brown (2.5Y 5/2) sandy clay loam; common medium distinct yellowish brown (10YR 5/6, 5/8) mottles; weak medium subangular blocky structure; friable; patchy clay films on faces of peds; common concretions; few pores; strongly acid; gradual smooth boundary.

IICg—40 to 72 inches, light brownish gray (10YR 6/2) loamy fine sand; many fine yellowish brown specks of color that are uncoated sand grains; single grained; very friable; few fine dark concretions; strongly acid.

The Ap and A12 horizons are dark grayish brown, grayish brown, or brown. The A12 horizon is absent in some pedons. The B21tg and B22tg horizons are grayish brown and dark grayish brown and are mottled with brown and yellowish brown. Texture is silty clay loam or clay loam. The B3 horizon is grayish brown or dark grayish brown. The texture is sandy clay loam, silt loam, or silty clay loam. The C horizon is light brownish gray, grayish brown, or gray. The texture is loam, fine sandy loam, silt loam, or loamy fine sand. Reaction in the A horizon ranges from medium acid to very strongly acid. In the B horizon it is strongly acid or very strongly acid and in the C horizon it ranges from neutral to very strongly acid.

Dundee soils are associated with Amagon, Bosket, and Dubbs soils. They have a browner B horizon than Amagon soils and a grayer B horizon than Bosket and Dubbs soils.

DeA—Dundee silt loam, 0 to 1 percent slopes. This soil is on the lower part of natural levees. Individual areas range from 10 to 100 acres in size. Slope is less than 1 percent. The profile of this soil is the one described as representative of the series. Included in the mapping are a few spots of Amagon, Bosket, and Dubbs soils.

This soil is well suited to farming, but wetness is a moderate hazard. Field work is commonly delayed several days after a rain unless surface drains are installed. Clean-tilled crops that leave large amounts of residue can be safely grown year after year if this soil is adequately drained.

The main crops are cotton and soybeans. Corn, peanuts, grain sorghum, winter small grains, and such truck crops as okra, green beans, potatoes, sweet corn, tomatoes, strawberries, and melons also are suited to this soil. Adapted pasture plants are bermudagrass, tall fescue, and white clover. Capability unit IIw-2; woodland group 2w5.

DeB—Dundee silt loam, gently undulating. This soil is in areas where long narrow swales alternate with low ridges that rise 2 to 5 feet above the swales. Individual areas range from about 10 to 100 acres in size. Slope is less than 3 percent. The profile of this soil is similar to the one described as representative of the series. Included in mapping are a few spots of Amagon, Bosket, and Dubbs soils and small areas where sandy material is beneath the subsoil.

This soil is well suited to farming, but wetness is a moderate hazard. After a rain, water collects in the swales, and fields dry unevenly. Fieldwork is commonly delayed several days after a rain unless surface drains are installed. Clean-tilled crops that leave large amounts of residue can be safely grown year after year if this soil is adequately drained.

The main crops are cotton and soybeans. Corn, peanuts, grain sorghum, winter small grains and such crops as okra, green beans, potatoes, sweet corn, tomatoes, strawberries, and melons are suited to this soil. Adapted pasture plants are bermudagrass, fescue, and white clover. Capability unit IIw-2; woodland group 2w5.

Foley Series

The Foley series consists of poorly drained, level soils on upland flats and on flats adjoining natural levees. These soils formed in thick, loamy deposits of loess and in stratified alluvial sediment. The native vegetation is mixed hardwood forests with an understory of grasses and shrubs.

In a representative profile the surface layer is brown silt loam about 5 inches thick. The subsurface layer is grayish brown, mottled silt loam about 10 inches thick. The subsoil is gray and olive gray, mottled silty clay loam about 25 inches thick. The underlying material is light olive gray, mottled fine sandy loam that extends to a depth of 72 inches or more.

Foley soils are medium in natural fertility. Content of organic matter is low. Permeability is very slow, and the available water capacity is moderate. These soils respond well to fertilizer, and good tilth is easy to maintain. Because of the high content of sodium and magnesium in the lower part of the subsoil, the effective rooting depth is limited.

These soils are suited to most crops commonly grown in the county. Nearly all of the acreage is cultivated. Some areas are within the White River National Wildlife Refuge.

Representative profile of Foley silt loam in a moist, cultivated area of the Foley-Calhoun-Bonn complex in the NE1/4 NE1/4 SE1/4 sec. 19, T. 3 N., R. 2 W.:

Ap—0 to 5 inches, brown (10YR 4/3) silt loam; weak fine granular structure; very friable; common fine roots; very strongly acid; abrupt smooth boundary.

A2—5 to 15 inches, grayish brown (10YR 5/2) silt loam; common medium distinct pale brown (10YR 6/3) and dark yellowish brown (10YR 4/4) mottles; weak fine subangular blocky structure; friable; common fine roots; strongly acid; clear irregular boundary.

B21tg—15 to 21 inches, gray (10YR 5/1) silty clay loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR

5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; common patchy clay films on faces of peds; tongues of A2 material about 2 inches wide extend through horizon; few dark concretions; strongly acid; abrupt wavy boundary.

B22tg—21 to 40 inches, olive gray (5Y 5/2) silty clay loam; few fine distinct brown (10YR 4/3) mottles; coarse prismatic structure parting to moderate medium subangular blocky structure; very firm; common patchy clay films on faces of peds; dark stains on some peds; common concretions; strongly alkaline; gradual wavy boundary.

IICg—40 to 72 inches, light olive gray (5Y 6/2) fine sandy loam; few medium distinct brown (10YR 4/3) mottles; massive; friable; few nodules of calcium carbonates; few dark stains; strongly alkaline.

The Ap horizon is brown, very dark grayish brown, or grayish brown. The A2 horizon is grayish brown or gray. The B2 horizon is gray, grayish brown, or olive gray. The C horizon is light olive gray or gray silt loam or fine sandy loam. The Ap and A2 horizons range from medium acid to very strongly acid, and the B21tg horizon is strongly acid or medium acid. The B22tg and C horizons are neutral to strongly alkaline. Depth to the high concentration of sodium and magnesium ranges from 16 to 24 inches.

Foley soils are generally associated with Bonn, Calhoun, Calloway, Grenada, Grubbs, Jackport, Lafe, McCrory, and Mhoon soils. They have a high concentration of sodium and magnesium in the subsoil, and Calhoun, Calloway, Grenada, Jackport, and Mhoon soils do not. Depth to the high concentration of sodium and magnesium is greater in Foley soils than in Bonn and Lafe soils. Foley soils contain less sand in the A and B horizons than McCrory soils, and they contain less clay in the B horizon than Grubbs soils.

Fo—Foley-Calhoun-Bonn complex. This complex of level soils is on broad flats in areas of wind-deposited sediments. Most areas range from 10 to about 1,500 acres in size. Slopes range from 0 to 1 percent. In a typical area about 50 to 60 percent is Foley silt loam, 15 to 20 percent Calhoun silt loam, and 15 to 20 percent Bonn silt loam.

Included in mapping are spots of Calloway, Grenada, and Lafe soils.

The soils in this complex are suited to farming, but excess water is a severe limitation. Farming operations are delayed several days after a rain unless surface drains are provided. If fields are adequately drained, tilled crops that leave large amounts of residue can be grown year after year. If the soils are to be graded and smoothed, the depth to the sodium affected layers in the subsoil should be determined before cuts are made. If sodium-affected material is brought near the surface, productivity is impaired.

The main crops are soybeans and rice. Cotton and grain sorghum are fairly well suited, and winter small grain can be grown where surface drainage is adequate. Suitable pasture plants are bermudagrass, tall fescue, annual lespedeza, and white clover. Capability unit IIIw-2; woodland group Foley part and Calhoun part 3w9, Bonn part 5t0.

Gore Series

The Gore series consists of moderately well drained, gently sloping soils on the higher escarpments above flood plains of existing streams. These soils formed in predominantly clayey sediment deposited in abandoned slack water areas of flood plains of extinct drainage systems. The native vegetation is hardwood forests consisting of upland oaks, gum, and hickory.

In a representative profile the surface layer is brown silt loam about 3 inches thick. The upper part of the subsoil is yellowish red silty clay about 6 inches thick. The lower part is dark red, red, and dark reddish brown clay that extends to a depth of 72 inches or more.

Gore soils are medium in natural fertility. Generally the content of organic matter is low. Permeability is very slow, and the available water capacity is moderate. These soils respond well to fertilizer, but good tilth is difficult to maintain. The clay layers restrict root penetration and slow the movement of water through the soil.

These soils are suited to most commonly grown crops in the county. Nearly all of the acreage is cultivated.

Representative profile of Gore silt loam, 3 to 8 percent slopes, in a moist grassed area in the SW1/4SW1/4SW1/4 sec. 7, T. 1 S., R. 3 W.:

Ap—0 to 3 inches, brown (10YR 5/3) silt loam; weak fine granular structure; very friable; many fine roots; few fine dark concretions; strongly acid; abrupt smooth boundary.

B21t—3 to 9 inches, yellowish red (5YR 4/6) silty clay; moderate medium subangular blocky structure; firm, plastic; common fine roots; continuous thick clay films on faces of peds and in old root channels; strongly acid; clear smooth boundary.

B22t—9 to 25 inches, dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure; firm, plastic; few fine roots; continuous thick clay films on faces of peds and root channels; few small dark concretions; medium acid; clear smooth boundary.

B23t—25 to 40 inches, red (2.5YR 4/6) clay; moderate medium subangular and angular blocky structure; firm, plastic; few roots; continuous thick clay films on faces of peds; few dark concretions; old root channels filled with gray clay; medium acid; clear smooth boundary.

B24t—40 to 50 inches, dark reddish brown (2.5YR 3/4) clay; moderate medium angular blocky structure; firm, plastic; few roots; continuous thick clay films on faces of peds; gray streaks on some peds; common organic stains on faces of peds; few calcium concretions; neutral; clear smooth boundary.

B25t—50 to 72 inches, dark reddish brown (2.5YR 3/4) clay; moderate medium subangular and angular blocky structure; firm, plastic; few roots; continuous thick clay films; organic stains on faces of peds; common calcium concretions; strongly alkaline.

The Ap horizon is brown or dark brown. The B horizon ranges from yellowish red to red. Except where limed, the A horizon is strongly acid or very strongly acid. The B21t, B22t, and B23t horizons are strongly acid or medium acid. The B24t and B25t horizons range from neutral to strongly alkaline.

These soils lack mottles in the B horizon and have a slightly higher content of clay than the series range allows. These differences do not affect usefulness and behavior of the soils.

Gore soils are associated with Crowley and Stuttgart soils. They are redder in the B horizon than Stuttgart soils and redder in the upper part of the B horizon than Crowley soils.

Ge—Gore silt loam, 3 to 8 percent slopes. This gently sloping soil is on the higher parts of the escarpment adjacent to bottom land. Individual areas range from 10 to 100 acres in size. Included in mapping are spots of Crowley and Stuttgart soils.

This soil is suited to farming but runoff is rapid, and the hazard of erosion is very severe. This soil is poorly suited to cultivated crops. Sown crops can be safely grown occasionally if the soil is in close-growing cover

most of the time. The soil is suited to pasture. Suitable pasture plants are bermudagrass, bahiagrass, white clover, annual lespedeza, and sericea lespedeza. Capability unit IVe-1; woodland group 3c8.

Grenada Series

The Grenada series consists of moderately well drained, level to gently sloping, upland soils on hilltops, and side slopes. These soils formed in thick deposits of loess.

In a representative profile the surface layer is brown silt loam about 5 inches thick. The upper 14 inches of the subsoil is yellowish brown silty clay loam that is mottled in the lower part. Below this is a layer of gray, mottled silt loam about 3 inches thick. The lower part of the subsoil is a firm, brittle, mottled fragipan about 36 inches thick. The upper 14 inches of the fragipan is mottled grayish brown, light brownish gray, and brown silty clay loam. The lower 22 inches is dark yellowish brown, mottled silt loam. The underlying material is mottled dark yellowish brown and brown silt loam that extends to a depth of 72 inches or more.

Grenada soils are medium in natural fertility. Content of organic matter is low. Permeability is slow, and the available water capacity is moderate. These soils respond well to fertilizer, and good tilth is easy to maintain. These soils warm early in spring and can be planted early.

Grenada soils are suited to the crops commonly grown in the county. Nearly all of the acreage is cultivated.

Representative profile of Grenada silt loam, 1 to 3 percent slopes, in a moist cultivated area in the SW1/4 NE1/4 SE1/4 sec. 23, T. 4 N., R. 2 W.:

Ap—0 to 5 inches, brown (10YR 4/3) silt loam; weak fine granular structure; very friable; common fine roots; few fine concretions; strongly acid; abrupt smooth boundary.

B21—5 to 14 inches, yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; very strongly acid; clear smooth boundary.

B22—14 to 19 inches, yellowish brown (10YR 5/4) silty clay loam; common fine and medium distinct pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable; few concretions; strongly acid; clear smooth boundary.

A'2—19 to 22 inches, gray (10YR 6/1) silt loam; common medium distinct brown (10YR 5/3) mottles; weak medium subangular blocky structure; firm, compact, and brittle; few concretions; strongly acid; abrupt smooth boundary.

B'x1—22 to 36 inches, mottled grayish brown (10YR 5/2) light brownish gray (10YR 6/2) and brown (10YR 4/3) silty clay loam; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm, compact, and brittle; common clay films on faces of peds; silt coatings on faces of prisms; common concretions; strongly acid; clear smooth boundary.

B'x2—36 to 58 inches, dark yellowish brown (10YR 4/4) silt loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm, compact, and brittle, thin patchy clay films on faces of peds; few concretions; strongly acid; gradual wavy boundary.

C—58 to 72 inches, mottled dark yellowish brown (10YR 4/4) and brown (10YR 5/3) silt loam; massive; friable; strongly acid.

The Ap horizon is dark grayish brown to yellowish brown. The B2 horizon is yellowish brown or dark yellowish brown silt loam or silty clay loam. The B'x horizon is silt loam or silty clay loam. Except where it has been limed, reaction of the Ap horizon is medium acid or strongly acid. In the underlying horizons reaction ranges from very strongly acid to medium acid.

Grenada soils are chiefly associated with Bonn, Calhoun, Calloway, Foley, Loring, and Tichnor soils. They have a fragipan that is lacking in Bonn, Calhoun, Foley, and Tichnor soils. Grenada soils lack the mottles in the upper 10 inches of the B horizon of Calloway soils. Unlike Loring soils, Grenada soils have an A' horizon.

GrA—Grenada silt loam, 0 to 1 percent slopes. This moderately well drained soil is on uplands. Individual areas range from about 10 to 200 acres in size. The profile of this soil is similar to the one described as representative of the series. Included in mapping are spots of Calhoun, Calloway, and Foley soils.

This soil is suited to farming but wetness is a moderate hazard. Field work is delayed several days after a rain unless surface drains are installed. Clean-tilled crops that leave large amounts of residue can be safely grown year after year if the soil is adequately drained and management is good.

The main crops are cotton and soybeans. Corn, grain sorghum (fig. 2), and winter small grain also are suited to this soil. Okra is a suitable truck crop. Adapted pasture plants are bermudagrass, tall fescue, and white clover. Capability unit IIw-1; woodland group 3o7.

GrB—Grenada silt loam, 1 to 3 percent slopes. This moderately well drained soil is on uplands. Individual areas range from 10 to 200 acres in size. The profile of this soil is the one described as representative of the series. Included in mapping are spots of Calloway soils.

This soil is suited to farming, but runoff is medium and erosion is a moderate hazard. Clean-tilled crops that leave large amounts of residue can be grown year after year if contour cultivation, terracing on long slopes, and other good management is practiced.

The main crops are cotton and soybeans. Corn, grain sorghum, and winter small grain also are suited to this soil. Okra is a suitable truck crop. Adapted pasture plants are bermudagrass, tall fescue, and white clover. Capability unit IIIe-2; woodland group 3o7.

GrC—Grenada silt loam, 3 to 8 percent slopes. This moderately well drained soil is on side slopes and escarpments of uplands. Individual areas range from about 10 to 100 acres in size. The profile of this soil is similar to the one described as representative of the series, but the Ap horizon is thinner in most areas. Included in mapping are spots of Loring and Memphis soils and a few spots that have shallow gullies.

This soil is suited to farming, but runoff is medium to rapid and erosion is a severe hazard. Sown crops that leave large amounts of residue can be safely grown year after year if contour cultivation, terracing, and other good management is practiced. Clean-tilled crops can be grown most years if the cropping system includes a sod crop or a winter cover crop. In areas where length and gradient of slope increase, there is need for more intensive conservation treatment. The surface layer of this soil puddles and crusts over readily after a rain because of low content of organic matter and weak structure.

The main crops are cotton and soybeans. Corn, grain sorghum, okra, and winter small grain also are suited to this soil. Adapted pasture plants are bahiagrass (fig. 3), bermudagrass, tall fescue, and white clover. Capability unit IIIe-1; woodland group 3o7.

Grubbs Series

The Grubbs series consists of somewhat poorly drained, level soils on broad upland flats. These soils formed in loess and the underlying alluvial clayey sediment. The native vegetation is hardwood forests consisting mainly of oak, hickory, and gum.

In a representative profile the surface layer is brown and dark grayish brown silt loam about 11 inches thick. The subsurface layer is gray, mottled silt loam about 1 inch thick. The subsoil extends to a depth of 72 inches. The upper 10 inches is reddish brown, mottled clay; the next 16 inches is reddish brown, mottled silty clay; the next 29 inches is grayish brown, mottled silty clay loam; and the lower 5 inches is light brownish gray, mottled silt loam.

Grubbs soils are medium in natural fertility. Content of organic matter is low. Permeability is very slow, and the available water capacity is high. These soils respond well to fertilizer, and good tilth is easy to maintain.

These soils are suited to most crops commonly grown in the county. Nearly all of the acreage is cultivated.

Representative profile of Grubbs silt loam in a moist, cultivated area in the NW1/4NW1/4NE1/4 sec. 33, T. 4 N., R. 2 W.:

Ap—0 to 5 inches, brown (10YR 4/3) silt loam; weak fine granular structure; friable; common fine roots; few small dark concretions; medium acid; abrupt smooth boundary.

A1—5 to 11 inches, dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; friable; common fine roots; few small dark concretions; slightly acid; abrupt smooth boundary.

A2—11 to 12 inches, gray (10YR 6/1) silt loam; few fine distinct yellowish red mottles; weak fine subangular structure; friable; few roots; few fine concretions; very strongly acid; abrupt smooth boundary.

B21t—12 to 22 inches, reddish brown (2.5YR 4/4) clay; common medium prominent grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm, plastic; continuous thick clay films on faces of peds and in old root channels; few fine roots; some organic stains; few fine concretions; strongly acid; clear smooth boundary.

B22t—22 to 38 inches, reddish brown (2.5YR 4/4) silty clay; few fine prominent gray (10YR 5/1) mottles; moderate medium subangular blocky structure; firm, plastic; continuous thick clay films on faces of peds; few roots; gray silt streaks in crevices; few fine dark concretions; strongly acid; gradual smooth boundary.

B31g—38 to 54 inches, grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) and brown (10YR 4/3) mottles; moderate medium subangular blocky structure; firm, plastic; thick patchy clay films on faces of peds; common organic stains; silt streaks in crevices; small silt pockets; common small medium dark accretions and concretions; medium acid; clear smooth boundary.

B32g—54 to 67 inches, grayish brown (2.5Y 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular and angular blocky structure; firm; thick patchy clay films on faces of peds; common large organic stains on peds; few dark accretions; slightly acid; clear smooth boundary.

B33g—67 to 72 inches, light brownish gray (10YR 6/2) silt loam; common medium distinct yellowish brown (10YR 5/6) and brown (10YR 4/3) mottles; moderate medium subangular blocky structure; friable; common thick patchy clay films on faces of peds; few calcium concretions and few small dark concretions; organic stains on some peds; neutral.

The Ap horizon is very dark grayish brown to brown. In some pedons the A2 horizon is lacking. The B21t horizon is reddish brown, red, or yellowish red; and the B22t is reddish brown or brown. Texture of the B2 horizons is clay or silty clay. Texture of the B3 horizon is silt loam or silty clay loam. Reaction of the A horizon ranges from medium acid to very strongly acid. The B2 horizon is strongly acid or slightly acid, and the B3 horizon ranges from medium acid to moderately alkaline.

Grubbs soils are generally associated with Bonn, Calhoun, Foley, and Jackport soils. They are redder in the upper part of the B horizon than the associated soils.

Gs—Grubbs silt loam. This level, somewhat poorly drained soil is on higher elevations of broad upland flats. Most areas range from 20 to 600 acres in size. Included in mapping are spots of Calhoun and Jackport soils.

This soil is suited to farming, but excess water is a severe hazard. Farming operations are delayed several days after a rain unless surface drains are installed. Under good management that includes adequate drainage, clean-tilled crops that leave large amounts of residue can be safely grown year after year. If grading and smoothing are planned, depth to the clayey subsoil should be determined before cuts are made. The subsoil is sticky, plastic, and difficult to cultivate when exposed to the surface.

The main crops are soybeans and rice. Cotton and grain sorghum are other suitable crops. Winter small grain can be grown if surface drainage is adequate. Adapted pasture plants are bermudagrass, bahiagrass, annual lespedezas, and white clover. Capability unit IIIw-3; woodland group 3w9.

Jackport Series

The Jackport series consists of poorly drained, level soils on abandoned flood plains in depressions on upland flats. These soils formed in beds of clayey sediment. Native vegetation is mainly water-tolerant hardwoods.

In a representative profile the surface layer is dark grayish brown silty clay loam about 6 inches thick. The upper part of the subsoil is olive gray, mottled clay about 7 inches thick. The middle part is grayish brown, mottled clay about 37 inches thick; and the lower part is olive gray, mottled silty clay that extends to a depth of 72 inches or more.

Jackport soils are medium in natural fertility. Permeability is very slow, and the available water capacity is high. These soils respond well to fertilizer. Tilth is easy to maintain except in places where the clayey material has been brought to the surface by deep plowing. Clods form in these areas if the soils are plowed when wet. Where drainage is adequate, these soils are suited to most crops commonly grown in the county. Most of the acreage is cultivated.

Representative profile of Jackport silty clay loam in a moist, cultivated area in the SW1/4SE1/4SE1/4 sec. 17, T. 2 N., R. 2 W.:

Ap—0 to 6 inches, dark grayish brown (10YR 4/2) silty clay loam; few fine faint brown mottles; moderate fine subangular structure; firm, sticky; common fine roots; few small dark concretions; strongly acid; abrupt smooth boundary.

B21tg—6 to 13 inches, olive gray (5Y 5/2) clay; common distinct yellowish brown (10YR 5/4) mottles; strong medium angular blocky structure; very firm, plastic; few fine roots; few fine medium dark concretions; very strongly acid; gradual smooth boundary.

B22tg—13 to 50 inches, grayish brown (2.5Y 5/2) clay; few fine distinct brown (10YR 4/3) and yellowish brown (10YR 5/4) mottles; strong medium angular blocky structure; very firm, very plastic; few slickensides; common pressure faces; common hard dark concretions; very strongly acid; gradual smooth boundary.

B3g—50 to 72 inches, olive gray (5Y 5/2) silty clay; common fine distinct brown (10YR 4/3) and yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; very firm, very plastic; very strongly acid.

The Ap horizon is grayish brown or dark grayish brown. The B21 horizon is grayish brown or olive gray silty clay or clay mottled with shades of brown or yellow. The B22 and B3 horizons have colors the same as the B21 horizon. Texture of the B3 horizon ranges from clay to silty clay loam. Reaction of the A horizon is strongly acid except where it has been limed. The B21 and B22 horizons are strongly acid or very strongly acid. The B3 horizon ranges from very strongly acid to mildly alkaline.

Jackport soils are associated with Bonn, Calhoun, Foley, and Grubbs soils. They lack the high concentration of sodium in the B horizon that is characteristic of Bonn and Foley soils. They have more clay in the B horizon than Calhoun soils, and they are grayer in the upper part of the B horizon than Grubbs soils.

Jc—Jackport silty clay loam. This level soil is in broad depressions. Slopes are less than 1 percent. Individual areas range from 20 to 2,000 acres in size. Included in mapping are spots of Calhoun, Foley, and Grubbs soils.

This soil is suited to farming, but wetness is a severe hazard. Farming operations are often delayed several days after a rain unless surface drains are installed to prevent ponding. Under good management that includes adequate drainage, clean tilled crops that have large amounts of residue can be grown year after year.

The main crops are soybeans and rice (fig. 4). Other suited crops are grain sorghum, and if surface drainage is adequate, winter small grain. Adapted pasture plants are bermudagrass, tall fescue, and white clover. Capability unit IIIw-4; woodland group 2w6.

Lafe Series

The Lafe series consists of somewhat poorly drained, level soils on upland flats. These soils formed in thick deposits of loess.

In a representative profile the surface layer is silt loam about 8 inches thick. The upper 5 inches of it is brown, and the lower 3 inches is dark grayish brown. The subsoil is brown, mottled silty clay loam about 28 inches thick. The underlying material is pale brown, mottled silt loam.

Lafe soils are low in natural fertility. Content of organic matter is low. Permeability is very slow, and the available water capacity is low.

Because of the high content of sodium and magnesium at levels toxic to most plants, these soils are poorly suited to cultivated crops. They are better suited to pasture and wildlife habitat than to other uses.

In this county Lafe soils are mapped only as part of a complex with Bonn soils.

Representative profile of Lafe silt loam in a moist, cultivated area in the SE1/4SE1/4SE1/4 sec. 36, T. 3 N., R. 2 W.:

Ap—0 to 5 inches, brown (10YR 4/3) silt loam; weak fine granular structure; friable; many fine roots; common fine black concretions; medium acid; abrupt smooth boundary.

A1—5 to 8 inches, dark grayish brown (10YR 4/2) silt loam; common fine faint gray mottles; weak fine granular structure; friable; common fine roots; common fine dark concretions; slightly acid; abrupt wavy boundary.

B21t—8 to 16 inches, brown (10YR 5/3) silty clay loam; common fine and medium faint gray (10YR 5/1), pale brown (10YR 6/3), and dark brown (10YR 3/3) mottles; moderate medium subangular blocky structure arranged in moderate coarse prisms; very firm; gray silt tongues and interfingers between prisms; clay films and silt coatings on faces of peds; some root cortices filled with silt; moderately alkaline; clear wavy boundary.

B22t—16 to 36 inches, brown (10YR 5/3) silty clay loam; common medium faint gray (10YR 5/1) and yellowish brown (10YR 5/6) mottles; moderate coarse angular blocky structure; very firm; clay films and silt coatings on faces of peds; silt in coarse channels and crevices; patchy webb-like black coatings on peds; common medium black concretions; few medium calcium carbonate concretions; strongly alkaline; gradual wavy boundary.

C—36 to 60 inches, pale brown (10YR 6/3) silt loam; common medium distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; massive; firm; common calcium carbonate concretions; strongly alkaline.

The Ap and A1 horizons are brown, dark brown, grayish brown, or dark grayish brown. Some pedons have an A2 horizon which is gray or dark grayish brown. Some pedons have an A2 horizon which is gray or grayish brown. The A horizon is silt loam, loam, or very fine sandy loam. It ranges from strongly acid to slightly acid.

The B21t horizon is brown, yellowish brown, or pale brown, mottled with shades of gray and brown. It is silt loam or silty clay loam and is mildy alkaline or moderately alkaline. The B22t horizon has the same color range as the B21t horizon or is gray and mottled with browns. It is silt loam or silty clay loam and ranges from mildly alkaline to strongly alkaline. Calcium-magnesium ratio of the B horizon is less than 1. Clay content of the upper 20 inches of the B horizon is 20 to 32 percent.

The C horizon is pale brown to gray and is mottled in shades of brown and gray. It ranges from silty clay loam through silt loam or fine sandy loam. It is moderately alkaline or strongly alkaline. Depths to horizons with sodium saturation of 15 percent or more range from 3 to 12 inches.

Lafe soils are associated with Bonn, Calhoun, and Foley soils. Lafe soils have a browner B horizon than the associated soils.

Lf—Lafe-Bonn complex. This level complex is on broad flats in areas of wind-blown sediments. Most areas are 10 to 400 acres in size. Slopes range from 0 to 1 percent. The areas contain about equal amounts of Lafe silt loam and Bonn silt loam. Included in mapping are spots of Calhoun, Calloway, and Foley soils.

This unit is best suited to native pasture and wildlife habitat. It is poorly suited to farming because of droughtiness and high concentrations of sodium and magnesium throughout the subsoil. Crop plants grown on this unit are stunted (fig. 5) and commonly die before they mature.

Where this unit is cultivated, mainly as part of fields of other soils, the main crop is soybeans. If surface drainage is adequate, shallow-rooting, cool-season plants survive better than warm-season plants. Pasture plants most likely to survive are bermudagrass and annual lespedeza. Capability unit VIs-1; woodland group 5t0.

Loring Series

The Loring series consists of moderately well drained, gently sloping and moderately sloping soils on uplands. These soils formed in thick deposits of loess.

In a representative profile the surface layer is brown silt loam about 7 inches thick. The subsoil is about 65 inches thick. The upper 5 inches is brown silt loam; the next 14 inches is brown silty clay loam; the next 17 inches is a brown, mottled shades of brown and gray, brittle silt loam fragipan; and the lower 29 inches is brown, mottled silt loam.

Loring soils are medium in natural fertility. Content of organic matter is low. Permeability is moderately slow, and the available water capacity is moderate. These soils respond well to fertilizer, and good tilth is easy to maintain. The fragipan restricts the penetration of roots and movement of water but does not seriously affect soil productivity or restrict the suitability for plants. These soils are susceptible to erosion.

These soils are suited to crops commonly grown in the county. Nearly all of the acreage is cultivated.

Representative profile of Loring silt loam, 3 to 8 percent slopes, in a moist pasture area in the SW1/4 NW1/4 SE1/4 sec. 36, T. 1 N., R. 4 W.:

Ap—0 to 7 inches, brown (10YR 5/3) silt loam; weak fine granular structure; friable; common fine roots; few fine dark concretions; strongly acid; abrupt smooth boundary.

B1—7 to 12 inches, brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; friable; few fine roots; few patchy clay films; strongly acid; clear smooth boundary.

B2t—12 to 26 inches, brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; thin discontinuous clay films on faces of peds; strongly acid; clear smooth boundary.

Bx1—26 to 32 inches, mottled brown (10YR 5/3), strong brown (7.5YR 5/6), and light brownish gray (10YR 6/2) silt loam; coarsely polygonal in places with silt coatings on faces of polygons, parts into moderate medium subangular blocky structure; firm; compact; brittle; few roots; continuous thin and medium clay films on faces of peds; common pores; few fine dark concretions; strongly acid; gradual smooth boundary.

Bx2—32 to 43 inches, brown (10YR 5/3) silt loam; common medium distinct light brownish gray (10YR 6/2) mottles; coarsely polygonal in place, parts into moderate medium subangular blocky structure; firm; brittle; silt streaks in cracks and on peds; few patchy clay films on faces of peds; common pores; few fine dark concretions; strongly acid; gradual wavy boundary.

B3—43 to 72 inches, brown (7.5YR 4/4) silt loam; common coarse dark brown (10YR 3/3) mottles; massive in place; parts into moderate medium subangular blocky structure; friable; common fine pores; few fine dark concretions; strongly acid.

The Ap horizon is brown or dark grayish brown. The B horizon above the Bx horizon is dark brown or strong brown silt loam or silty clay loam. Depth to the Bx horizon is 22 to 30 inches. The Bx horizon is brown, dark brown, or strong brown. The A horizon is strongly acid or medium acid, and the B horizon is very strongly acid or strongly acid.

Loring soils are chiefly associated with Memphis and Grenada soils. They have a fragipan that Memphis soils lack, and they lack the A'2 horizon of Grenada soils.

LoC—Loring silt loam, 3 to 8 percent slopes. This moderately well drained soil is on hilltops and side slopes on uplands. Individual areas range from 10 to 100 acres in size. The profile of this soil is the one described as representative of the series. Included in mapping are a few spots of Memphis and Grenada soils and a few small areas where shallow gullies are present.

This soil is suited to farming, but runoff is medium to rapid and erosion is a severe hazard. Sown crops that leave large amounts of residue can be safely grown year after year if contour cultivation and terracing and other good management is practiced. Clean-tilled crops can be grown most years if the cropping system includes a sod crop or a winter cover crop. In areas where length and gradient of slope increase, there is need for more intensive management.

The main crops are cotton and soybeans. Corn, grain sorghum, okra, and winter small grain also are suited to this soil. Adapted pasture plants are bermudagrass, tall fescue, and white clover. Capability unit IIIe-1; woodland group 3o7.

LoD—Loring silt loam, 8 to 12 percent slopes. This moderately well drained soil is on side slopes on uplands. Individual areas range from 10 to 100 acres in size. The profile of this soil is similar to the one described as representative of the series. Included in mapping are a few spots of Memphis and Grenada soils and small areas where shallow gullies are present.

Runoff is rapid, and the hazard of erosion is severe. This soil is poorly suited to cultivated crops. Sown crops can be safely grown occasionally if the soil is in close growing cover most of the time. The soil is suited to pasture. Suitable pasture plants are bermudagrass, tall fescue, bahiagrass, and white clover. Capability unit IVe-2; woodland group 3o7.

McCrory Series

The McCrory series consists of poorly drained, level soils on the lower parts of natural levees along stream channels. These soils formed in loamy alluvium. The native vegetation is hardwood forests, mainly water-tolerant oaks, gum, hackberry, and elm.

In a representative profile the surface layer is dark grayish brown fine sandy loam about 5 inches thick. The subsurface layer is grayish brown, mottled fine sandy loam about 13 inches thick. The subsoil is grayish brown and gray, mottled sandy clay loam about 26 inches thick. The underlying material is olive gray loamy fine sand extending to a depth of 72 inches or more.

McCrory soils are medium in natural fertility. Content of organic matter is low. Permeability is moderately slow, and the available water capacity is moderate to low.

These soils respond well to fertilizer, and good tilth is easy to maintain. Because of the high content of sodium and magnesium in the lower part of the subsoil, the effective rooting zone is limited. In places a plowpan has formed beneath the plow layer. This pan restricts root penetration and movement of water through the soil. These soils are suited to most crops grown in the county. Nearly all of the acreage is cultivated.

Representative profile of McCrory fine sandy loam in a moist cultivated area in the NE1/4NE1/4NW1/4 sec. 16, T. 4 N., R. 2 W.:

Ap—0 to 5 inches, dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; few fine roots; few medium dark concretions; very strongly acid; clear smooth boundary.

A21g—5 to 11 inches, grayish brown (10YR 5/2) fine sandy loam; common fine faint gray and common fine distinct dark brown (10YR 4/3) mottles; weak medium subangular blocky structure; very friable; few fine roots; few dark concretions; very strongly acid; clear smooth boundary.

A22g—11 to 18 inches, grayish brown (10YR 5/2) fine sandy loam; common medium distinct dark brown (10YR 4/3) mottles; moderate medium subangular blocky structure; friable; few fine roots; few dark concretions; very strongly acid; clear smooth boundary.

B21tg—18 to 29 inches, grayish brown (10YR 5/2) sandy clay loam; common medium distinct dark brown (10YR 4/3) mottles; moderate medium subangular blocky structure; firm; some peds coated with gray fine sandy loam; common patchy clay films; few fine roots; few dark concretions; strongly acid; clear smooth boundary.

B22tg—29 to 35 inches, gray (10YR 5/1) sandy clay loam; common medium distinct dark brown (10YR 4/3) and light olive brown (2.5Y 5/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; few patchy clay films; few fine concretions; neutral; clear smooth boundary.

B3g—35 to 44 inches, gray (10YR 5/1) sandy clay loam; common medium distinct dark brown (10YR 4/3) and light olive brown (2.5Y 5/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; common concretions; mildly alkaline; gradual wavy boundary.

Cg—44 to 72 inches, olive gray (5Y 5/2) loamy fine sand; single grained; few concretions; moderately alkaline.

The Ap horizon is dark grayish brown or grayish brown. The A2 horizon is grayish brown or gray. The B horizon is also grayish brown or gray. The C horizon is gray or olive gray loamy fine sand or fine sand. Reaction of the Ap, A2, and B21tg horizons is very strongly acid or strongly acid. The B22tg, B3, and C horizons range from neutral to moderately alkaline.

McCrory soils are associated with Bonn, Calhoun, Foley, and Mhoon soils. They have more sand in the A and B horizons than Bonn, Calhoun, and Foley soils; and they are more acid in the upper part of the B horizon than Mhoon soils.

Ma—McCrory fine sandy loam. This level soil is in depressions on flats and natural levees adjacent to small drainageways. Individual areas range from 20 to 100 acres in size. Included in mapping are spots of Foley and Mhoon soils and spots of soil similar to McCrory except the acid layers extend to slightly greater depths than in typical McCrory soils. Also included are areas that flood occasionally, but rarely between June and January.

This soil is suited to farming, but wetness is a severe hazard. Fieldwork is delayed several days after a rain unless surface drains are installed. Clean-tilled crops that leave large amounts of residue can be safely grown year after year if drainage is adequate and good management is practiced.

The main crops are soybeans and grain sorghum. Winter small grain can be grown if surface drainage is adequate, but the crop may be damaged by flooding at lower elevations. Adapted pasture plants are bermudagrass, bahiagrass, tall fescue, annual lespedeza, and white clover. Capability unit IIIw-2; woodland group 3w6.

Memphis Series

The Memphis series consists of well drained, level to gently sloping soils on uplands. These soils formed in thick deposits of loess. Native vegetation consists of mixed upland hardwoods.

In a representative profile the surface layer is brown silt loam about 6 inches thick. The upper part of the subsoil is brown and dark brown silty clay loam about 28 inches thick, and the lower part is dark yellowish brown silt loam about 18 inches thick. The underlying material is dark yellowish brown silt loam that extends to a depth of 72 inches or more.

Memphis soils are medium in natural fertility, and the content of organic matter is medium to low. Permeability is moderate, and available water capacity is high. These soils respond well to fertilizer, and good tilth is easy to maintain. These soils are susceptible to erosion.

These soils are suited to the crops commonly grown in the county. Nearly all of the acreage is cultivated.

Representative profile of Memphis silt loam in a moist, cultivated area in the NE1/4NE1/4NE1/4 sec. 12, T. 2 S., R. 1 W.:

Ap—0 to 6 inches, brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine roots; medium acid; clear smooth boundary.

B21t—6 to 24 inches, dark brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; continuous clay films on faces of peds; few fine roots; medium acid; gradual wavy boundary.

B22t—24 to 34 inches, dark brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm, slightly sticky; continuous clay films on faces of peds; dark organic stains on peds; medium acid; clear smooth boundary.

B3t—34 to 52 inches, dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; firm; few thin patchy clay films on faces of peds; few dark organic stains on peds; strongly acid; clear smooth boundary.

C—52 to 72 inches, dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; strongly acid.

The Ap horizon is brown, dark brown, or yellowish brown. The B horizon is silt loam or silty clay loam. The C horizon is dark yellowish brown or dark brown. The A horizon is slightly acid or medium acid; the B and C horizons are very strongly acid or medium acid.

Memphis soils are mainly associated with Grenada and Loring soils. They are free of mottles and do not have the fragipan that is characteristic of Loring and Grenada soils.

MeA—Memphis silt loam, 0 to 1 percent slopes. This well drained soil is on uplands. Individual areas range from 10 to 100 acres in size. The profile of this soil is the one described as representative of the series. Included in mapping are a few spots of Grenada and Loring soils.

This soil is suited to farming. Clean-tilled crops that leave large amounts of residue can be grown year after year if management is good.

The main crops are cotton and soybeans. Other suitable crops are grain sorghum, winter small grain, corn, and okra. Adapted pasture plants are bermudagrass, tall fescue, and white clover. Capability unit I-2; woodland group 2o7.

MeB—Memphis silt loam, 1 to 3 percent slopes. This well drained soil is on uplands. Individual areas range from about 10 to 80 acres in size. The profile of this soil is similar to the one described as representative for the series. Included in mapping are spots of Loring and Grenada soils.

This soil is suited to farming, but runoff is medium, and erosion is a moderate hazard. Clean-tilled crops that leave large amounts of residue can be grown year after year if contour cultivation, terracing on long slopes, and other good management is practiced. The main crops are cotton and soybeans. Corn, grain sorghum, okra, and winter small grain also are suited to this soil. Adapted pasture plants are bermudagrass, tall fescue, and white clover. Capability unit IIe-2; woodland group 2o7.

MeC—Memphis silt loam, 3 to 8 percent slopes. This well drained soil is on uplands. Individual areas range from 10 to 60 acres in size. The profile of this soil is similar to the one described as representative of the series. Included in mapping are a few spots of Loring soils and a few gullied spots.

This soil is suited to farming, but runoff is medium to rapid, and erosion is a severe hazard (fig. 6).

Sown crops that leave large amounts of residue can be safely grown year after year if contour cultivation and terracing and other good management is practiced. Clean-tilled crops can be grown most years if the cropping system includes a sod crop or a winter cover crop. In areas where length and gradient of slope are greater, more intensive conservation is needed to prevent loss of soil material by erosion. The surface layer of this soil puddles and crusts readily after a rain because of the low content of organic matter and weak structure.

The main crops are cotton and soybeans. Other suitable crops are corn, grain sorghum, okra, and winter small grain. Adapted pasture plants are bermudagrass, tall fescue, and white clover. Capability unit III-e; woodland group 2o7.

Mhoon Series

The Mhoon series consists of poorly drained, level soils on flood plains. These soils formed in stratified beds of loamy sediment. Native vegetation consists of hardwoods such as oaks, gum, and hackberry.

In a representative profile the upper 1 inch of the surface layer is dark gray, mottled silty clay loam; and the lower 7 inches is dark gray, mottled silt loam. The upper part of the subsoil is gray, mottled silt loam about 10 inches thick; the middle part is gray, mottled clay loam about 15 inches thick; and the lower part is gray, mottled silt loam about 27 inches thick. The underlying material is light brownish gray fine sandy loam that extends to a depth of 72 inches or more.

Mhoon soils are high in natural fertility. Content of organic matter is medium to low. Permeability is slow, and available water capacity is high. These soils respond well to fertilizer, and good tilth is easy to maintain. In places a plowpan has formed beneath the plow layer. This pan restricts root penetration and movement of water through the soil.

Because of frequent flooding, these soils are suited to only warm season annual crops that require a short growing season. About one-fourth of the acreage is cultivated, and most of the remaining acreage is wooded.

Representative profile of Mhoon silty clay loam in a moist, wooded area in the NE1/4SE1/4SE1/4 sec. 10, T. 1 N., R. 3 W.:

O1—1 to 0 inch, partly decomposed plant material.

A1—0 to 1 inch, dark gray (10YR 4/1) silty clay loam; common medium distinct very dark grayish brown (10YR 3/2) mottles and organic matter stains; moderate medium granular structure; friable; many roots; medium acid; clear wavy boundary.

A12—1 to 8 inches, dark gray (10YR 4/1) silt loam with a thin discontinuous layer of fine sandy loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; common strong brown and yellowish red stains around root channels; weak medium subangular blocky structure; friable; common roots; few pores; medium acid; clear smooth boundary.

B1g—8 to 18 inches, gray (10YR 5/1) silt loam; common medium distinct brown (10YR 4/3) and common medium faint grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; few small remnants of stratified silt loam and very fine sandy loam with platy structure; friable; few roots; few pores; few brown accretions; slightly acid; clear smooth boundary.

B21g—18 to 25 inches, gray (2.5Y 5/1) clay loam; common fine distinct brown (10YR 4/3) mottles; weak medium subangular blocky structure; friable; few roots; few pores; few black accretions; thin clay films on some vertical ped faces; slightly acid; clear smooth boundary.

B22g—25 to 33 inches, gray (10YR 5/1) clay loam; few fine faint grayish brown and brown mottles; weak medium subangular blocky structure; friable; thin clay films on some vertical faces of some peds; few pockets of gray (10YR 6/1) silt; few pores; few roots; neutral; clear smooth boundary.

B3g—33 to 60 inches, gray (10YR 6/1) silt loam; common fine distinct light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable; few pores; few pockets of silty clay loam; few fine dark accretions; mildly alkaline; abrupt smooth boundary.

IICg—60 to 72 inches, light brownish gray (2.5Y 6/2) fine sandy loam; common fine distinct brown and grayish brown mottles; weak fine subangular blocky structure; very friable; moderately alkaline.

The A horizon is dark gray or dark grayish brown silt loam, silty clay loam, or fine sandy loam. The B horizon is gray or dark grayish brown. The C horizon is gray or light brownish gray. Texture of the B and C horizons is variable because of the stratified parent material. Dominant textures are silt loam, clay loam, and fine sandy loam. Reaction of the A horizon ranges from medium acid to neutral. The B horizon ranges from slightly acid to mildly alkaline. The C horizon is moderately alkaline or mildly alkaline.

Mhoon soils are mainly associated with Bonn, Calhoun, Commerce, Foley, McCrory, and Sharkey soils. They lack the high content of sodium and magnesium in the middle and lower parts of the B horizon of Bonn, Foley, and McCrory soils. Mhoon soils contain less clay in the B horizon than Sharkey soils and contain more clay in the B horizon than Commerce soils.

MF—Mhoon soils, frequently flooded. This level, undifferentiated group of poorly drained soils is on flood plains, mainly along the White River and its larger local tributaries. Slopes range from 0 to 1 percent. Most areas range from about 50 to more than 500 acres in size. The profiles of the Mhoon soils in this unit are similar to the one described as representative of the series, but the surface layer ranges from silty clay loam to fine sandy loam. They make up about 60 to 90 percent of an area. In some tracts as much as 35 percent of the area is soils that have clayey subsoils or subsoils that are more sandy than the Mhoon soils. Included in mapping are spots of Commerce, McCrory, and Sharkey soils.

This unit is poorly suited to farming because of the very severe hazard of frequent flooding. In most years the floods occur between December and June. The unit is better suited to woodland and wildlife habitat than to other uses. With good management, warm-season crops that leave large amounts of residue can be grown most years, but planting is often delayed. Some years part or all of the harvest will be lost to floods.

The main crop is soybeans. Another suitable crop is grain sorghum. Bermudagrass is better suited for pasture than other plants. Capability unit IVw-1; woodland group 1w6.

Sharkey Series

The Sharkey series consists of poorly drained, predominantly level soils in slack-water areas. These soils formed in thick beds of clayey sediment. The native vegetation is mainly water tolerant oaks.

In a representative profile the surface layer is dark grayish brown silty clay about 7 inches thick. The subsoil is dark gray and gray, mottled clay about 38 inches thick. The underlying material is gray, mottled silty clay that extends to a depth of 72 inches or more.

Sharkey soils are high in natural fertility. Content of organic matter is medium to high. Permeability is very slow, and the available water capacity is high. These soils respond well to fertilizer. Good tilth is difficult to maintain, and seedbeds are difficult to prepare because of the high content of clay. These soils form clods if plowed when wet. They shrink and crack when they dry, and they expand and the cracks seal when they are wet.

If these soils are drained and well managed, they are suited to most crops grown in the county. Most of the acreage is cultivated, but some large areas are within the White River National Wildlife Refuge.

Representative profile of Sharkey silty clay, in a moist cultivated area in the SW1/4SE1/4NE1/4 sec. 9, T. 4 S., R. 1 E.:

Ap—0 to 7 inches, dark grayish brown (10YR 4/2) silty clay; moderate medium subangular blocky structure; firm; common fine roots; neutral; clear smooth boundary.

B21g—7 to 20 inches, dark gray (10YR 4/1) clay; few fine distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm, plastic; few fine roots; mildly alkaline; clear smooth boundary.

B22g—20 to 32 inches, gray (10YR 5/1) clay; common fine and medium faint brown (10YR 5/3) mottles; moderate medium subangular blocky structure; firm, plastic; few fine roots; neutral; clear smooth boundary.

B23g—32 to 45 inches, gray (5Y 5/1) clay; common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm, plastic; neutral; clear smooth boundary.

Cg—45 to 72 inches, gray (5Y 5/1) silty clay; moderate medium subangular blocky structure; firm, plastic; mildly alkaline.

The Ap horizon is dark gray, dark grayish brown, or very dark grayish brown. Texture ranges from silty clay loam to clay. The B horizon is gray or dark gray. The C horizon is gray or dark gray clay or silty clay. Reaction of the A horizon ranges from strongly acid to neutral and that of the B21g horizon ranges from medium acid to moderately alkaline. The B22g and B23g horizons range from slightly acid to moderately alkaline.

Sharkey soils are associated with Commerce and Mhoon soils. They have more clay in the B horizon than the associated soils.

Sa—Sharkey silty clay. This level, poorly drained soil is in slack-water areas along the White River. Individual areas range from 30 to 60 acres in size. The profile of this soil is the one described as representative of the series. Included in the mapping are a few spots of Commerce and Mhoon soils.

This soil is suited to farming, but wetness is a severe hazard. Fieldwork is delayed several days after a rain unless surface drains are installed. When plowed too wet, the surface soil forms clods. Seedbed preparation is difficult. If management is good and includes adequate drainage, crops that leave large amounts of residue can be grown year after year.

The main crops are soybeans and cotton. Other suitable crops are rice and grain sorghum. Bermudagrass is better suited to pasture than other plants. Capability unit IIIw-4; woodland group 2w6.

SF—Sharkey soils, frequently flooded. This undifferentiated group of poorly drained soils is on flood plains along the White and Cache Rivers. In most areas these soils are level, but some are gently undulating with alternating long, narrow swales and low ridges. Slopes range from 0 to 3 percent. Most areas range from about 100 to more than 2,000 acres in size. The profile of a Sharkey soil in this unit is similar to the one described as representative of the series, but the surface layer ranges from silty clay loam to clay. Sharkey soils make up from about 50 to 90 percent of the area. In some tracts as much as 40 percent is soils like Sharkey soils, except they have slightly less clay in the subsoil. Included in mapping are spots of Commerce and Mhoon soils.

The soils in this unit are poorly suited to farming because of the very severe hazard of frequent flooding. In most years the floods occur between December and June. The soils are better suited to woodland and wildlife habitat than to other uses. When plowed too wet, the surface soil forms clods, and seedbed preparation is difficult. With good management, warm season crops that leave large amounts of residue can be grown most years, but planting is often delayed, and some years part or all of the harvest will be lost to floods.

The main crop is soybeans. Another suitable crop is grain sorghum. The best suited pasture plant is bermudagrass. Capability unit IVw-2; woodland group 3w6.

Stuttgart Series

The Stuttgart series consists of somewhat poorly drained to moderately well drained, level and nearly level soils on broad upland flats. These soils formed in a thin layer of loess and the underlying clayey and loamy sediment. The native vegetation is tall grasses with a few scattered hardwood trees.

In a representative profile the surface layer is brown and dark grayish brown, mottled silt loam about 9 inches thick. The subsurface layer is yellowish brown, mottled silt loam about 13 inches thick. The upper part of the subsoil is mottled shades of red, brown, and gray silty clay loam about 21 inches thick. The lower part of the subsoil is brown and shades of brown silt loam that extends to a depth of 72 inches or more.

Stuttgart soils are moderate in natural fertility, and the organic matter content is medium to low. Permeability is slow, and available water capacity is moderate. These soils respond well to fertilizer. Tilth is easy to maintain.

With good management that includes surface drainage on level areas and erosion control on the sloping areas, these soils are suited to most crops grown in the county. Nearly all of the acreage is cultivated.

Representative profile of Stuttgart silt loam in a moist, cultivated area in the NW1/4SE1/4NW1/4 sec. 13, T. 1 S., R. 4 W.:

Ap—0 to 5 inches, brown (10YR 4/3) silt loam; few fine faint grayish brown mottles; weak medium granular structure; friable; many fine roots; few fine dark concretions; medium acid; abrupt smooth boundary.

A12—5 to 9 inches, dark grayish brown (10YR 4/2) silt loam; few medium distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; many fine roots; few hard dark concretions; medium acid; clear smooth boundary.

A2—9 to 22 inches, yellowish brown (10YR 5/4) silt loam; common medium distinct brown (10YR 4/3) and gray (10YR 6/1) mottles; weak medium subangular blocky structure; friable; common fine roots; many fine pores; common fine dark concretions; strongly acid; abrupt smooth boundary.

B21t—22 to 31 inches, mottled dark reddish brown (2.5YR 3/4) and grayish brown (10YR 5/2) silty clay loam; moderate medium subangular blocky structure; firm, plastic; few roots; common medium patchy clay films in pores and on faces of peds; few fine dark concretions; strongly acid; gradual smooth boundary.

B22t—31 to 43 inches, mottled grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; firm, slightly plastic; common thin patchy clay films on faces of peds and in pores; organic stains on some peds; common fine concretions; strongly acid; gradual smooth boundary.

B31—43 to 54 inches, mottled grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; thin patchy clay films on face of peds; some organic stains on peds; few medium dark concretions; few pockets of clay; medium acid; gradual wavy boundary.

B32—54 to 72 inches, mottled yellowish brown (10YR 5/4) and brown (10YR 5/3) silt loam; moderate medium subangular blocky structure; friable; common thin patchy clay films on peds; organic stains on peds; common hard dark concretions; medium acid.

The Ap and A12 horizons are brown or dark grayish brown. The A2 horizon ranges from yellowish brown to pale brown. Texture of the B21 horizon is silty clay loam or silty clay. Texture of the B22 and B3 horizons is silt loam or silty clay loam. Reaction of the A horizon is medium acid or strongly acid except where it has been limed. The B21 horizon ranges from slightly acid to strongly acid. The B22 horizon and B3 horizon range from strongly acid to neutral.

Stuttgart soils are mainly associated with Crowley, Grenada, and Tichnor soils. They are browner in the upper part of the subsoil than Crowley and Tichnor soils. Stuttgart soils lack the fragipan that Grenada soils have.

StA—Stuttgart silt loam, 0 to 1 percent slopes. This level soil is on broad upland flats. Individual areas range from 20 to 200 acres in size. The profile for this soil is the same as the one described as representative of the series. Included in mapping are spots of Crowley and Grenada soils and small areas of soils that have slopes greater than 1 percent. These make up 15 to 25 percent of this mapping unit.

This soil is suited to farming, but excess surface water is a moderate hazard. Farming operations are delayed a few days after a rain unless surface drains are installed. With good management that includes adequate drainage, clean-tilled crops that leave large amounts of residue can be safely grown year after year.

The main crops are soybeans (fig. 7) and rice. Other suitable crops are cotton and grain sorghum. Winter small grain can also be grown where surface drainage is adequate. Adapted pasture plants are bermudagrass, bahiagrass, tall fescue, white clover, and annual lespedeza. Capability unit IIw-3; woodland group 3w8.

StB—Stuttgart silt loam, 1 to 3 percent slopes. This nearly level soil is mainly between broad flats and small stream bottom land. Most individual areas are 10 to 80 acres in size. The profile of this soil is similar to the one described as representative of the series. Included in the mapping are spots of Crowley and Grenada soils and small areas of soils that have slopes of less than 1 percent.

This soil is well suited to farming, but erosion is a moderate hazard. With good management that includes contour cultivation and terraces on long slopes, clean-tilled crops that leave large amounts of residue can be safely grown year after year.

The main crops are soybeans and rice. Other suitable crops are corn, cotton, grain sorghum, and winter small grain. Truck crops such as okra, strawberries, melons, cucumbers, and green beans are suited to this soil. Adapted pasture plants are bermudagrass, bahiagrass, tall fescue, white clover, and annual lespedeza. Capability unit IIe-2; woodland group 3o7.

Tichnor Series

The Tichnor series consists of poorly drained, level soils in drainageways on uplands. These soils formed in sediment washed from loess. The native vegetation is mainly water-tolerant oaks.

In a representative profile the surface layer is dark grayish brown, mottled silt loam about 2 inches thick. The subsurface layer is light brownish gray and gray, mottled silt loam about 26 inches thick. The subsoil is gray and light brownish gray, mottled silty clay loam that extends to a depth of 72 inches or more.

Tichnor soils are moderate in natural fertility. Content of organic matter is low. Permeability is slow, and the available water capacity is high. These soils respond well to fertilizer, and good tilth is easy to maintain. In places a plowpan has formed beneath the plow layer. This pan restricts root penetration and movement of water through the soil.

These soils are suited to most warm season crops commonly grown in the county. Most of the acreage is woodland.

Representative profile of Tichnor silt loam in an area of Tichnor soils, frequently flooded; in a moist, wooded area in the NE1/4NE1/4SW1/4 sec. 15, T. 1 S., R. 4 W.:

O1—1 to 0 inch, partly decomposed plant material.

A1—0 to 2 inches, dark grayish brown (10YR 4/2) silt loam; common fine distinct yellowish brown and common fine faint grayish brown mottles; weak fine medium subangular blocky structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

A21g—2 to 17 inches, light brownish gray (10YR 6/2) silt loam; common medium distinct yellowish brown (10YR 5/6) and brown (10YR 4/3) mottles; weak fine medium subangular blocky structure; friable; few roots; few pores; few fine concretions; strongly acid; clear smooth boundary.

A22g—17 to 28 inches, gray (10YR 6/1) silt loam; common medium distinct brown (10YR 4/3) and few fine distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable; few roots; few pores; few concretions; strongly acid; clear smooth boundary.

B2tg—28 to 52 inches, light brownish gray (10YR 6/2) silty clay loam; common fine distinct brown (10YR 4/3) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; peds coated with thin layer of gray silt; thin continuous clay films on faces of peds; few pores; few concretions; strongly acid; gradual smooth boundary.

B3g—52 to 72 inches, gray (10YR 6/1) silty clay loam; common fine distinct brown (10YR 4/3) and yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; firm; few pores; few concretions; strongly acid.

The A horizon is very dark grayish brown or dark grayish brown. The B horizon is light brownish gray or gray. Reaction of the A and B horizons is strongly acid or very strongly acid.

Tichnor soils are mainly associated with Grenada, Loring, and Stuttgart soils on adjacent uplands. They lack the fragipan of Grenada and Loring soils, and the red mottles in the upper part of the B horizon of Stuttgart soils.

Tf—Tichnor soils, frequently flooded. This undifferentiated group of level, poorly drained soils is on flood plains of streams that drain areas of soils that have a high silt content. Slopes are 0 to 1 percent. Tichnor soils make up 50 to 90 percent of an area. In some tracts as much as 45 percent of the area is soils that are silt loam or silty clay loam throughout. A few tracts are extremely acid in the subsoil. Included in the mapping are spots of Amagon and Mhoon soils and small tracts that flood less frequently.

The soils in this unit are generally unsuited to farming because of the very severe hazard of frequent flooding (fig. 8). In most years they are flooded from December to late spring or summer. They are better suited to woodland or wildlife habitat than to other uses. A few small tracts are cultivated as part of larger fields, but most of the acreage is wooded. Some tracts have been leveed to form reservoirs for irrigation water. Capability unit Vw-1; woodland group 1w6.

Planning the Use and Management of the Soils

The soil survey is a detailed analysis and evaluation of the most basic resource of the survey area—the soil. It may be used to fit the use of the land, including urbanization, to the limitations and potentials of the natural resources and the environment. The soil survey may also be used to help avoid soil-related failures in uses of the land.

During a soil survey, soil scientists, conservationists, engineers, and others keep extensive notes, not only about the nature of the soils but also about unique aspects of behavior of these soils in the field and at construction sites. These notes include observations of erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic systems, and other factors relating the kinds of soil and their productivity, potentials, and limitations under various uses and management. In this way field experience incorporated with measured data on soil properties and performance is used as a basis for predicting soil behavior.

Information in this section will be useful in applying basic facts about the soils to plans and decisions for use and management of soils for crops and pasture, range, woodland, and many nonfarm uses, including building sites, highways and other transportation systems, sanitary facilities, parks and other recreational developments, and wildlife habitat. From the data presented, the potential of each soil for specified land uses may be determined, soil limitations for these land uses may be identified, and costly failures in homes and other structures, because of unfavorable soil properties, may be avoided. A site can be selected where the soil properties are favorable, or practices can be planned that will overcome the soil limitations.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning areas, and on the environment. Both of these factors are closely related to the nature of the soil. Plans can be made to maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information useful in locating sources of sand and gravel, road fill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, trees and shrubs, and most other uses of land are influenced by the nature of the soil.

Crops and Pasture

W. WILSON FERGUSON, conservation agronomist, Soil Conservation Service, assisted in preparing this section.

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

This section provides information about the overall potential and needed practices in the survey area for those in the "agribusiness-sector"—farmers, equipment dealers, drainage contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil Maps for Detailed Planning." When making plans for management systems for individual fields or farms, check the detailed information given in the description of each soil.

More than 179,172 acres in the survey area were used for crops, pasture, and hay in 1969, according to the Census of Agriculture. Of this total 3,110 acres were used for improved pasture; 156,950 acres for row crops, mainly soybeans; 18,700 acres for close-grown crops, mainly rice and wheat; and 3,522 acres for rotation hay and pasture. The rest was idle cropland.

The potential of the soils in Monroe County for increased production of food is good. Food and fiber production could also be increased considerably by extending the latest crop production technology to all cropland in the county. This soil survey can greatly facilitate the application of such technology.

Contour cultivation, terraces, vegetated waterways, or combinations of these erosion control treatments are needed on sloping soils that are used for clean-tilled crops. Row arrangement and suitable surface drainage are needed for dependable growth in wet areas. Many tracts that are subject to frequent flooding are unsuited or only marginally suited to most crops commonly grown in the county.

Annual cover crops or grasses and legumes should be grown regularly in the cropping system if the erosion hazard is severe or if the crops grown leave only small amounts of residue. Crop residue should be shredded and spread evenly to provide protective cover and active organic matter to the soils.

A plowpan commonly develops in loamy soils that are improperly tilled or are tilled frequently with heavy equipment. Keeping tillage to a minimum, varying the depth of tillage, and tilling when soil moisture content is favorable will help prevent formation of a plowpan. Growing deep-rooted grasses and legumes in the cropping system will help break up plowpans.

If left bare, many soils tend to puddle, pack, and crust during periods of heavy rainfall. Growing cover crops and managing crop residue help preserve or improve tilth.

Perennial grasses or legumes, or mixtures of these, are grown for pasture and hay. The mixtures generally consist of either a summer or a winter perennial grass and a suitable legume.

Coastal bermudagrass, common bermudagrass, dallisgrass, and Pensacola bahiagrass are the summer perennials most commonly grown. Coastal bermudagrass and Pensacola bahiagrass are fairly new to this county, but both are highly satisfactory in production of good quality forage. Tall fescue, the chief winter perennial grass now grown in the county, grows well only in soils that have a favorable soil-moisture relationship. All of these grasses respond well to fertilizer and particularly to nitrogen. White clover, crimson clover, annual lespedeza, and sericea lespedeza are the most commonly grown legumes.

Proper grazing is essential for the production of high-quality forage, stand survival, and erosion control. Other treatments and management practices such as brush and weed control, fertilization, and renovation of the pasture are also important.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in table 5 because of seasonal variations in rainfall and other climatic factors. Absence of a yield estimate indicates that the crop is not suited to or not commonly grown on the soil or that irrigation of a given crop is not commonly practiced on the soil.

The predicted yields are based mainly on the experience and records of farmers, conservationists, and other agricultural workers. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The latest soil and crop management practices used by many farmers in the county are assumed in predicting the yields. Hay and pasture yields are predicted for varieties of grasses and legumes suited to the soil. A few farmers may be using more advanced practices and are obtaining average yields higher than those shown in table 5.

The management needed to achieve the indicated yields of the various crops depends upon the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful

insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residues and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

For yields of irrigated crops it is assumed that the irrigation system is adapted to the soils and to the crop grown; that good quality irrigation water is uniformly applied in proper amounts as needed; and that tillage is kept to a minimum. The only irrigated crop in this county is rice. Other crops may receive supplemental irrigation where they are rotated with rice and an irrigation system is available.

The predicted yields reflect the relative productive capacity of the soils for each of the principal crops. Yields are likely to increase in the future as new production technology is developed. The relative productivity of a given soil compared to other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but because their acreage is small, predicted yields for these crops are not included. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the productivity and management concerns of the soils for these crops.

Capability Classes and Subclasses

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, horticultural crops, or other crops that require special management. This classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or for engineering purposes.

In the capability system, all kinds of soils are grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and landforms have limitations that nearly preclude their use for commercial plants.

CAPABILITY SUBCLASSES are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral; for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w*, *s*, or *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability unit is identified in the description of each soil mapping unit. Capability units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol; for example, IIe-2 or IIIw-4.

Farmers and others may find it practical to use and manage different kinds of soils in the same manner and thus make good use of the capability grouping. The placement of any mapping unit in the grouping can be learned by referring to the notation at the end of the description of each mapping unit in the section "Descriptions of the Soils."

Woodland Management and Productivity

MAX D. BOLAR, woodland conservationist, Soil Conservation Service, assisted in preparing this section.

When the first settlers arrived in Monroe County, virgin forest covered all of the county except river sandbars and scattered, small patches where the Indians grew such crops as corn, beans, and squash.

In the lowlands the principal tree species were sweetgum, water tupelo, baldcypress, bottom-land oaks, ash, sycamore, cottonwood, and hickory. On the uplands and

loess plains were beech, black walnut, butternut, cucumbertree, black cherry, red oak, black oak, white oak, hickory, ash, sycamore, and cottonwood.

Woodland now makes up only about 150,400 acres, or 39 percent of the land area of the county (*12*). About 22,100 acres of the woodland is in the White River National Wildlife Refuge and Dagmar Game Management Area. The rest is privately owned. In recent years, there has been a trend to convert several thousand acres each year from woodland to cropland. It is expected that this trend will continue, but at a gradually reduced rate.

Table 6 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Mapping-unit symbols for those soils suitable for wood crops are listed alphabetically by soil name, and the ordination symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the symbol, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *w* indicates excessive water in or on the soil; *t*, toxic substances in the soil; and *c*, clay in the upper part of the soil. The letter *o* indicates no significant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the order in which the letters are listed above—w, t, and c. The third part of the symbol indicates the degree of hazard of limitation and general suitability of the soils for certain kinds of trees. The numeral 1 indicates that the soils have no significant limitation and are best suited to needleleaf trees (pines or redcedar); 2 indicates the soils have a slight to moderate limitation and are best suited to needleleaf trees; 3 indicates the soils have a moderate to severe limitation and are best suited to needleleaf trees; 4 indicates the soils have no significant limitation and are best suited to broadleaf trees; 5 indicates the soils have a slight to moderate limitation and are best suited to broadleaf trees; 6 indicates the soils have a moderate to severe limitation and are best suited to broadleaf trees; 7 indicates no significant limitation and suitability for both needleleaf and broadleaf trees; 8 indicates a slight to moderate limitation and suitability for both needleleaf and broadleaf trees; 9 indicates a moderate to severe limitation and suitability for both needleleaf and broadleaf trees. The numeral 0 indicates that the soils are not suitable for the production of commercial wood crops. Only numerals, 0, 4, 5, 6, 7, 8, and 9 are shown in Table 6.

In table 6 the soils are also rated for a number of factors to be considered in management. The ratings of slight, moderate, and severe are used to indicate the degree of major soil limitations.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well-managed woodland. The risk is *slight* if the expected soil loss is small; *moderate* if some measures are needed to control erosion during logging and road construction; and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings when plant competition is not a limiting factor. The ratings are for seedlings from good planting stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

The potential productivity of merchantable trees on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Wildlife Habitat

ROY A. GRIZZELL, JR., biologist, Soil Conservation Service, assisted in preparing this section.

Soils are related to the kinds and abundance of wildlife through the vegetation they support and the habitat the vegetation provides. Desirable habitat depends on the diversity of food, cover, and nearness of vegetation to water. The kind and amount of vegetation is closely related to soil characteristics and land use.

All wildlife and fish respond to the basic characteristics of soils. This response is affected in many ways by fertility, slope, wetness, and other characteristics of soils. The permeability rate determines whether or not the soil can be used to impound water in ponds and lakes.

Extensive wooded areas, such as those in the White River National Wildlife Refuge and Dagmar Game Management Area, are well suited to habitat for deer, wild turkey, squirrel, and other woodland wildlife. These areas and similar ones on private land provide suitable food, cover, and drinking water for wildlife, if they are not unduly disturbed.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the development of water impoundments. The kind and abundance of wildlife that populate an area depend

largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, inadequate, or inaccessible, wildlife will either be scarce or will not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by properly managing the existing plant cover, and by fostering the natural establishment of desirable plants and by suitably developing water areas where appropriate.

In table 7 the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in—

1. Planning the use of parks, wildlife refuges, nature study areas, and other developments for wildlife.
2. Selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat.
3. Determining the intensity of management needed for each element of the habitat.
4. Determining areas that are suitable for acquisition to manage for wildlife.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderate intensity of management and fairly frequent attention are required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and requires intensive effort. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. Examples are corn, sorghum, wheat, oats, barley, millet, buckwheat, cowpeas, soybeans, and sunflowers. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Examples are fescue, bluegrass, lovegrass, switchgrass, bromegrass, timothy, orchardgrass, clover, alfalfa, trefoil, and crownvetch. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations.

Wild herbaceous plants are native or naturally established herbaceous grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are bluestem, indiangrass, goldenrod, beggarweed, pokeweed, partridgepea, wheatgrass, fescue, and grama. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Examples of native plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, persimmon, sassafras, sumac, hickory, hazelnut, black walnut, blackberry, grape, blackhaw, viburnum, blueberry, bayberry, and briers. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated good are Russian-olive, autumn-olive and crabapple. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness.

Coniferous plants are cone-bearing trees, shrubs, or ground cover that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Examples are pine, spruce, hemlock, fir, yew, cedar, and juniper. Major soil properties that affect the growth of coniferous plants are depth of the root zone, available water capacity, and wetness.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Examples of wetland plants are smartweed, wild millet, rushes, sedges, reeds, wildrice, saltgrass, cordgrass, and cattail. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness.

Shallow water areas are bodies of surface water that have an average depth of less than 5 feet and are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control devices in marshes or streams. Examples are muskrat marshes, waterfowl feeding areas, wildlife watering developments, beaver ponds, and other wildlife ponds. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Open land habitat consists of croplands, pastures, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and

seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, and cottontail rabbit.

Woodland habitat consists of hardwoods or conifers or a mixture of both, with associated grasses, legumes, and wild herbaceous plants. Examples of wildlife attracted to this habitat are wild turkey, ruffed grouse, woodcock, thrushes, vireos, woodpeckers, squirrels, raccoon, deer.

Wetland habitat consists of water-tolerant plants in open, marshy, or swampy shallow water areas. Examples of wildlife attracted to this habitat are ducks, geese, herons, shore birds, rails, kingfishers, muskrat, mink, and beaver.

Local representatives of the Soil Conservation Service may be consulted for help in planning and establishing food supply and habitat for a specific area.

Engineering

JAMES L. LANSKI, civil engineer, Soil Conservation Service, assisted in preparing this section.

This section provides information about the use of soils for building sites, sanitary facilities, construction materials, and water management. Among those who can benefit from this section are engineers, landowners, community decision makers and planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in tables in this section are based on test data and estimated data in the "Soil Properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by the soil survey and used in determining the ratings in this section are grain-size distribution, liquid limit, plasticity index, soil reaction, depth to and hardness of bedrock within 5 or 6 feet of the surface, soil wetness characteristics, depth to a seasonal water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

Based on the information assembled about soil properties, ranges of values may be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values may be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to select potential residential, commercial, industrial, and recreational areas; make preliminary estimates pertinent to construction in a particular area; evaluate alternate routes for roads, streets, highways, pipelines, and underground cables; evaluate alternate sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; plan detailed onsite investigations of soils and geology; find sources of gravel, sand, clay, and topsoil; plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations and testing.

The information is presented mainly in tables. Table 8 shows, for each kind of soil, ratings of the degree and kind of limitations for building site development; table 9, for sanitary facilities; and table 11, for water management. Table 10 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have different meanings in soil science and in engineering; the Glossary defines many of these terms.

Building Site Development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 8. A *slight* limitation indicates that soil properties are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For

some soils rated severe, such costly measures may not be feasible.

Shallow excavations are used for pipelines, sewerlines, telephone and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by the soil wetness of a high seasonal water table, the texture and consistence of soils, the tendency of soils to cave in or slough, and the presence of very firm, dense soil layers. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is defined, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and small commercial buildings referred to in table 8 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence from settling or shear failure of the foundation do not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Slope is also an important consideration in the choice of sites for these structures and was considered in determining the ratings. Susceptibility to flooding is a serious limitation.

Local roads and streets referred to in table 8 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load-supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The AASHTO (*1*) and Unified classifications (*2*) of the soil and the soil texture, density, and shrink-swell potential are indicators of the traffic-supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones, all of which affect stability and ease of excavation, were also considered.

Sanitary Facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that deal with the ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 9 shows the degree and kind of limitations of each soil for these uses and for use of the soil as daily cover for landfills.

If the degree of soil limitation is indicated by the rating *slight*, soils are favorable for the specified use and limitations are minor and easily overcome; if the rating is *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if the rating is *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance are required.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that effect the absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas. Also, soil erosion and soil slippage are hazards where absorption fields are installed in sloping soils.

Some soils are underlain by loose sand and gravel at a depth less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and as a result ground water supplies in the area may be contaminated. Soils having a hazard of inadequate filtration are indicated by footnotes in table 9.

Percolation tests are performed to determine the absorptive capacity of the soil and its suitability for septic tank absorption fields. These tests should be performed during the season when the water table is highest and the soil is at minimum absorptive capacity.

In many of the soils that have moderate or severe limitations for septic tank absorption fields, it may be possible to install special systems that lower the seasonal water table or to increase the size of the absorption field so that satisfactory performance is achieved.

Sewage lagoons are shallow ponds constructed to hold sewage while bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor area surrounded by cut slopes or embankments of compacted, nearly impervious soil material. They generally are designed so that depth of the sewage is 2 to 5 feet. Impervious soil for the lagoon floor and sides is required to minimize seepage and contamination of local ground water. Soils that vary, are high in organic matter, and have stones and boulders are undesirable. Unless the soil

has very slow permeability, contamination of local ground water is a hazard in areas where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce its capacity for liquid waste. Slope and susceptibility to flooding also affect the location of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soils affect the performance of embankments.

Sanitary landfill is solid waste that has been disposed of either in excavated trenches or on the surface. The waste is spread, compacted in layers, and covered with thin layers of soil material. Landfill areas are subject to heavy vehicular traffic. Ease of excavation, risk of polluting ground water, and trafficability affect the suitability of a soil for this purpose. The best soils have a loamy or silty texture, have moderate or slow permeability, are deep to a seasonal water table and are not subject to flooding. In areas where the seasonal water table is high, water seeps into the trenches and causes problems in excavating and filling the trenches. Also, seepage into the refuse increases the risk of pollution of ground water. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability that might allow noxious liquids to contaminate local ground water.

Unless otherwise stated, the ratings in table 9 apply only to soil properties and features within a depth of about 6 feet. If the trench is deeper, ratings of slight or moderate may not be valid. Site investigation is needed before a site is selected.

In the area type of sanitary landfill, refuse is placed on the surface of the soil in successive layers. The limitations caused by soil texture do not apply to this type of landfill. Soil wetness, however, may be a limitation because of difficulty in operating equipment.

Daily cover for sanitary landfills should be soil that is easy to excavate and spread over the compacted fill during both wet and dry weather. Soils that are loamy are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

In addition to these features, the soils selected for final cover of landfills should be suitable for growing plants. In comparison with other horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas, such as slope, erodibility, and potential for plant growth.

Construction Materials

The suitability of each soil as a source of road fill, sand, gravel, and topsoil is indicated in table 10 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed and described as the survey is made, generally about 6 feet.

Road fill is soil material used in embankments for roads. The ratings reflect the ease of excavating and working the material and the expected performance of the material after it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about soil properties that determine such performance is given in the descriptions of soil series.

The ratings apply to the soil profile between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within the profile. The estimated engineering properties in table 13 provide more specific information about the nature of each horizon that can help determine its suitability for road fill.

According to the Unified soil classification system, soils rated *good* have low shrink-swell potential. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as high shrink-swell potential, steep slopes, or wetness. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*, regardless of the quality of the suitable material.

Sand and gravel are used in great quantities in many kinds of construction. The ratings in table 10 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 13.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to sustain the growth of plants. Also considered is the damage that would result to the area from which the topsoil is taken.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are low in content of

gravel and other coarse fragments and have gentle slopes. They are low in soluble salts, which can limit plant growth. They are naturally fertile or respond well to fertilization. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel or soluble salt.

Soils rated *poor* are very sandy soils, very firm clayey soils, soils with suitable layers less than 8 inches thick, soils having large amounts of gravel or soluble salt, steep soils, and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is much preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter. Consequently, careful preservation and use of material from these horizons is desirable.

Water Management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 11 the degree of soil limitation and soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water-control structures.

Soil limitations for the specified uses in table 11 are expressed as slight, moderate, and severe. *Slight* means that the soil properties and site features are generally favorable for the specified use and that any limitation is minor and easily overcome. *Moderate* means that some soil properties or site features are unfavorable for the rated use but can be overcome or modified by special planning and design. *Severe* means that the soil properties and site features are so unfavorable and so difficult to correct or overcome that major soil reclamation, special design, or intensive maintenance is required.

Pond reservoir areas hold water behind a dam or embankment. Soils suitable for this use have low seepage potential, which is determined by the permeability and depth over fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and is of favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

An *aquifer-fed excavated pond* is a body of water created by excavating a pit or dugout into a ground water aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table 11 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage of soil is affected by such soil properties as permeability, texture, structure, depth to claypan or other layers that influence rate of water movement, depth to the water table, slope, stability of ditchbanks, susceptibility to flooding, salinity and alkalinity, and availability of outlets for drainage.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments, or a combination of channels and ridges, constructed across a slope to intercept runoff and allow the water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity of slope and steepness, depth to bedrock or other unfavorable material, permeability, ease of establishing vegetation, and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff at nonerosive velocities to outlets. Features that affect the use of soils for waterways are slope, permeability, erodibility, and suitability for permanent vegetation.

Recreation

The soils of the survey area are rated in table 12 according to limitations that affect their suitability for camp areas, picnic areas, playgrounds, and paths and trails. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreational use by the duration of flooding and the season when it occurs. Onsite assessment of height, duration, and frequency of flooding is essential in planning recreational facilities.

In table 12 the limitations of soils are rated as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 12 can be supplemented by additional information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 9, and interpretations for dwellings without basements and for local roads and streets, given in table 8.

Camp areas require such site preparation as shaping and leveling tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The soils better suited to this use have mild slopes and are not wet or subject to flooding during the period of use. The surface absorbs rain readily but remains firm and is not dusty when dry. Strong slopes can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The soils better suited to use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The better suited soils are almost level and not wet or subject to flooding during the season of use. The surface is firm after rains and is not dusty when dry.

The design and layout of *paths and trails* for walking, horseback riding, and bicycling should require little or no cutting and filling. The soils better suited to this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the period of use. They should have moderate slopes.

Soil Properties

Extensive data about soil properties collected during the soil survey are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of samples selected from representative soil profiles in the field.

When he makes soil borings during field mapping, the soil scientist can identify several important soil properties. He notes the seasonal soil moisture condition, or the presence of free water and its depth in the profile. For each horizon, he notes the thickness of the soil and its color; the texture, or the amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or natural pattern of cracks and pores in the undisturbed soil; and the consistence of soil in place under the existing soil moisture conditions. He records the root depth of existing plants, determines soil pH, or reaction, and identifies any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties, especially those that cannot be estimated accurately by field observation, and to characterize key soils. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many of the soil series are available from nearby areas.

Based on summaries of available field and laboratory data, and listed in tables in this section, are estimated ranges in engineering properties and classifications and ranges in physical and chemical properties for each major horizon of each soil in the survey area. Also, pertinent soil and water features and data obtained from laboratory analyses, both physical and chemical, are presented.

Engineering Properties and Classification

Table 13 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area. These estimates are presented as ranges in values most likely to exist in areas where the soil is mapped.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Information is presented for each of these contrasting horizons. Depth to the upper and lower boundaries of each horizon in a typical profile of each soil is indicated. More information about the range in depth and in properties of each horizon is given for each soil series in the section "Descriptions of the Soils."

Texture is described in table 13 in standard terms used by the United States Department of Agriculture (*9*). These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added; for example, "gravelly loam." Other texture terms used by USDA are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (USCS) and the American Association of State Highway and Transportation Officials Soil Classification System (AASHTO). In table 13 soils in the survey area are classified according to both systems.

The USCS system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example CL-ML.

The AASHTO system classifies soils according to those properties that affect their use in highway construction

and maintenance. In this system a mineral soil is classified as one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified as A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or more for the poorest. The estimated AASHTO classification, without group index numbers, is given in table 13. Percentage of the soil material less than 3 inches in diameter that passes each of four standard sieves is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and plasticity index indicate the effect of water on the strength and consistency of soil. These indexes are used in both the USCS and the AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. ("NP" in the Plasticity Index column of table 13 is an abbreviation for nonplastic.)

Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

Physical and Chemical Properties

Table 14 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the representative profile of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships between the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for water movement in a vertical direction when the soil is saturated. Not considered in the estimates are lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in the plannning and design of drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as range in pH values. The range, in pH, of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops and ornamental or other plants to be grown, in evaluating soil amendments for fertility and stabilization, and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others it was estimated on the basis of the kind of clay and on measurements of similar soils. Size of imposed loadings and the magnitude of changes in soil moisture content are also important factors that influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A *high* shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion, as used in table 14, pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rating of soils for corrosivity to concrete is based mainly on the sulfate content, soil texture, and acidity. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Installations of steel that intersect soil boundaries or soil horizons are more susceptible to corrosion than installations entirely within one kind of soil or within one soil horizon.

Erosion factors. The soil erodibility factor "K" is a measure of the rate at which soil will erode. Soil properties that influence erodibility by water are those that affect infiltration rate, movement of water through the soil, water storage capacity, resist dispersion, splashing, abrasion, and transporting forces from rainfall and runoff. Soil-loss tolerance "T," sometimes called "permissible soil loss," is the maximum rate of soil erosion that will permit a high level of crop productivity to be sustained economically and indefinitely. These rates are expressed in tons of soil loss per acre per year. Rates of 1 through 5 tons are used depending upon soil properties, soil depth, and prior erosion.

Soil and Water Features

Features that relate to runoff or infiltration of water and to flooding of each soil are indicated in table 15. This information is helpful in planning land uses and engineer-

ing projects that are likely to be affected by the amount of runoff from watersheds, by flooding, and by a seasonal high water table.

Hydrologic groups are used to estimate runoff after rainfall. Soil properties that influence the minimum rate of infiltration into the bare soil after prolonged wetting are depth to a water table, water intake rate and permeability after prolonged wetting, and depth to layers of slowly or very slowly permeable soil.

Flooding is rated in general terms that describe the frequency, duration, and period of the year when flooding is most likely. The ratings are based on evidences in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; absence of distinctive soil horizons that form in soils of the area that are not subject to flooding; local information about floodwater heights and the extent of flooding; and local knowledge that relates the unique landscape position of each soil to historic floods. Most soils in low positions on the landscape where flooding is likely to occur are classified as fluvents at the suborder level or as fluventic subgroups. See the section "Classification of the Soils."

The generalized description of flood hazards is of value in land use planning and provides a valid basis for land use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

A seasonal *high water table* is the highest level of a saturated zone more than 6 inches thick in soils for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed during the course of the soil survey. Indicated are the depth to the seasonal high water table; the kind of water table, whether perched, artesian, or the upper part of the ground water table; and the months of the year that the high water commonly is present. Only those saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not to construct basements and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Physical and Chemical Analyses of Selected Soils

Physical and chemical data resulting from laboratory analyses can be useful to the soil scientist in classifying soils. These data are helpful in estimating available water capacity, acidity, cation exchange capacity, mineralogical composition, organic-matter content, and other soil characteristics that affect management needs. The data are also helpful in developing concepts of soil formation. More recently, laboratory data have proved helpful in rating soils for nonfarm uses; that is, for residential, industrial, recreational, or transportational use.

Several factors are involved in selecting soils for laboratory analyses. Soils that are extensive and most important in the survey area are considered first. A review of available laboratory data is made to determine the need for additional information on these particular soils. Generally priority is given to soils for which little or no laboratory data are available.

In Monroe County, soils representing three soil series were selected for laboratory analyses. Profiles of these soils are described in the section "Descriptions of the Soils." The analyses were made by the University of Arkansas in Fayetteville. Tables 16 and 17 show the results.

Silt and clay particle size distribution was determined by the hydrometer method (*3*). Sands were measured by sieving (*11*).

Organic matter was determined by a modified Walkley-Black method (*5*). The organic matter is digested with potassium dichromate-sulfuric acid and the quantity of chromic acid reduced is measured colorimetrically.

Soil reaction was determined on the basis of a 1:1 soil to water mixture. Available phosphorus was extracted with the Bray No. 1 solution (0.03 N ammonium floride and 0.025 N hydrochloric acid) and measured colorimetrically.

The bases were extracted with 1 N, pH 7.0, ammonium acetate at a pH of 7. Calcium, potassium, and sodium were determined with a flame photometer, and magnesium was measured by atomic absorption. The extractable acidity was determined by the barium chloride-triethanolamine method (*11*).

The total extractable calcium, potassium, magnesium, sodium, and extractable acidity is an approximation of the cation exchange capacity of the soil. Except in soils that contain soluble salts, base saturation was determined by dividing this total into the sum of calcium, potassium, magnesium, and sodium, and multiplying by 100.

Formation and Classification of the Soils

The factors of soil formation and their relation to the formation of soils in the survey area are discussed in this section. Also, the processes of soil formation are explained, the current system of classifying soils is defined, and the soils of the area are classified according to the current system.

Factors of Soil Formation

Soil is a natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

The interaction of five main factors results in differences among the soils. These factors are the physical and chemical composition of the parent material; the climate during and after the accumulation of the parent material; the kind of plants and organisms living in the soil; the relief of the land and its effect on runoff; and the length of time it took the soil to form.

The effect of a factor can differ from place to place, but the interaction of all the factors determines the kind of soil that forms. In the following paragraphs the factors of soil formation are discussed as they relate to the soils in the survey area.

Climate

The climate of Monroe County is characterized by mild winters, warm or hot summers, and generally abundant rainfall. The generally warm temperatures and high precipitation probably are similar to the climate under which the soils in the county formed. The average daily maximum temperature at Brinkley in July is about 92 degrees F. and the average in January is about 51 decrees F. The total annual rainfall of about 61 inches is well distributed throughout the year. For additional information about the climate, refer to the section "General Nature of the County."

The warm, moist climate promotes rapid soil formation, and the warm temperature encourages rapid chemical reactions. The large amount of water that moves through the soil is instrumental in removing dissolved or suspended materials. Because remains of plants decompose rapidly, the organic acids thus formed hasten the formation of clay minerals and removal of carbonates. Because the soil is frozen only to shallow depths and for short periods, soil formation continues almost the year around. The climate throughout the county is uniform, though its effect is modified locally by runoff. Climate alone does not account for differences in the soils of the county.

Plant and Animal Life

The higher plants and animals, as well as insects, bacteria, and fungi, are important in the formation of soils. Among the changes they cause are gains and losses in organic matter and nitrogen in the soils, gains or losses in plant nutrients, and changes in structure and porosity.

Before Monroe County was settled, the native vegetation probably had more influence on soil formation than did animal activity. Hardwood forests broken by swamps and a few canebreaks, covered the county. Differences in native vegetation seem to have been related mainly to variations in drainage and, to a lesser degree, parent material. Because the type of vegetation was relatively uniform over the county, differences among the soils cannot be directly related to vegetation.

Man is important to the future rate and direction of soil formation. He clears the forest, cultivates the soils, and introduces new kinds of plants. He adds fertilizer and lime, and chemicals for insect, disease, and weed control. Building levees for flood control, improving drainage, and grading the soil surface also affect the future development of soils. Results of these changes may not be evident for many centuries. Nevertheless, the complex of living organisms affecting soil formation in this county has been drastically changed by man. Thus, man has had more effect on soil formation than other living organisms.

Parent Material

The soils of Monroe County formed in water-deposited alluvium and wind-transported loess.

The alluvium was deposited by the Mississippi River (*4*) when it flowed in the channels now occupied by the White and Cache Rivers. The alluvium consists of a mixture of minerals washed from the many kinds of soil, rocks, and unconsolidated sediment in about 24 states (*14*). In this great basin, which extends from Montana to Pennsylvania, sedimentary rocks of various kinds are widespread. Other kinds of rocks also are exposed in many places and serve as sediment sources. Large areas of the upper basin are mantled by glacial drift and loess. Consequently, the alluvium consists of many kinds of minerals, most of which are but slightly weathered.

The wide range in texture of alluvium in the county results from differences in the site of deposition. When a river overflows and spreads over its flood plain, the coarse sediment is deposited in bands roughly parallel to the channel. Thus, low ridges known as natural levees are formed (*14*). On these ridges, Dubbs and Bosket soils formed. Finer sediment, high in silt, is deposited as the floodwaters spread and lose velocity. This sediment contains some sand and clay, and soils such as Commerce and Dundee formed in it. When the flood recedes and water is left standing as shallow lakes or swamps, the clay and finer silt settle. Sharkey and Mhoon soils formed in this clay and silt.

This simple pattern of sediment distribution is no longer common along the river bottom land because the river channel has meandered back and forth across the flood plain through the centuries. Sometimes the channel has cut out all or parts of natural levees. At other times it has deposited sandy or loamy sediment over slack-water clays or slack-water clays over sandy or loamy sediment. The natural pattern of sediment distribution from a single channel has been truncated in many places, and more recent beds of alluvium have been superimposed. Parts of former stream channels have been filled and are now wide, flat-bottomed depressions in which Amagon soils formed.

During much of the Pleistocene epoch, the Mississippi River flood plain was west of Crowley Ridge in the adjoining county east of Monroe County, and the Ohio River flowed on the east side of the ridge (*4*).

Thousands of years ago the wide trough carved west of Crowley Ridge was partly refilled with sediment by the Mississippi River in much the same manner as the river deposits of recent time were laid down. Finally, the vast complex of alluvial terraces west of the Ridge was abandoned by the Mississippi River in favor of the Ohio River channel on the east side of the ridge. The broad, abandoned flood plain was subsequently drained by smaller, more localized streams that occupied former braided channels of the Mississippi River. These smaller streams were inadequate to maintain the entire area as an active flood plain. Those parts of the plain above overflow were progressively mantled with loess.

The soils on the uplands of the county formed in loess deposited during the Pleistocene epoch. This mantle of wind-transported material was deposited over older alluvium. On the uplands the mantle was thick enough for the solum of most soils to form entirely in loess. Generally, the loess is about 2 to 20 feet thick. It is unstratified and is mainly silt-size particles. On the level parts of the plain, poorly drained soils such as Calhoun formed. In the nearly level to gently sloping areas, moderately well drained and well drained soils such as Grenada, Loring, and Memphis formed. The somewhat poorly drained Calloway soils formed at intermediate positions between these extremes.

In places are Foley, Bonn, McCrory, and Lafe soils that formed in soil material containing large amounts of sodium and magnesium.

The loess in Monroe County is typical of the loess on the Southern Mississippi Valley silty uplands. Most soils that formed in the loess are acid, though the content of bases is moderately high.

Relief

Relief is the inequality in elevation of a land surface. The other soil-forming factors are affected by relief through its effect on drainage, runoff, erosion, and percolation of water through the soil. Some of the greatest differences among the soils are due mainly to differences in relief.

The bottom land of Monroe County has relief ranging from broad flats to undulating areas of alternating swales and low ridges. Dubbs soils formed on low ridges, whereas Dundee soils formed in similar parent material but on lower, wetter positions in the landscape. Local differences in elevation are predominantly less than 1 foot, but range up to 4 or 5 feet in the areas of swales and low ridges. Differences in a few areas along streambanks are as much as 15 to 20 feet, but the total area of this greater relief is negligible. The highest elevation in the bottom land area, about 175 feet above sea level, is in the northwestern part along the Cache River. The lowest elevation, about 145 feet above sea level, is in the southeastern part, along the White River. The highest point above sea level is 215 feet in the uplands in the northeastern part of the county.

The uplands are in the eastern and west central parts of the county. The relief is characterized by short slopes between ridges and streams. The well drained Memphis and moderately well drained Loring and Grenada soils formed in this level to moderately sloping landscape.

Broad flats broken by higher lying level and undulating natural levees occupy most of the land area which extends from the north-central to the south-central parts of the county. On the flats the lack of significant slope results in water ponding or draining away very slowly. As a consequence, the soils show evidence of gleying, and the B horizon is prominent because more water must percolate through the soil than on soils where relief promotes drainage. Amagon soils that formed on the flats are strongly gleyed and show much evidence of clay translocation as well as reduction and transfer of iron. Bosket soils, in contrast, are on convex natural levees. Because excess water drains away, the soil is well drained internally and there is no evidence of gleying in the profile.

Time

The length of time required for formation of a soil depends largely upon other factors of soil formation. Less time generally is required if the climate is warm and humid and the vegetation is luxuriant. If other factors are equal, less time also is required where the parent material is sandy or loamy than where it is clayey. It seems probable that the sediment now forming most of the land surface in Monroe County was deposited during and after the advance of the continental glaciers. The last of these glaciers retreated from the North Central States about 11,000 years ago (*6*, *7*). Thus, in terms of geological time, the soils in Monroe County are young. In terms of soil formation, the age of the soils in the county varies widely. On the smoother parts of the uplands, the soils are more mature, but on the stronger slopes where geologic erosion has more nearly kept pace with soil formation, the soils have less thick, less strongly developed horizons. On young natural levees and in areas of local alluvium, the soil material has been in place so short a time that the soils show relatively little evidence of development. Many such areas receive fresh deposits of sediment at frequent intervals. In these areas are such soils as Mhoon, Tichnor, Commerce, and Robinsonville.

Processes of Soil Formation

In this subsection a brief definition of the horizon nomenclature and processes responsible for soil formation are given.

The marks that the soil-forming factors leave on the soil are recorded in the soil profile, which is a succession of layers, or horizons, from the surface down to the parent material that has been altered but little by soil-

forming processes. The horizons differ in one or more properties, such as color, texture, structure, consistence, porosity, and reaction.

Most soil profiles contain three major horizons called A, B, and C. Very young soils do not have a B horizon.

The A horizon can be the horizon of maximum accumulation of organic matter, called the A1 horizon or the surface layer, or it can be the horizon of maximum leaching of dissolved or suspended materials, called the A2 horizon or the subsurface layer.

The B horizon lies immediately beneath the A horizon and is sometimes called the subsoil. It is a horizon of maximum accumulation of dissolved or suspended materials, such as iron and clay. Commonly, the B horizon has blocky structure (*13*) and is firmer than the horizons immediately above and below it.

Beneath the B is the C horizon, which has been affected but little by the soil-forming processes, although the C horizon can be materially modified by weathering. In some young soils, the C horizon immedately underlies the A horizon and has been slightly modified by living organisms, as well as by weathering.

Several processes have been active in the formation of soil horizons in the soils of Monroe County. Among these processes are the accumulation of organic matter, the leaching of calcium carbonates and bases, the reduction and transfer of iron, and the formation and translocation of silicate clay minerals. In most of the soils of the county, more than one of these processes has been active in soil formation.

Accumulation of organic matter in the upper part of the profile to form an A1 horizon has been an important process of soil formation. The soils of Monroe County range from high to low in content of organic matter.

Leaching of carbonates and bases has occurred to some degree in nearly all the soils of Monroe County. Among soil scientists, it is generally accepted that bases are leached downward in soils before silicate clay minerals begin to move. Some of the soils, such as Mhoon, are only slightly leached, but most of the soils in the county are moderately leached, an important factor in horizon development.

Reduction and transfer of iron has occurred to a significant degree in the somewhat poorly drained and poorly drained soils of the county. In the naturally wet soils, this process is called gleying. Gray colors in the layers below the surface indicate the reduction and loss of iron. Some horizons contain reddish or yellowish mottles and concretions derived from segregated iron. Gleying is prominent in many of the soils. Among the strongly gleyed soils are the Amagon, Sharkey, Calhoun, and Mhoon soils.

In several soils of Monroe County, the translocation of clay minerals has contributed to the formation of horizons. In most places the eluviated A2 horizon has been destroyed by cultivation. In areas where there is an A2 horizon, its structure is blocky to platy, clay content is less than in the lower horizons, and the soil is lighter in color. Generally clay films have accumulated in pores and on surfaces of peds in the B horizon. The soils were probably leached of carbonates and soluble salts to a great extent before translocation of silicate clay occurred, even though the content of bases is still high in all soils of the county.

Leaching of bases and translocation of silicate clay are among the most important processes in horizon differentiation in the soils of Monroe County.

Classification of the Soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to the latest literature available (*8*, *10*).

The system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the bases for classification are the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 18 the soils of the survey area are classified according to the system. Classes of the system are briefly discussed in the following paragraphs.

ORDER. Ten soil orders are recognized. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Alfisols.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and that are important to plant growth or that were selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aqualfs (*Aqu*, meaning water, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. The name of a great group ends with the name of a suborder. A prefix added to the name suggests something about the properties of the soil. An example is Ochraqualfs (*Ochr*, meaning pale surface horizon, plus *aqualfs*, the suborder of Ochraqualfs that have an aquic moisture regime).

SUBGROUP. Each great group is divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades that have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. The names of subgroups are derived by placing one or more adjectives before the name of the great

group. The adjective *Typic* is used for the subgroup that is thought to typify the great group. An example is Typic Ochraqualfs.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-silty, mixed, thermic, Typic Ochraqualfs.

SERIES. The series consists of a group of soils that are formed from a particular kind of parent material and have horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single mapping 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—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

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

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

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

Broad-base terrace. A ridge-type terrace built to control erosion by diverting runoff along the contour at a nonscouring velocity. The terrace is 10 to 20 inches high and 15 to 30 feet wide and has gently sloping sides, a rounded crown, and a dish-shaped channel along the upper side. It may be nearly level or have a grade toward one or both ends.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Channery soil. A soil, that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Coarse textured (light textured) soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Compressible. Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

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 40 or 80 inches (1 or 2 meters).

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (tabular information). Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. A delay in grazing until range plants have reached a specified stage of growth. Grazing is deferred in order to increase the vigor of forage and to allow desirable plants to produce seed. Contrasts with continuous grazing and rotation grazing.

Delta. An alluvial deposit, commonly triangular in shape, formed largely beneath water and deposited at the mouth of a river or stream.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are

commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

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

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

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Excess alkali. Excess exchangeable sodium. The resulting poor physical properties restrict the growth of plants.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime. Excess carbonates. Excessive carbonates, or lime, restrict the growth of some plants.

Excess salts. Excess water soluble salts. Excessive salts restrict the growth of most plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake. The rapid movement of water into the soil.

Favorable (tabular information). Favorable soil features for the specified use.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

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

Foot slope. The inclined surface at the base of a hill.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

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

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

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.

Gilgai. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green manure (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table, which is the upper limit of saturation.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Gypsum. Hydrous calcium sulphate.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming 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.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the

solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered, but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

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.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants are those that follow disturbance of the surface.

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

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

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

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

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.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Landslide. The rapid downhill movement of a mass of soil and loose rock generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

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

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength (tabular information). Inadequate strength for supporting loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous areas. Areas that have little or no natural soil, are too nearly inaccessible for orderly examination, or cannot otherwise be feasibly classified.

Moderately coarse textured (moderately light textured) soil. Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy textured) soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material mixed with mineral soil material. The content of organic matter is more than 20 percent.

Munsell notation. A designation of color by degrees of the three single variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Pan. A compact, dense layer in a soil. A pan impedes the movement of water and the growth of roots. The word "pan" is commonly combined with other words that more explicitly indicate the nature of the layer; for example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (tabular information). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less

than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differences are too small to justify separate series.

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

Piping. Moving water of subsurface tunnels or pipelike cavities in the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents that commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on exposure to repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade, whereas ironstone cannot be cut but can be broken or shattered with a spade. Plinthite is one form of the material that has been called laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Polypedon. A volume of soil having properties within the limits of a soil series, the lowest and most homogeneous category of soil taxonomy. A "soil individual."

Poorly graded. Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets. Surface or subsurface drainage outlets difficult or expensive to install.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock. Soil scientists regard as soil only the part of the regolith that is modified by organisms and other soil-building forces. Most engineers describe the whole regolith, even to a great depth, as "soil."

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

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

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

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

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline-alkali soil. A soil that contains a harmful concentration of salts and exchangeable sodium; contains harmful salts and is strongly alkaline; or contains harmful salts and exchangeable sodium and is very strongly alkaline. The salts, exchangeable sodium, and alkaline reaction are in the soil in such location that growth of most crop plants is less than normal.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

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-size 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.

Saprolite (geology). Soft, earthy, clay-rich, thoroughly decomposed rock formed in place by chemical weathering of igneous and metamorphic rock. In soil survey, the term saprolite is applied to any unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

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

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-alumina ratio. The molecular ratio of silica to alumina in soil, clay, or any alumino-silicate mineral.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

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. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in a landscape where limestone has been locally dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. Locally, a small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow intake. The slow movement of water into the soil.

Slow refill. The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na to Ca + Mg. The degrees of sodicity are—

	SAR
Slight	Less than 13:1
Moderate	13-30:1
Strong	More than 30:1

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.005 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Solodized soil. A formerly alkali (sodic) soil that has been leached so that it has become acid and has a thick, gray upper layer over an acid, blocky B horizon. The resulting soil may be termed a Soloth.

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

Stone line. A concentration of coarse fragments in soils that generally marks an old weathering surface. In a cross section, the line may be one fragment or more thick. The line generally overlies material that weathered in place and marks the top of a paleosol. It is ordinarily overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

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

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining 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).

Stubble mulch. Stubble or other crop residue left on the soil, or partly worked into the soil, to provide protection from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitaion is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

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

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use or management.

Terrace. 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 it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally 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 (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or " very fine."

Thin layer (tabular information). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Trace elements. The chemical elements in soils, in only extremely small amounts, essential to plant growth. Examples are zinc, cobalt, manganese, copper, and iron.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Unstable fill. Risk of caving or sloughing in banks of fill material.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams emerging from hills or mountains and spreading sediments onto the lowland as a series of adjacent alluvial fans.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within 1 year; specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

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

Illustrations

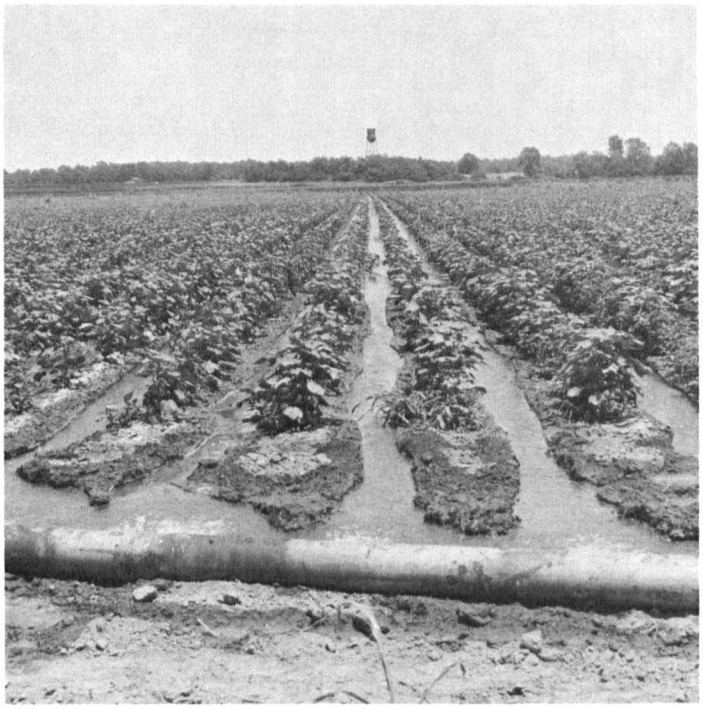

Figure 1.—Irrigating cotton via gated pipe, Dubbs silt loam, 0 to 1 percent slopes.

Figure 2.—Grain sorghum growing in Grenada silt loam, 0 to 1 percent slopes.

Figure 3.—Bahiagrass pasture, Grenada silt loam, 3 to 8 percent slopes.

Figure 4.—Rice growing in Jackport silty clay loam.

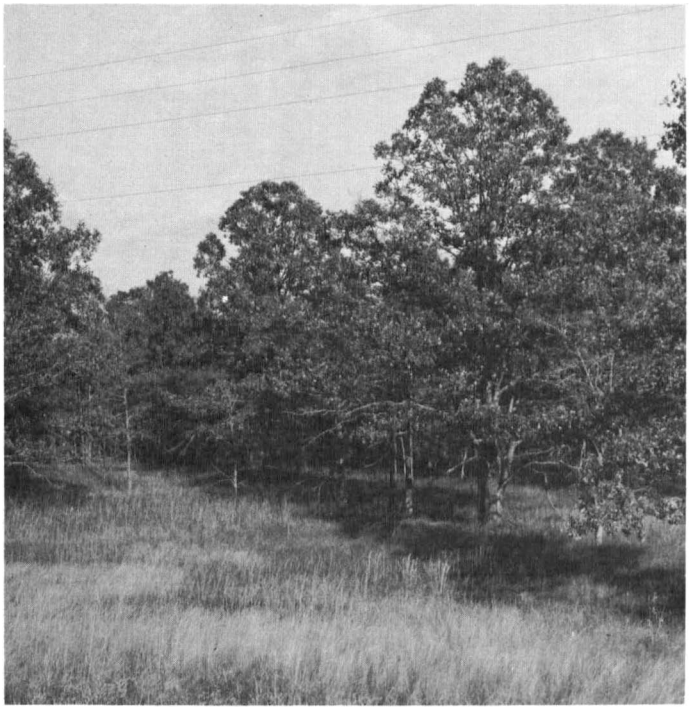

Figure 5.—Typical open stand of stunted hardwoods, Lafe-Bonn complex.

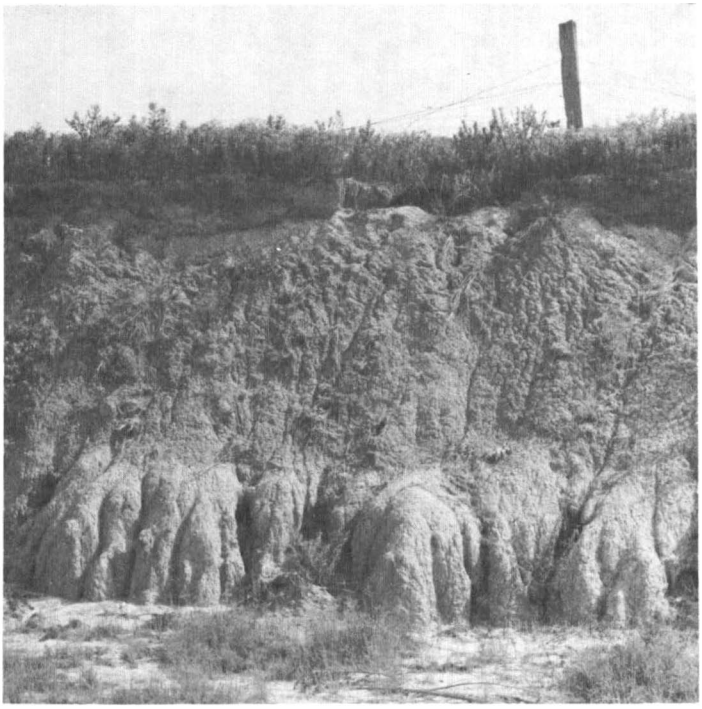

Figure 6.—Profile of Memphis silt loam, 3 to 8 percent slopes.

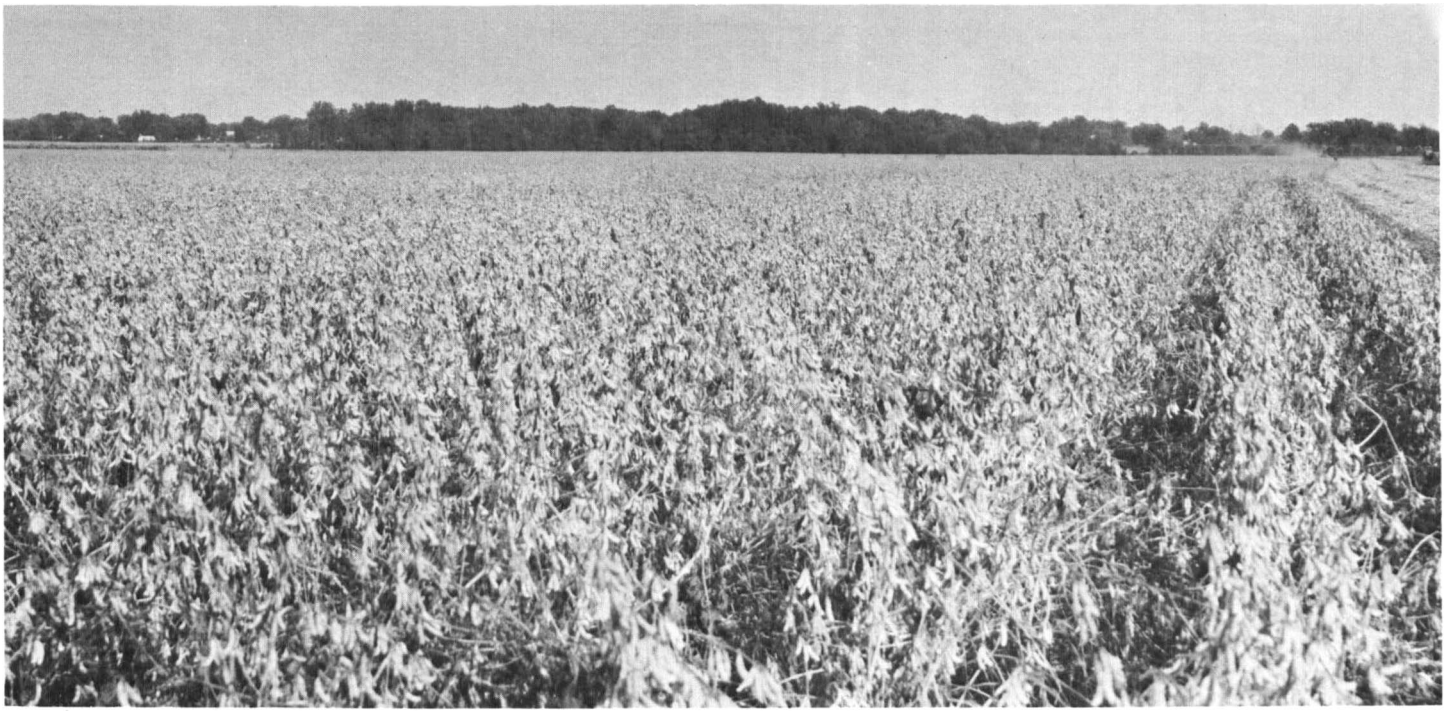

Figure 7.—Soybeans ready for harvest. Stuttgart silt loam, 0 to 1 percent slopes.

Figure 8.—Summer flooding of Tichnor soils, frequently flooded.

Tables

TABLE 1.--ACREAGE OF PRINCIPAL CROPS FOR STATED YEARS

Crops	Acres in 1964	Acres in 1969
Soybeans (for beans)	94,703	124,459
Cotton	38,510	32,250
Wheat	483	832
Other small grain (includes rice)	16,551	17,868
Corn (for all purposes)	1,357	241
Hay (excluding sorghum hay)[1]	984	412
Pasture and rangeland[1]	2,380	3,110

[1] Exclude hay and pasture acreage on levees.

TABLE 2.--NUMBER OF LIVESTOCK IN STATED YEARS

Livestock	1964	1969
All cattle and calves	3,658	3,237
Milk cows	162	86
Hogs and pigs	1,320	1,077
Chickens[1]	15,943	2,166

[1] More than 3 months old.

TABLE 3.--TEMPERATURE AND PRECIPITATION

[Data from Brinkley, Arkansas; period of record, 1941-1970]

Month	Average daily temperature	Average monthly precipitation
January	40.8	4.4
February	44.1	4.7
March	51.3	5.1
April	62.5	5.4
May	70.5	5.0
June	78.1	3.3
July	81.0	3.7
August	79.9	3.4
September	72.8	3.5
October	62.4	2.9
November	50.8	4.0
December	42.7	4.7
Year	61.4	50.1

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
Am	Amagon silt loam	5,828	1.5
BkA	Bosket fine sandy loam, 0 to 1 percent slopes	3,902	1.0
BkB	Bosket fine sandy loam, gently undulating	7,822	2.0
Ca	Calhoun silt loam	12,350	3.2
Cb	Calloway silt loam	3,283	0.8
CF	Commerce soils, frequently flooded	21,647	5.5
Cr	Crowley silt loam	5,467	1.4
DbA	Dubbs silt loam, 0 to 1 percent slopes	23,321	6.0
DbB	Dubbs silt loam, gently undulating	6,784	1.7
DeA	Dundee silt loam, 0 to 1 percent slopes	7,616	2.0
DeB	Dundee silt loam, gently undulating	6,519	1.7
Fo	Foley-Calhoun-Bonn complex	86,538	22.3
Ge	Gore silt loam, 3 to 8 percent slopes	771	0.2
GrA	Grenada silt loam, 0 to 1 percent slopes	5,127	1.3
GrB	Grenada silt loam, 1 to 3 percent slopes	14,265	3.6
GrC	Grenada silt loam, 3 to 8 percent slopes	6,687	1.7
Gs	Grubbs silt loam	4,368	1.1
Jc	Jackport silty clay loam	31,436	8.1
Lf	Lafe-Bonn complex	15,275	3.9
LoC	Loring silt loam, 3 to 8 percent slopes	590	0.2
LoD	Loring silt loam, 8 to 12 percent slopes	737	0.2
Ma	McCrory fine sandy loam	1,488	0.4
MeA	Memphis silt loam, 0 to 1 percent slopes	1,947	0.5
MeB	Memphis silt loam, 1 to 3 percent slopes	300	0.1
MeC	Memphis silt loam, 3 to 8 percent slopes	245	0.1
MF	Mhoon soils, frequently flooded	13,968	3.6
Sa	Sharkey silty clay	575	0.1
SF	Sharkey soils, frequently flooded	75,604	19.5
StA	Stuttgart silt loam, 0 to 1 percent slopes	3,877	1.0
StB	Stuttgart silt loam, 1 to 3 percent slopes	2,196	0.6
Tf	Tichnor soils, frequently flooded	7,021	1.8
	Water	11,118	2.9
	Total	388,672	100.0

TABLE 5.--ESTIMATED ACRE YIELDS OF CROPS AND PASTURE PLANTS

[Yields in columns N are for nonirrigated soils; those in columns I are for irrigated soils. All yields are those to be expected under a high level of management. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Cotton lint	Soybeans	Rice	Wheat	Common bermudagrass	Tall fescue
	N	N	I	N	N	N
	Lb	Bu	Bu	Bu	AUM[1]	AUM[1]
Amagon:						
Am	650	35	120	---	7.5	9.0
Bosket:						
BkA	800	40	---	50	10.0	9.0
BkB	750	35	---	50	10.0	9.0
Calhoun:						
Ca	600	30	120	---	6.0	7.0
Calloway:						
Cb	650	35	120	---	6.5	8.0
Commerce:						
[2]CF	---	30	---	---	7.0	---
Crowley:						
Cr	550	30	130	---	7.0	---
Dubbs:						
DbA	850	40	---	45	8.0	10.0
DbB	800	40	---	40	8.0	10.0
Dundee:						
DeA	800	40	---	---	8.0	10.0
DeB	750	40	---	---	8.0	10.0
Foley:						
[2]Fo	500	25	100	---	5.5	7.0
Gore:						
Ge	---	---	---	---	4.5	6.0
Grenada:						
GrA	675	35	---	40	8.0	8.5
GrB	650	35	---	40	7.5	8.0
GrC	550	30	---	35	7.0	7.0
Grubbs:						
Gs	700	30	120	---	7.0	8.0
Jackport:						
Jc	550	30	130	---	7.0	8.0
Lafe:						
[2]Lf	---	---	---	---	4.0	---
Loring:						
LoC	600	25	---	35	7.0	7.5
LoD	---	---	---	30	6.5	7.0
McCrory:						
Ma	650	30	120	40	6.0	8.0
Memphis:						
MeA	800	40	---	40	8.0	8.5
MeB	750	35	---	35	7.5	8.5

See footnotes at end of table.

TABLE 5.--ESTIMATED ACRE YIELDS OF CROPS AND PASTURE PLANTS--Continued

Soil name and map symbol	Cotton lint	Soybeans	Rice	Wheat	Common bermudagrass	Tall fescue
	N Lb	N Bu	I Bu	N Bu	N AUM[1]	N AUM[1]
Memphis:						
MeC	700	30	---	30	7.0	7.5
Mhoon:						
[2]MF	---	25	---	---	7.5	---
Sharkey:						
Sa	600	35	130		7.0	9.0
[2]SF	---	30	---	---	6.0	
Stuttgart:						
StA	550	35	130	35	7.0	8.0
StB	500	30	115	35	7.0	8.0
Tichnor:						
[2]Tf	---	---	---	---	8.0	---

[1]Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.

[2]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed in this table. Absence of an entry in a column means the information was not available]

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant
Amagon:							
Am	1w6	Slight	Severe	Moderate	Eastern cottonwood	100	Eastern cottonwood, cherrybark oak, Nuttall oak, Shumard oak, water oak, willow oak, sweetgum, American sycamore.
					Water oak	100	
					Willow oak	100	
					Cherrybark oak	90	
					Nuttall oak	100	
					Green ash	80	
					Sweetgum	100	
Bosket:							
BkA, BkB	2o4	Slight	Slight	Slight	Eastern cottonwood	100	Eastern cottonwood, green ash, sweetgum, cherrybark oak, water oak, willow oak, Shumard oak, American sycamore.
					Green ash	80	
					Sweetgum	90	
					Cherrybark oak	90	
					Water oak	90	
					Willow oak	90	
Calhoun:							
Ca	3w9	Slight	Severe	Moderate	Loblolly pine	84	Loblolly pine.
					Shortleaf pine	---	
					Sweetgum	---	
Calloway:							
Cb	2w8	Slight	Moderate	Slight	Cherrybark oak	90	Cherrybark oak, Shumard oak, sweetgum, water oak, yellow-poplar.
					Loblolly pine	90	
					Shortleaf pine	80	
					Sweetgum	90	
					Water oak	90	
Commerce:							
[1]CF	1w5	Slight	Moderate	Slight	Green ash	80	Eastern cottonwood, American sycamore.
					Eastern cottonwood	120	
					Nuttall oak	90	
					Water oak	110	
					Pecan	---	
					American sycamore	---	
Crowley:							
Cr	3w9	Slight	Severe	Moderate	Loblolly pine	83	Loblolly pine.
					Shortleaf pine	---	
Dubbs:							
DbA, DbB	2o4	Slight	Slight	Slight	Cherrybark oak	100	Eastern cottonwood, green ash, Nuttall oak, sweetgum, American sycamore, yellow-poplar.
					Eastern cottonwood	100	
					Green ash	80	
					Nuttall oak	95	
					Shumard oak	100	
					Sweetgum	95	
					Water oak	90	
					Willow oak	95	
Dundee:							
DeA, DeB	2w5	Slight	Moderate	Slight	Cherrybark oak	105	Cherrybark oak, eastern cottonwood, sweetgum, water oak, yellow-poplar.
					Eastern cottonwood	100	
					Sweetgum	100	
					Water oak	95	
Foley:							
[1]Fo:							
Foley and Calhoun parts.	3w9	Slight	Severe	Moderate	Sweetgum	80	Sweetgum, American sycamore, loblolly pine.
					Cherrybark oak	80	
					Water oak	80	
					Loblolly pine	60	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Important trees	Site index	
Fo:							
Bonn part	5t0	Slight	Severe	Severe	Eastern redcedar	---	Eastern redcedar.
Gore:							
Ge	3c8	Slight	Moderate	Moderate	Loblolly pine	76	Loblolly pine.
					Shortleaf pine	---	
Grenada:							
GrA, GrB, GrC	3o7	Slight	Slight	Slight	Cherrybark oak	85	Cherrybark oak,
					Southern red oak	80	Shumard oak,
					Loblolly pine	85	water oak,
					Shortleaf pine	75	loblolly pine,
					Sweetgum	80	white oak,
							shortleaf pine,
							slash pine,
							sweetgum.
Grubbs:							
Gs	3w9	Slight	Moderate	Moderate	Cherrybark oak	80	Sweetgum,
					Willow oak	80	Nuttall oak,
					Sweetgum	80	green ash,
							American sycamore.
Jackport:							
Jc	2w6	Slight	Severe	Moderate	Green ash	80	Green ash,
					Cherrybark oak	90	eastern cottonwood,
					Water oak	90	Nuttall oak,
					Willow oak	90	willow oak,
					Sweetgum	90	sweetgum,
							American sycamore.
Lafe:							
[1]Lf:							
Lafe part	5t0	Slight	Severe	Severe	Eastern redcedar	---	Eastern redcedar.
Bonn part	5t0	Slight	Severe	Severe	Eastern redcedar	---	Eastern redcedar.
Loring:							
LoC, LoD	3o7	Slight	Slight	Slight	Cherrybark oak	86	Loblolly pine,
					Sweetgum	90	yellow-poplar,
					Southern red oak	74	southern red oak.
					Loblolly pine	85	
					Water oak	82	
McCrory:							
Ma	3w6	Slight	Severe	Moderate	Sweetgum	85	Sweetgum,
					Water oak	80	American sycamore.
Memphis:							
MeA, MeB, MeC	2o7	Slight	Slight	Slight	Cherrybark oak	90	Cherrybark oak,
					Loblolly pine	90	loblolly pine,
					Sweetgum	90	sweetgum,
					Water oak	90	yellow-poplar.
Mhoon:							
[1]MF	1w6	Slight	Severe	Moderate	Green ash	90	Eastern cottonwood,
					Eastern cottonwood	110	American sycamore.
					Water oak	---	
					Cherrybark oak	---	
					Sweetgum	100	
					American sycamore	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant
Sharkey:							
Sa	2w6	Slight	Severe	Moderate	Green ash	85	Eastern cottonwood, American sycamore, sweetgum.
					Eastern cottonwood	100	
					Cherrybark oak	90	
					Sweetgum	90	
					Water oak		
[1]SF	3w6	Slight	Severe	Severe	Green ash	80	Eastern cottonwood, sweetgum.
					Eastern cottonwood	80	
Stuttgart:							
StA	3w7	Slight	Moderate	Slight	Loblolly pine	80	Loblolly pine, cherrybark oak, Shumard oak, sweetgum, willow oak, southern red oak.
					Shortleaf pine	70	
					Cherrybark oak	70	
					Sweetgum	80	
StB	3o7	Slight	Slight	Slight	Loblolly pine	80	Loblolly pine, cherrybark oak, Shumard oak, sweetgum, willow oak, southern red oak.
					Shortleaf pine	70	
					Cherrybark oak	70	
					Sweetgum	80	
Tichnor:							
[1]Tf	1w6	Slight	Severe	Moderate	Eastern cottonwood	105	Eastern cottonwood, Nuttall oak, cherrybark oak, sweetgum, American sycamore, green ash, water oak.
					Nuttall oak	100	
					Cherrybark oak	90	
					Sweetgum	100	

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 7.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Amagon:										
Am	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Bosket:										
BkA, BkB	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Calhoun:										
Ca	Fair	Fair	Fair	Good	---	Good	Good	Fair	Fair	Good.
Calloway:										
Cb	Fair	Good	Good	Good	---	Fair	Fair	Good	Good	Fair.
Commerce:										
[1]CF	Poor	Fair	Fair	Good	---	Fair	Fair	Fair	Good	Fair.
Crowley:										
Cr	Fair	Fair	Fair	Fair	---	Good	Good	Fair	Fair	Good.
Dubbs:										
DbA, DbB	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
Dundee:										
DeA, DeB	Fair	Good	Good	Good	---	Fair	Fair	Good	Good	Fair.
Foley:										
[1]Fo:										
Foley part	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Calhoun part	Poor	Fair	Fair	Good	---	Good	Good	Fair	Fair	Good.
Bonn part	Poor	Poor	Poor	Poor	---	Poor	Good	Poor	Poor	Fair.
Gore:										
Ge	Poor	Good	Good	---	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Grenada:										
GrA, GrB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GrC	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Grubbs:										
Gs	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Jackport:										
Jc	Fair	Fair	Fair	Fair	---	Good	Good	Fair	Fair	Good.
Lafe:										
[1]Lt:										
Lafe part	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Good	Very poor.	Poor	Fair.
Bonn part	Poor	Poor	Poor	Poor	---	Poor	Good	Poor	Poor	Fair.
Loring:										
LoC, LoD	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnotes at end of table.

TABLE 7.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
McCrory:										
Ma	Fair	Fair	Fair	Fair	---	Good	Fair	Fair	Fair	Fair.
Memphis:										
MeA, MeB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MeC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Mhoon:										
[1]MF	Poor	Fair	Fair	Fair	---	Good	Good	Poor	Good	Good.
Sharkey:										
Sa	Fair	Fair	Fair	Good	---	Good	Good	Fair	Good	Good.
[1]SF	Poor	Fair	Fair	Good	---	Fair	Fair	Poor	Fair	Fair.
Stuttgart:										
StA	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
StB	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
Tichnor:										
[1]Tf	Poor	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 8.--BUILDING SITE DEVELOPMENT

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe."]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Amagon: Am	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength.
Bosket: BkA, BkB	Slight	Slight	Slight	Slight	Moderate: low strength.
Calhoun: Ca	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Calloway: Cb	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, corrosive.	Moderate: wetness, shrink-swell.
Commerce: [1]CF	Severe: floods, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Severe: floods.
Crowley: Cr	Severe: wetness, too clayey.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: low strength, shrink-swell.
Dubbs: DbA, DbB	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.
Dundee: DeA, DeB	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Moderate: wetness, shrink-swell.
Foley: [1]Fo:					
Foley part	Severe: wetness.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strensth.
Calhoun part	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Bonn part	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Gore: Ge	Severe: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.
Grenada: GrA, GrB, GrC	Moderate: wetness.	Moderate: wetness, low strength.	Moderate: wetness, low strength.	Moderate: corrosive, wetness, low strength.	Moderate: low strength, wetness.

See footnotes at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Grubbs:					
Gs	Severe: too clayey, wetness.	Severe: shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: shrink-swell, low strength.
Jackport:					
Jc	Severe: wetness, too clayey.	Severe: wetness, low strength, shrink-swell.	Severe: wetness, low strength, shrink-swell.	Severe: wetness, low strength, shrink-swell.	Severe: wetness, low strength, shrink-swell.
Lafe:					
[1]Lf:					
Lafe part	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.
Bonn part	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Loring:					
LoC	Moderate: low strength, wetness.	Moderate: low strength.	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.
LoD	Moderate: slope, wetness, low strength.	Moderate: slope, low strength.	Moderate: slope, low strength.	Severe: slope.	Moderate: slope, low strength.
McCrory:					
Ma	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Memphis:					
MeA, MeB	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
MeC	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength, slope.	Moderate: low strength.
Mhoon:					
[1]MF	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, low strength, floods.
Sharkey:					
Sa	Severe: wetness, too clayey.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.
[1]SF	Severe: floods, wetness, too clayey.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell	Severe: floods, wetness, shrink-swell.

See footnotes at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Stuttgart: StA, StB	Moderate: wetness, too clayey.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength.
Tichnor: [1]Tf	Severe: floods, wetness.	Severe: floods, low strength, wetness.	Severe: floods, low strength, wetness.	Severe: floods, low strength, wetness.	Severe: floods, low strength, wetness.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 9.--SANITARY FACILITIES

["Percs slowly" and some of the other terms that describe restrictive soil features are defined in the Glossary. Absence of an entry means soil was not rated.]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Amagon:					
Am	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Bosket:					
BkA, BkB	Slight	Moderate[2]: slope, percs rapidly.	Severe[2]: seepage.	Slight	Good.
Calhoun:					
Ca	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Calloway:					
Cb	Severe: percs slowly, wetness.	Slight	Moderate: wetness, percs slowly.	Moderate: wetness.	Good.
Commerce:					
[1]CF	Severe: floods, percs slowly, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Moderate: too clayey.	Fair: too clayey.
Crowley:					
Cr	Severe: percs slowly, wetness.	Slight	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
Dubbs:					
DbA, DbB	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Fair: too clayey.
Dundee:					
DeA, DeB	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
Foley:					
[1]Fo:					
Foley part	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Calhoun part	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Bonn part	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Gore:					
Ge	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Grenada:					
GrA	Severe: percs slowly.	Slight	Moderate: wetness, percs slowly.	Moderate: wetness.	Good.
GrB, GrC	Severe: percs slowly.	Moderate: slope.	Moderate: wetness.	Moderate: wetness.	Good.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Grubbs:					
Gs	Severe: percs slowly, wetness.	Slight	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
Jackport:					
Jc	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.
Lafe:					
[1]Lf:					
Lafe part	Severe: percs slowly, wetness.	Slight	Moderate: too clayey, wetness.	Moderate: wetness.	Poor: hard to pack, thin layer.
Bonn part	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Loring:					
LoC	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
LoD	Severe: percs slowly.	Severe: slope.	Slight	Moderate: slope.	Fair: slope.
McCrory:					
Ma	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Memphis:					
MeA	Slight	Moderate: seepage.	Slight	Slight	Fair: too clayey.
MeB, MeC	Slight	Moderate: seepage, slope.	Slight	Slight	Fair: too clayey.
Mhoon:					
[1]MF	Severe: percs slowly, wetness, floods.	Severe: wetness, floods.	Severe: floods, wetness.	Severe: wetness, floods.	Poor: wetness.
Sharkey:					
Sa	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, wetness.
[1]SF	Severe: floods, wetness, percs slowly.	Severe: floods.	Severe: floods. wetness, too clayey.	Severe: floods. wetness.	Poor: too clayey, wetness.
Stuttgart:					
StA	Severe: percs slowly, wetness.	Slight	Moderate: too clayey, wetness.	Moderate: wetness.	Poor: too clayey.
StB	Severe: percs slowly, wetness.	Moderate: slope.	Moderate: too clayey, wetness.	Moderate: wetness.	Poor: too clayey.
Tichnor:					
[1]Tt	Severe: floods, percs slowly, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.
[2]Hazard of aquifer pollution.

TABLE 10.--CONSTRUCTION MATERIALS

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor".]

Soil name and map symbol	Road fill	Sand	Gravel	Topsoil
Amagon:				
Am	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Bosket:				
BkA, BkB	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Good.
Calhoun:				
Ca	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Calloway:				
Cb	Fair: wetness, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Commerce:				
[1]CF	Fair: low strength, shrink-swell, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Crowley:				
Cr	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, wetness.
Dubbs:				
DbA, DbB	Fair: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
Dundee:				
DeA, DeB	Fair: wetness, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Foley:				
[1]Fo:				
Foley part	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, area reclaim.
Calhoun part	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Bonn part	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, excess alkali.
Gore:				
Ge	Poor: low strength, shrink-swell	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
Grenada:				
GrA, GrB, GrC	Fair: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Grubbs:				
Gs	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.

See footnotes at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Road fill	Sand	Gravel	Topsoil
Jackport:				
Jc	Poor: wetness, low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, too clayey.
Lafe:				
[1]Lf:				
Lafe part	Poor: area reclaim, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: area reclaim, excess alkali, thin layer.
Bonn part	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, excess alkali.
Loring:				
LoC, LoD	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
McCrory:				
Ma	Poor: wetness.	Poor: excess fines.	Unsuited: excess fines.	Poor: wetness.
Memphis:				
MeA, MeB, MeC	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Mhoon:				
[1]MF	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Sharkey:				
Sa, [1]SF	Poor: too clayey, shrink-swell, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, too clayey.
Stuttgart:				
StA, StB	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: area reclaim.
Tichnor:				
[1]Tt	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 11.--WATER MANAGEMENT

["Seepage" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe."]

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Amagon:							
Am	Slight	Moderate: unstable fill, compressible, low strength.	Severe: no water.	Percs slowly, wetness.	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Bosket:							
BkA	Severe: seepage.	Moderate: piping, unstable fill.	Severe: no water.	Not needed	Favorable	Favorable	Favorable.
BkB	Severe: seepage.	Moderate: piping, unstable fill.	Severe: no water.	Not needed	Complex slope, erodes easily, slope.	Erodes easily, slope.	Erodes easily, slope.
Calhoun:							
Ca	Slight	Moderate: piping, erodes easily, low strength.	Severe: no water.	Percs slowly, cutbanks cave.	Wetness, percs slowly.	Not needed	Wetness.
Calloway:							
Cb	Slight	Moderate: piping, compressible, low strength.	Severe: deep to water.	Cutbanks cave, percs slowly.	Percs slowly.	Percs slowly.	Percs slowly.
Commerce:							
[1]CF	Moderate: seepage.	Slight	Severe: no water.	Floods	Slow intake	Not needed	Favorable.
Crowley:							
Cr	Slight	Moderate: compressible, low strength.	Severe: no water.	Percs slowly	Slow intake, percs slowly.	Not needed	Favorable.
Dubbs:							
DbA, DbB	Moderate: seepage.	Moderate: compressible, piping, unstable fill.	Severe: no water.	Not needed	Slow intake	Slope, erodes easily.	Favorable.
Dundee:							
DeA	Moderate: seepage.	Moderate: seepage, compressible, piping.	Severe: deep to water.	Favorable	Wetness, slow intake.	Not needed	Wetness, percs slowly.
DeB	Moderate: seepage.	Moderate: seepage, compressible, piping.	Severe: deep to water.	Favorable	Wetness, slow intake, slope.	Not needed	Wetness, percs slowly.

See footnotes at end of table.

Foley:							
[1]Fo:							
Foley part	Slight	Moderate: unstable fill, compressible, low strength.	Severe: no water.	Wetness, percs slowly.	Wetness, slow intake.	Wetness	Wetness.
Calhoun part	Slight	Moderate: piping, erodes easily, low strength.	Severe: no water	Percs slowly, cutbanks cave.	Wetness, percs slowly.	Not needed	Wetness.
Bonn part	Slight	Moderate: piping, erodes easily.	Severe: no water.	Cutbanks cave, excess alkali, percs slowly.	Droughty, excess alkali, wetness.	Not needed	Droughty, erodes easily, excess alkali.
Gore:							
Ge	Slight	Moderate: low strength, shrink-swell.	Severe: no water.	Not needed	Slope, percs slowly, erodes easily.	Erodes easily, percs slowly, slope.	Slope.
Grenada:							
GrA	Slight	Moderate: piping, low strength.	Severe: deep to water.	Slope	Slow intake	Not needed	Favorable.
GrB, GrC	Slight	Moderate: piping, low strength.	Severe: deep to water.	Not needed	Slow intake, erodes easily.	Favorable	Favorable.
Grubbs:							
Gs	Slight	Moderate: unstable fill, piping, compressible.	Severe: no water.	Percs slowly, wetness.	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Jackport:							
Jc	Slight	Moderate: unstable fill, compressible, low strength.	Severe: no water.	Wetness, percs slowly.	Slow intake, wetness.	Wetness	Wetness.
Lafe:							
[1]Lf:							
Lafe part	Slight	Moderate: compressible, low strength, piping.	Severe: no water.	Cutbanks cave, excess alkali, percs slowly.	Droughty, excess alkali, slow intake.	Percs slowly, wetness.	Excess alkali, percs slowly, wetness.
Bonn part	Slight	Moderate: piping, erodes easily.	Severe: no water.	Cutbanks cave, excess alkali, percs slowly.	Droughty, excess alkali, wetness.	Not needed	Droughty, erodes easily, excess alkali.
Loring:							
LoC, LoD	Moderate: seepage.	Moderate: piping, low strength.	Severe: no water.	Not needed	Rooting depth, erodes easily, slope.	Erodes easily, slope.	Rooting depth, erodes easily, slope.

See footnotes at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
McCrory:							
Ma	Moderate: seepage.	Moderate: unstable fill, seepage, piping.	Severe: no water.	Wetness, percs slowly.	Wetness	Wetness	Wetness.
Memphis:							
MeA, MeB, MeC	Moderate: seepage.	Moderate: piping, compressible, erodes easily.	Severe: deep to water.	Not needed	Erodes easily, slope.	Erodes easily, slope, piping.	Erodes easily, slope.
Mhoon:							
[1]MF	Slight	Slight	Severe: no water.	Percs slowly, floods.	Floods, slow intake, wetness.	Not needed	Wetness.
Sharkey:							
Sa	Slight	Moderate: low strength, compressible, shrink-swell.	Severe: no water.	Percs slowly.	Percs slowly, slow intake, wetness.	Not needed	Wetness.
[1]SF	Slight	Moderate: low strength, compressible, shrink-swell.	Severe: no water.	Percs slowly, floods.	Percs slowly, slow intake, wetness.	Not needed	Wetness.
Stuttgart:							
StA	Slight	Moderate: unstable fill, compressible, piping.	Severe: no water.	Wetness, percs slowly.	Slow intake	Favorable	Favorable.
StB	Slight	Moderate: unstable fill, compressible, piping.	Severe: no water.	Not needed	Slope, slow intake, erodes easily.	Favorable	Favorable.
Tichnor:							
[1]Tr	Slight	Moderate: compressible, low strength, piping.	Severe: no water.	Floods, percs slowly, wetness.	Slow intake, wetness, floods.	Wetness	Wetness.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 12.--RECREATIONAL DEVELOPMENT

["Percs slowly" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe"]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Amagon:				
Am	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Bosket:				
BkA, BkB	Slight	Slight	Slight	Slight.
Calhoun:				
Ca	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Calloway:				
Cb	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, percs slowly.	Moderate: wetness.
Commerce:				
[1]CF	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Crowley:				
Cr	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.
Dubbs:				
DbA	Slight	Slight	Slight	Slight.
DbB	Slight	Slight	Moderate: slope.	Slight.
Dundee:				
DeA	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, percs slowly.	Moderate: wetness.
DeB	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, percs slowly, slope.	Moderate: wetness.
Foley:				
[1]Fo:				
Foley part	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.
Calhoun part	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Bonn part	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.
Gore:				
Ge	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight.
Grenada:				
GrA, GrB, GrC	Moderate: percs slowly, wetness.	Moderate: wetness.	Moderate: percs slowly, wetness.	Slight.

See footnotes at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Grubbs:				
Gs	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, percs slowly.	Moderate: wetness.
Jackport:				
Jc	Severe: wetness, percs slowly, too clayey.	Severe: wetness, too clayey.	Severe: wetness, percs slowly, too clayey.	Severe: wetness, too clayey.
Lafe:				
[1]Lf:				
Lafe part	Severe: dusty, percs slowly, wetness.	Moderate: dusty, wetness.	Severe: dusty, percs slowly, wetness.	Moderate: dusty, wetness.
Bonn part	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.
Loring:				
LoC	Slight	Slight	Moderate: slope.	Slight.
LoD	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
McCrory:				
Ma	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Memphis:				
MeA	Slight	Slight	Slight	Slight.
MeB, MeC	Slight	Slight	Moderate: slope.	Slight.
Mhoon:				
[1]MF	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: tloods, wetness.
Sharkey:				
Sa, [1]SF	Severe: floods, too clayey, percs slowly.	Severe: floods, too clayey, wetness.	Severe: floods, too clayey, percs slowly.	Severe: floods, too clayey, wetness.
Stuttgart:				
StA, StB	Severe: percs slowly.	Moderate: wetness.	Severe: percs slowly.	Moderate: wetness.
Tichnor:				
[1]Tf	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
Amagon:											
Am	0-10	Silt loam	ML, CL, CL-ML	A-4	0	-	100	85-100	85-100	<30	NP-10
	10-25	Silt loam	CL, CL-ML	A-4, A-6	0	-	100	85-100	85-100	25-40	7-18
	25-52	Silty clay loam	CL	A-6, A-7	0	-	100	85-100	85-100	30-45	11-22
	52-72	Silt loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	-	100	80-100	60-100	20-45	1-22
Bosket:											
BkA, BkB	0-13	Fine sandy loam	SM	A-2, A-4	0	100	100	75-100	25-45	<20	NP-3
	13-38	Sandy clay loam	SC, CL	A-4,	0	100	100	85-100	40-70	30-40	8-17
	38-72	Fine sandy loam	SM	A-2, A-4	0	100	100	75-100	25-45	<20	NP-3
Calhoun:											
Ca	0-12	Silt loam	CL-ML, ML, CL	A-4	0	100	100	100	95-100	<31	NP-10
	12-49	Silty clay loam	CL	A-6	0	100	100	100	95-100	32-40	12-18
	49-72	Silt loam	CL, CL-ML	A-6, A-4	0	100	100	100	95-100	26-35	5-15
Calloway:											
Cb	0-25	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	100	90-100	25-35	5-15
	25-40	Silty clay loam	CL	A-6	0	100	100	100	90-95	30-40	12-20
	40-72	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	100	90-100	25-35	5-15
Commerce:											
[1]CF	0-6	Silty clay loam	CL	A-6, A-7	0	100	100	100	90-100	32-45	11-25
	6-33	Silty clay loam	CL	A-6, A-7	0	100	100	100	85-100	32-45	11-23
	33-72	Silty clay loam	CL-ML, CL	A-4, A-6	0	100	100	100	75-100	23-40	5-23
Crowley:											
Cr	0-21	Silt loam	ML, CL-ML, CL	A-4	0	100	100	95-100	80-100	<30	NP-10
	21-28	Silty clay	CH, CL	A-7	0	100	100	95-100	85-100	41-60	20-35
	28-72	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	85-100	38-50	18-30
Dubbs:											
DbA, DbB	0-10	Silt loam	CL-ML, CL	A-4	0	100	100	100	85-100	20-30	5-10
	10-47	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	95-100	85-100	25-45	11-25
	47-72	Loamy fine sand, fine sand.	ML, SM	A-4, A-2	0	100	100	60-85	25-55	<25	NP-3

See footnotes at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Dundee:											
DeA, DeB	0-10	Silt loam	CL, ML, CL-ML	A-4, A-6	0	100	100	90-100	75-98	20-35	4-11
	10-27	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	70-95	28-44	12-22
	27-40	Sandy clay loam	CL, ML, CL-ML	A-4	0	100	100	85-100	60-90	<30	NP-8
	40-72	Loamy fine sand, silt loam, loam	SM, ML	A-4, A-2	0	100	100	60-95	25-75	<30	NP-3
Foley:											
[1]Fo:											
Foley part	0-15	Silt loam	CL, CL-ML	A-4, A-5, A-6, A-7	0	100	100	95-100	70-100	25-45	5-20
	15-21	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	90-100	30-49	11-25
	21-40	Silty clay loam	CL, CH	A-6, A-7	0	100	100	95-100	90-100	40-60	18-32
	40-72	Fine sandy loam	SM, ML	A-4, A-2	0	100	100	80-90	30-55	<20	NP-3
Calhoun part	0-12	Silt loam	CL-ML, ML, CL	A-4	0	100	100	100	95-100	<31	NP-10
	12-49	Silty clay loam	CL	A-6	0	100	100	100	95-100	32-40	12-18
	49-72	Silt loam	CL, CL-ML	A-6, A-4	0	100	100	100	95-100	26-35	5-15
Bonn part	0-10	Silt loam	ML, CL-ML	A-4	0	100	100	95-100	75-100	20-30	2-7
	10-16	Silt loam	ML, CL-ML	A-4	0	100	100	95-100	75-100	20-30	2-7
	16-55	Silty clay loam	CL	A-6, A-4	0	100	95-100	90-100	75-100	28-38	8-18
	55-72	Silt loam	ML, CL-ML	A-4	0	100	100	95-100	75-100	20-30	2-7
Gore:											
Ge	0-3	Silt loam	ML, CL-ML	A-4	0	100	100	95-100	80-100	<27	NP-7
	3-50	Clay, silty clay	CH	A-7	0	100	100	95-100	90-100	53-65	28-40
	50-72	Clay	CH	A-7	0	100	100	95-100	90-100	50-75	25-45
Grenada:											
GrA, GrB, GrC	0-5	Silt loam	ML,	A-4	0	100	100	100	90-100	27-31	4-6
	5-19	Silty clay loam	CL	A-6	0	100	100	100	90-100	35-40	13-15
	19-22	Silt loam	CL-ML, CL	A-4	0	100	100	100	90-100	20-30	5-10
	22-58	Silt loam, silty clay loam.	CL	A-6	0	100	100	100	90-100	32-40	11-18
	58-72	Silt loam	CL, CL-ML.	A-6, A-4	0	100	100	100	90-100	20-32	5-12
Grubbs:											
Gs	0-12	Silt loam	ML, CL, CL-ML	A-4	0	-	100	90-100	85-100	<30	NP-10
	12-38	Silty clay, clay	CH	A-7	0	-	100	95-100	90-100	55-70	30-45
	38-72	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0	-	100	95-100	90-100	20-45	5-25
Jackport:											
Jc	0-6	Silty clay loam	CL, CH	A-6, A-7	0	100	100	95-100	85-100	30-55	12-30
	6-50	Clay	CH	A-7	0	100	100	95-100	90-100	51-85	25-55
	50-72	Silty clay	CH	A-7	0	100	100	95-100	90-100	65-85	35-55

See footnotes at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Lafe:											
[1]Lf:											
Lafe part	0-8	Silt loam	ML, CL, CL-ML	A-4	0	100	100	95-100	90-100	<30	NP-10
	8-36	Silty clay loam	CL	A-4, A-6, A-7	0	100	100	95-100	90-100	25-45	8-25
	36-62	Silt loam, silty clay loam, silty clay.	ML, CL, CH	A-4, A-6, A-7	0	100	100	90-100	75-100	20-65	1-35
Bonn part	0-10	Silt loam	ML, CL-ML	A-4	0	100	100	95-100	75-100	20-30	2-7
	10-16	Silt loam	ML, CL-ML	A-4	0	100	100	95-100	75-100	20-30	2-7
	16-55	Silty clay loam	CL	A-6, A-4	0	100	95-100	90-100	75-100	28-38	8-18
	55-72	Silt loam	CL	A-6, A-4	0	100	100	95-100	90-100	26-36	8-18
Loring:											
LoC, LoD	0-12	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	20-35	4-15
	12-26	Silty clay loam	CL	A-6,	0	100	100	95-100	90-100	30-40	12-25
	26-43	Silt loam	CL,	A-4, A-6,	0	100	100	95-100	90-100	30-40	8-18
	43-72	Silt loam	CL, CL-ML, ML	A-4, A-6	0	100	100	95-100	90-100	25-40	6-15
McCrory:											
Ma	0-18	Fine sandy loam	SM, ML	A-4	0	100	100	70-95	40-65	<25	NP-3
	18-29	Sandy clay loam	SM, SC, ML, CL	A-4	0	100	100	70-95	40-85	<30	NP-10
	29-44	Sandy clay loam	SM, SC, ML, CL	A-4	0	100	100	70-95	40-85	<30	NP-10
	44-72	Loamy fine sand	SM, ML	A-4, A-2	0	100	100	60-95	25-75	<30	NP-3
Memphis:											
MeA, MeB, MeC	0-6	Silt loam	ML, CL, CL-ML	A-4	0	100	100	100	90-100	<30	NP-10
	6-34	Silty clay loam	CL	A-6, A-7	0	100	100	100	90-100	35-48	15-25
	34-72	Silt loam	ML, CL	A-4, A-6	0	100	100	100	90-100	30-40	6-15
Mhoon:											
[1]MF	0-18	Silt loam, silty clay loam	ML, CL, CL-ML	A-4	0	100	100	100	95-100	22-30	3-10
	18-60	Silt loam, clay loam.	CL,	A-6, A-7	0	100	100	95-100	90-100	30-48	11-25
	60-72	Fine sandy loam	SM, ML	A-4	0	100	100	70-95	40-65	<25	NP-3
Sharkey:											
Sa	0-7	Silty clay	CH, CL	A-7	0	100	100	100	95-100	46-85	22-50
	7-45	Clay	CH	A-7	0	100	100	100	95-100	56-85	30-50
	45-72	Silty clay	CL, CH	A-7	0	100	100	100	95-100	50-85	25-50

See footnotes at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Sharkey:											
[1]SF	0-7	Silty clay loam	CL, CH	A-6, A-7	0	100	100	100	95-100	32-60	11-30
	7-45	Clay	CH	A-7	0	100	100	100	95-100	56-85	30-50
	45-72	Clay, silty clay	CH, CL	A-7,	0	100	100	100	95-100	50-85	25-50
Stuttgart:											
StA, StB	0-22	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	95-100	95-100	20-35	5-15
	22-31	Silty clay loam	CL, CH	A-7	0	100	100	95-100	95-100	41-65	20-40
	31-43	Silty clay loam	CL	A-4, A-6	0	100	100	95-100	95-100	25-40	8-20
	43-72	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	95-100	95-100	20-35	5-15
Tichnor:											
[1]Tf	0-28	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	<35	NP-15
	28-72	Silty clay loam	CL	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	10-25

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[Dashes indicate data were not available. The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Amagon:									
Am	0-10	0.6-2.0	0.16-0.24	4.5-6.0	Low	High	High	---	---
	10-25	0.2-0.6	0.16-0.24	4.5-6.0	Low	High	High	---	
	25-52	0.06-0.2	0.18-0.22	4.5-6.0	Moderate	High	High	---	
	52-72	0.06-0.6	0.16-0.24	5.1-6.5	Low	High	High	---	
Bosket:									
BkA, BkB	0-13	2.0-6.0	0.11-0.15	5.1-6.5	Low	Low	Moderate	0.24	4
	13-38	0.6-2.0	0.12-0.17	5.1-6.5	Low	Low	Moderate	---	
	38-72	2.0-6.0	0.11-0.15	5.1-6.5	Low	Low	Moderate	---	
Calhoun:									
Ca	0-12	0.2-0.6	0.20-0.24	4.5-6.0	Low	High	Moderate	---	---
	12-49	0.06-0.2	0.18-0.22	4.5-5.5	Low	High	Moderate	---	
	49-72	0.2-0.6	0.20-0.24	4.5-6.0	Low	High	Moderate	---	
Calloway:									
Cb	0-25	0.6-2.0	0.20-0.23	4.5-6.0	Low	High	Moderate	0.43	3
	25-40	0.06-0.2	0.09-0.12	4.5-6.0	Moderate	High	Moderate	0.43	
	40-72	0.06-0.2	0.09-0.12	5.1-7.3	Low	High	Moderate	0.43	
Commerce:									
[1]CF	0-6	0.2-0.6	0.18-0.22	5.6-7.3	Moderate	High	Low	0.32	5
	6-33	0.2-0.6	0.18-0.22	5.6-7.3	Moderate	High	Low	0.32	
	33-72	0.2-2.0	0.18-0.22	6.6-7.8	Low	High	Low	0.37	
Crowley:									
Cr	0-21	0.2-0.6	0.20-0.24	4.5-6.5	Low	High	Moderate	0.43	4
	21-28	<0.06	0.14-0.18	4.5-6.5	High	High	Moderate	0.32	
	28-72	0.06-0.2	0.18-0.22	5.6-8.4	Moderate	High	Moderate	0.32	
Dubbs:									
DbA, DbB	0-10	0.6-2.0	0.20-0.24	4.5-7.3	Low	Moderate	Moderate	0.37	5
	10-47	0.6-2.0	0.18-0.22	5.1-7.3	Moderate	Moderate	Moderate	0.37	
	47-72	2.0-6.0	0.07-0.11	5.1-6.0	Low	Moderate	Moderate	0.37	
Dundee:									
DeA, DeB	0-10	0.6-2.0	0.16-0.24	4.5-6.0	Low	High	Moderate	0.37	---
	10-27	0.2-0.6	0.18-0.22	4.5-5.5	Moderate	High	Moderate	0.37	
	27-40	0.6-2.0	0.12-0.17	4.5-5.5	Low	High	Moderate	0.37	
	40-72	<0.06	0.14-0.18	4.5-7.3	High	High	Moderate	---	
Foley:									
[1]Fo:									
Foley part	0-15	0.6-2.0	0.18-0.24	4.5-6.0	Low	High	Moderate	---	---
	15-21	0.2-06	0.18-0.22	5.1-6.0	Moderate	High	Low	---	
	21-40	<0.06	0.10-0.14	6.6-9.0	Moderate	High	Low	---	
	40-72	<0.06	0.10-0.14	6.6-9.0	Low	High	Low	---	
Calhoun part	0-12	0.2-0.6	0.20-0.24	4.5-6.0	Low	High	Moderate	---	---
	12-49	0.06-0.2	0.18-0.22	4.5-5.5	Low	High	Moderate	---	
	49-72	0.2-0.6	0.20-0.24	4.5-6.0	Low	High	Moderate	---	
Bonn part	0-10	0.2-0.6	0.15-0.23	4.5-7.3	Low	High	Low	0.49	3
	10-16	<0.06	0.08-0.14	6.6-9.0	Low	High	Low	0.49	
	16-55	<0.06	0.08-0.14	6.6-9.0	Low	High	Low	0.49	
	55-72	<0.2	0.08-0.14	7.9-9.0	Low	High	Low	0.49	
Gore:									
Ge	0-3	0.6-2.0	0.20-0.22	4.5-5.5	Low	Moderate	Low	0.43	3
	3-50	<0.06	0.14-0.18	5.1-7.3	Very high	High	Low	0.32	
	50-72	<0.06	0.14-0.18	6.6-9.0	Very high	High	Low	0.32	

See footnotes at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Grenada:									
GrA, GrB, GrC-----	0-5	0.6-2.0	0.20-0.23	5.1-6.0	Low-------	Moderate-----	Moderate-----	0.43	3
	5-19	0.6-2.0	0.20-0.23	4.5-6.0	Low-------	Moderate-----	Moderate-----	0.43	
	19-22	0.6-2.0	0.20-0.23	4.5-6.0	Low-------	Moderate-----	Moderate-----	0.43	
	22-58	0.06-0.2	0.10-0.12	4.5-6.0	Low-------	Moderate-----	Moderate-----	0.43	
	58-72	0.06-0.2	0.10-0.12	4.5-6.0	Low-------	Moderate-----	Moderate-----	0.43	
Grubbs:									
Gs----------	0-12	0.2-0.6	0.16-0.24	5.1-6.0	Low-------	High----------	Moderate-----	---	---
	12-38	<0.06	0.14-0.18	5.1-6.5	High------	High----------	Moderate-----	---	
	38-72	0.06-0.2	0.13-0.17	5.6-8.4	Moderate--	High----------	Low----------	---	
Jackport:									
Jc----------	0-6	0.2-0.6	0.18-0.22	5.1-5.5	Moderate--	High----------	High----------	---	---
	6-50	<0.06	0.12-0.18	4.5-5.5	High------	High----------	High----------	---	
	50-72	<0.06	0.12-0.18	4.5-7.8	High------	High----------	High----------	---	
Lafe:									
[1]Lf:									
Lafe part--------	0-8	0.6-2.0	0.13-0.24	5.1-6.5	Low-------	High----------	Moderate-----	---	---
	8-36	<0.06	0.09-0.15	7.4-8.4	Moderate--	High----------	Low----------	---	
	36-60	<0.2	0.02-0.07	7.9-9.0	Moderate--	High----------	Low----------	---	
Bonn part--------	0-10	0.2-0.6	0.15-0.23	4.5-7.3	Low-------	High----------	Low----------	0.49	3
	10-16	<0.06	0.08-0.14	6.6-9.0	Low-------	High----------	Low----------	0.49	
	16-55	<0.06	0.08-0.14	6.6-9.0	Low-------	High----------	Low----------	0.49	
	55-72	<0.2	0.08-0.14	7.9-9.0	Low-------	High----------	Low----------	0.49	
Loring:									
LoC, LoD----------	0-12	0.6-2.0	0.20-0.23	5.1-6.0	Low-------	Moderate-----	Moderate-----	0.37	4
	12-26	0.6-2.0	0.20-0.22	4.5-5.5	Low-------	Moderate-----	Moderate-----	0.32	
	26-43	0.2-0.6	0.06-0.13	4.5-5.5	Low-------	Moderate-----	Moderate-----	0.28	
	43-72	0.6-2.0	0.06-0.13	4.5-5.5	Low-------	Moderate-----	Low----------	0.32	
McCrory:									
Ma----------	0-18	0.6-2.0	0.11-0.15	4.5-5.5	Low-------	High----------	Moderate-----	---	---
	18-29	0.2-0.6	0.11-0.17	4.5-5.5	Low-------	High----------	Moderate-----	---	
	29-44	0.2-0.6	0.05-0.08	6.6-8.4	Low-------	High----------	Low----------	---	
	44-72	0.6-2.0	0.03-0.08	6.6-8.4	Low-------	High----------	Low----------	---	
Memphis:									
MeA, MeB, MeC-----	0-6	0.6-2.0	0.20-0.23	5.6-6.5	Low-------	Low----------	Moderate-----	0.37	5
	6-34	0.6-2.0	0.18-0.22	4.5-6.0	Low-------	Moderate-----	Moderate-----	0.37	
	34-72	0.6-2.0	0.20-0.23	4.5-6.0	Low-------	Low----------	Moderate-----	0.37	
Mhoon:									
[1]MF----------	0-18	0.6-2.0	0.21-0.23	5.6-7.3	Low-------	High----------	Low----------	0.43	5
	18-60	0.06-0.2	0.18-0.22	6.1-7.8	Moderate--	High----------	Low----------	0.37	
	60-72	2.0-6.0	0.10-0.15	7.4-8.4	Low-------	High----------	Low----------	0.37	
Sharkey:									
Sa----------	0-7	<0.06	0.14-0.18	5.1-7.3	Very high	High----------	Low----------	---	---
	7-45	<0.06	0.12-0.18	5.6-8.4	Very high	High----------	Low----------	---	
	45-72	0.06-0.2	0.14-0.18	6.1-8.4	Very high	High----------	Low----------	---	
[1]SF----------	0-7	0.2-0.6	0.18-0.22	5.1-7.3	Moderate--	High----------	Low----------	---	---
	7-45	<0.06	0.12-0.18	5.6-8.4	Very high	High----------	Low----------	---	
	45-72	0.06-0.2	0.14-0.18	6.1-8.4	Very high	High----------	Low----------	---	
Stuttgart:									
StA, StB----------	0-22	0.2-0.6	0.20-0.24	5.1-6.0	Low-------	Moderate-----	Low----------	0.43	3
	22-31	<0.06	0.14-0.18	5.1-6.5	High------	High----------	Low----------	---	
	31-43	<0.06	0.08-0.12	5.1-7.3	Moderate--	High----------	Low----------	---	
	43-72	0.06-0.2	0.08-0.12	5.1-7.3	Low-------	Moderate-----	Low----------	---	
Tichnor:									
[1]Tf----------	0-28	0.6-2.0	0.18-0.24	4.5-5.5	Low-------	High----------	Moderate-----	---	---
	28-72	0.06-0.2	0.16-0.24	4.5-5.5	Moderate--	High----------	Moderate-----	---	

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 15.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. The symbol > means greater than.]

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
Amagon:							
Am	D	None	---	---	1.0-2.0	Perched	Dec-Apr
Bosket:							
BkA, BkB	B	None	---	---	>6.0	---	---
Calhoun:							
Ca	D	None	---	---	0-2.0	Apparent	Dec-Apr
Calloway:							
Cb	C	None	---	---	1.0-2.0	Perched	Dec-Apr
Commerce:							
[1]CF	C	Frequent	Brief to long	Dec-June	1.5-4.0	Apparent	Dec-Apr
Crowley:							
Cr	D	None	---	---	0.5-1.5	Perched	Dec-Apr
Dubbs:							
DbA, DbB	B	None	---	---	>6.0	---	---
Dundee:							
DeA, DeB	C	None	---	---	1.5-3.5	Apparent	Dec-Apr
Foley:							
[1]Fo:							
Foley part	D	None	---	---	0-1.0	Perched	Dec-Apr
Calhoun part	D	None	---	---	0-2.0	Apparent	Dec-Apr
Bonn part	D	None	---	---	0-2.0	Perched	Dec-Apr
Gore:							
Ge	D	None	---	---	>6.0	---	---
Grenada:							
GrA, GrB, GrC	C	None	---	---	2.0-2.5	Perched	Jan-Mar
Grubbs:							
Gs	D	None	---	---	1.5-2.5	Perched	Jan-Apr
Jackport:							
Jc	D	None	---	---	0-1.0	Perched	Dec-Apr
Lafe:							
[1]Lf:							
Lafe part	D	None	---	---	0-1.0	Perched	Dec-Apr
Bonn part	D	None	---	---	0-2.0	Perched	Dec-Apr
Loring:							
LoC, LoD	C	None	---	---	2.0-3.0	Perched	Jan-Apr
McCrory:							
Ma	D	None	---	---	0-1.0	Perched	Dec-Apr
Memphis:							
MeA, MeB, MeC	B	None	---	---	>6.0	---	---
Mhoon:							
[1]MF	D	Frequent	Brief to long	Dec-June	0-3.0	Apparent	Dec-Apr

See footnotes at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
Sharkey: Sa, [1]SF	D	None to frequent.	Brief to very long.	Dec-June	0-2.0	Apparent	Dec-Apr
Stuttgart: StA, StB	D	None	---	---	1.0-2.0	Perched	Dec-Apr
Tichnor: [1]Tf	D	Frequent	Long to very long.	Dec-May	0-1.0	Perched	Dec-May

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 16--PHYSICAL ANALYSES OF SELECTED SOILS

Soil and sample number	Depth	Horizon	Distribution (in percent) of particles less than 2.0 mm in diameter					
			Very coarse sand through medium sand (2.0-0.25 mm)	Fine sand (0.25-0.10 mm)	Very fine sand (0.10-0.05 mm)	Total sand (2.0-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002mm)
	Inches		Pct	Pct	Pct	Pct	Pct	Pct
Commerce silty clay loam: S-71-Ark-48-04-(1-5).	0-6	Ap	3	2	5	10	60	30
	6-16	B21	3	2	4	9	58	33
	16-33	B22	2	2	7	11	55	34
	33-55	C1	1	4	17	22	49	29
	55-72	C2	1	4	10	15	53	32
Dubbs silt loam: S-71-Ark-48-09-(1-7).	0-5	Ap	1	14	14	29	62	9
	5-10	A12	1	15	14	30	62	8
	10-19	B21t	0	8	11	19	55	26
	19-36	B22t	0	4	12	16	54	30
	36-47	B3	0	10	15	25	56	19
	47-62	IIC1	4	50	22	76	17	7
	62-72	IIC2	3	86	7	96	4	0
Grubbs silt loam: S-71-Ark-48-08-(1-8).	0-5	Ap	5	3	3	11	74	15
	5-11	A12	3	3	3	9	76	15
	11-12	A2	4	3	2	9	68	23
	12-22	B21t	1	1	1	3	35	62
	22-38	B22t	1	1	1	3	41	56
	38-54	B31g	1	2	3	6	53	41
	54-67	B32g	2	4	4	10	52	38
	67-72	B33g	1	2	4	7	69	24

TABLE 17--CHEMICAL ANALYSES OF SELECTED SOILS

Soil and sample number	Depth	Horizon	Extractable bases				Extractable acidity	Base saturation	Reaction (1:1 soil-water)	Organic matter	Available phosphorus
			Ca	Mg	Na	K					
	Inches		Meq/100g soil	Meq/100g soil	Meq/100g soil	Meq/100g soil	Meq/100g soil	Percent	pH	Percent	Parts per million
Commerce silty clay loam: S-71-Ark-48-04-(1-5).	0-6	Ap	9.3	2.7	0.2	0.2	6.1	67	6.3	2.3	28
	6-16	B21	12.1	3.4	0.2	0.3	6.7	70	6.3	2.1	17
	16-33	B22	11.0	5.1	0.2	0.3	6.4	72	6.1	0.8	15
	33-55	C1	8.9	5.1	0.3	0.3	3.3	82	6.4	0.6	10
	55-72	C2	9.1	5.3	0.4	0.3	3.7	80	7.3	0.6	11
Dubbs silt loam: S-71-Ark-48-09-(1-7).	0-5	Ap	4.8	0.8	0.1	0.6	2.9	68	7.0	0.9	22
	5-10	A12	5.0	0.8	0.1	0.4	2.6	71	7.2	1.2	25
	10-19	B21t	9.8	2.2	0.3	0.3	4.8	72	7.0	1.1	6
	19-36	B22t	9.3	4.4	0.2	0.4	7.1	67	6.3	0.8	7
	36-47	B3	5.4	4.6	0.2	0.3	6.6	61	5.3	0.6	7
	47-62	IIC1	2.4	2.1	0.1	0.2	3.0	62	5.3	0.5	9
	62-72	IIC2	1.6	0.8	0.2	0.2	1.4	67	5.5	0.3	18
Grubbs silt loam: S-71-Ark-48-08-(1-8).	0-5	Ap	5.9	1.5	0.2	0.6	6.2	57	6.3	1.8	16
	5-11	A12	6.1	1.6	0.4	0.2	4.7	64	6.0	1.8	8
	11-12	A2	2.6	1.2	0.8	0.2	11.0	30	4.7	1.0	8
	12-22	B21t	4.3	5.0	4.5	0.6	28.3	34	4.9	1.5	7
	22-38	B22t	5.7	6.1	6.3	0.7	20.8	47	4.9	1.3	7
	38-54	B31g	7.3	5.7	6.4	0.5	13.2	60	5.5	0.6	58
	54-67	B32g	8.7	7.7	6.3	0.6	8.3	74	5.7	0.5	29
	67-72	B33g	6.9	5.5	4.6	0.4	3.9	82	7.3	0.5	18

TABLE 18.--CLASSIFICATION OF THE SOILS

Soil	Family	Subgroup	Order
Amagon	Fine-silty, mixed, thermic	Typic Ochraqualfs	Alfisols.
Bonn	Fine-silty, mixed, thermic	Glossic Natraqualfs	Alfisols.
Bosket	Fine-loamy, mixed, thermic	Mollic Hapludalfs	Alfisols.
Calhoun	Fine-silty, mixed, thermic	Typic Glossaqualfs	Alfisols.
Calloway	Fine-silty, mixed, thermic	Glossaquic Fragiudalfs	Alfisols.
Commerce	Fine-silty, mixed, nonacid, thermic	Aeric Fluvaquents	Entisols.
Crowley	Fine, montmorillonitic, thermic	Typic Albaqualfs	Alfisols.
Dubbs	Fine-silty, mixed, thermic	Typic Hapludalfs	Alfisols.
Dundee	Fine-silty, mixed, thermic	Aeric Ochraqualfs	Alfisols.
Foley	Fine-silty, mixed, thermic	Albic Glossic Natraqualfs	Alfisols.
Gore	Fine, mixed, thermic	Vertic Paleudalfs	Alfisols.
Grenada	Fine-silty, mixed, thermic	Glossic Fragiudalfs	Alfisols.
Grubbs	Fine, mixed, thermic	Aquic Hapludalfs	Alfisols.
Jackport	Very-fine, montmorillonitic, thermic	Vertic Ochraqualfs	Alfisols.
Lafe	Fine-silty, mixed, thermic	Glossic Natrudalfs	Alfisols.
Loring	Fine-silty, mixed, thermic	Typic Fragiudalfs	Alfisols.
McCrory	Fine-loamy, mixed, thermic	Albic Glossic Natraqualfs	Alfisols.
Memphis	Fine-silty, mixed, thermic	Typic Hapludalfs	Alfisols.
Mhoon	Fine-silty, mixed, nonacid, thermic	Typic Fluvaquents	Entisols.
Sharkey	Very-fine, montmorillonitic, nonacid, thermic	Vertic Haplaquepts	Inceptisols.
Stuttgart	Fine, montmorillonitic, thermic	Typic Natrudalfs	Alfisols.
Tichnor	Fine-silty, mixed, thermic	Typic Ochraqualfs	Alfisols.

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