SOIL SURVEY

Ouachita County, Arkansas

United States Department of Agriculture
Soil Conservation Service
In cooperation with
Arkansas Agricultural Experiment Station

Issued May 1973

Major fieldwork for this soil survey was done in the period 1962–68. Soil names and descriptions were approved in 1969. Unless otherwise indicated, statements in this publication refer to conditions in the county in 1968. 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 Ouachita Conservation District, which includes all of Ouachita County.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, USDA, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms, ranches, and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Ouachita County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the woodland group in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions, from the discussions of the capability units and woodland groups, and from the section "Use of the Soils for Wildlife."

Foresters and others can refer to the section "Use of the Soils for Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Use of the Soils for Wildlife."

Community planners and others can read about soil properties that affect the choice of sites for nonindustrial buildings and for recreation areas in the section "Use of Soils for Town and Country Planning."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of the Soils."

Newcomers in Ouachita County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the County," which gives additional information about the county.

Cover: **Loblolly and shortleaf pine on Amy silt loam.**

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SOIL SURVEY OF OUACHITA COUNTY, ARKANSAS

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE ARKANSAS AGRICULTURAL EXPERIMENT STATION

OUACHITA COUNTY is in south-central Arkansas (fig. 1). It is bounded on the north by Clark and

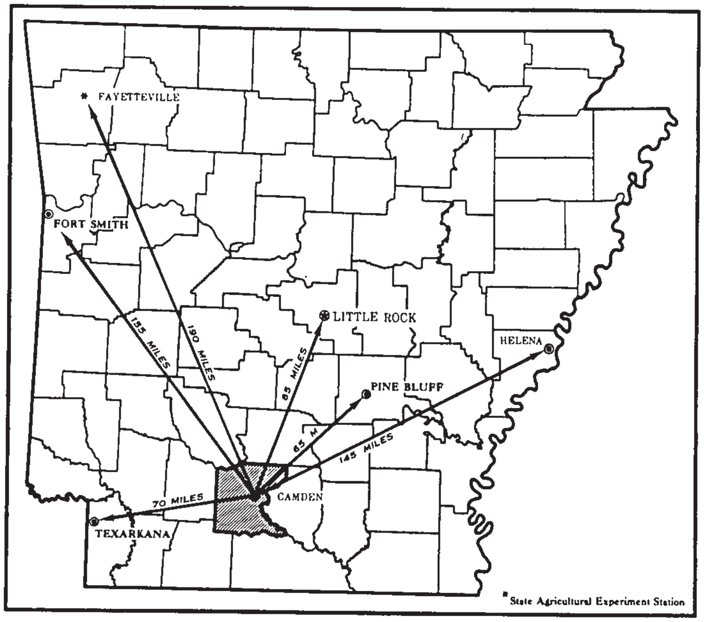

Figure 1.—Location of Ouachita County in Arkansas.

Dallas Counties, on the west by Nevada and Columbia Counties, on the south by Columbia and Union Counties, and on the east by Calhoun County.

The county is about 30 miles from north to south and averages about 25 miles east to west. The approximate area is 472,960 acres, or 739 square miles. In 1970, the population totaled 31,262. Camden, the county seat, is in the east-central part of the county. It has about half the total population. It is at the head of regular barge traffic on the Ouachita River. Situated on a bluff above the river, its elevation ranges from about 150 to about 220 feet above sea level.

All of the county is within the Southern Coastal Plain. The eastern third of the county has predominantly level to gently sloping topography, while the western two-thirds of the county is nearly level to hilly. The soils are derived from unconsolidated waterborne sediment. They are very low to moderate in plant nutrients.

The total rainfall is greater than is needed for most crops but is not seasonally distributed for the best use by plants.

Forestry is the principal farm enterprise. Only a small acreage is now used for pasture and row crops, but land clearing in the Ouachita River bottom lands has increased in recent years. Most of the newly cleared areas are used for soybeans.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Ouachita County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. As they traveled over the county, they observed the steepness, length, and shape of the slopes, the size and speed of streams, the kinds of native plants or crops, 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 not been changed much 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. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Alaga and Norfolk, 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 those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil, 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, Norfolk fine sandy loam, 1 to 3 percent slopes, is one of several phases within the Norfolk 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 accurately. 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 recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Ouachita County: soil associations and undifferentiated groups.

A soil association is made up of adjacent soils that occur as areas large enough to be shown individually on the soil map but are shown as one unit because the time and effort of delineating them separately cannot be justified. There is a considerable degree of uniformity in pattern and relative extent of the dominant soils, but the soils may differ greatly one from another. The name of an association consists of the name of the dominant soil or soils. Where there are two or more dominant soils, the names are joined by a hyphen. Cahaba-Norfolk association, undulating, is an example.

An undifferentiated group is made up of two or more soil series or phases 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. The name of an undifferentiated group consists of the name of the dominant soil or soils. Bibb soils is an example. Where there are two or more dominant soils, the names are joined by "and."

In most areas surveyed there are places where the soil material is so altered by man's activity that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Oil-waste land is a land type in Ouachita County.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are also assembled. 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. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way as to be readily useful to different groups of users, among them farmers, managers of woodland and rangeland, and engineers.

The soil scientists set up trial groups of soils on the basis of yield and practice tables and other data. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. Then they adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Ouachita County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It 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 soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The soil associations in Ouachita County are discussed in the following pages.

1. Amy-Ouachita-Leaf association

Poorly drained and well-drained, dominantly level, loamy soils on flood plains that are flooded frequently.

This association consists of predominantly level soils on the flood plains along the Ouachita River and its larger tributaries of Smackover Creek, Two Bayou, Freeo Creek, Little Missouri River, and others. Slopes are dominantly less than 1 percent but range to 2 percent.

Amy soils make up about 38 percent of the association, Ouachita soils, about 31 percent; Leaf soils, about 26 percent; and other soils, mainly Bibb, Ennis, and Lobelville, and water areas, make up the remaining 5 percent. The total area is about 18 percent of the county.

Amy soils are poorly drained. Their surface layer is light brownish-gray to dark grayish-brown silt loam. The subsurface layer is gray or grayish-brown silt loam. The subsoil is light gray or light brownish-gray silt loam or silty clay loam mottled with shades of brown. Below is light-gray or light brownish-gray, mottled silt loam. The Amy and Leaf soils lie between the Ouachita soils and the uplands.

Ouachita soils are well drained and generally are adjacent to the streams (fig. 2). They have a surface layer of brown or dark grayish-brown silt loam over brown to dark yellowish-brown silt loam. The subsoil is dark grayish-brown, dark yellowish-brown, and yellowish-brown silt loam or silty clay loam. In some areas it is mottled with shades of gray in the lower part. The material beneath is yellowish-brown loam, fine sandy loam, or silty clay loam. In some areas it is mottled with shades of gray.

Leaf soils are poorly drained. They have a surface layer of grayish-brown or dark grayish-brown silt loam or silty clay loam. The subsoil is light brownish-gray or gray silty clay or clay mottled with shades of red and brown.

This association is subject to frequent flooding, mainly during the winter and spring. About 90 percent is used for mixed hardwoods and loblolly pine and is well suited for this use. Most of the cleared areas are of Ouachita soils. The main crop is soybeans, but some areas are in pasture.

Amy and Leaf soils have severe limitations for industrial, residential, or recreational development because of their wetness, seasonal high water table, and the flood hazard. Because of the flood hazard, Ouachita soils have severe limitations for industrial or residential development. They have moderate to severe limitations for recreational use, depending on the intensity of development and time of use.

2. *Amy-Smithton association*

Poorly drained, level, loamy soils on broad stream terraces and upland flats

This association consists of broad flats adjacent to association 1, but at slightly higher elevation. Slopes are less than 1 percent.

Amy soils make up about 72 percent of the association; Smithton soils, about 23 percent; and other soils, mainly Mashulaville, Pheba, Leaf, and Bibb, make up the remaining 5 percent. The total area is about 13 percent of the county. Much of the Oil-waste land is in this association near Smackover Creek.

Amy soils are poorly drained. Their surface layer is light brownish-gray to dark grayish-brown silt loam over a subsurface layer of gray or grayish-brown silt loam. The subsoil is light gray to light brownish-gray silt loam or silty clay loam mottled with shades of brown. The material beneath is light-gray or light brownish-gray, mottled silt loam.

Smithton soils are poorly drained. They have a surface layer of very dark grayish-brown or grayish-brown fine sandy loam over a subsurface layer of grayish-brown or light brownish-gray fine sandy loam. The upper part of the subsoil is light brownish-gray fine sandy loam or loam mottled with yellowish brown. The lower part is

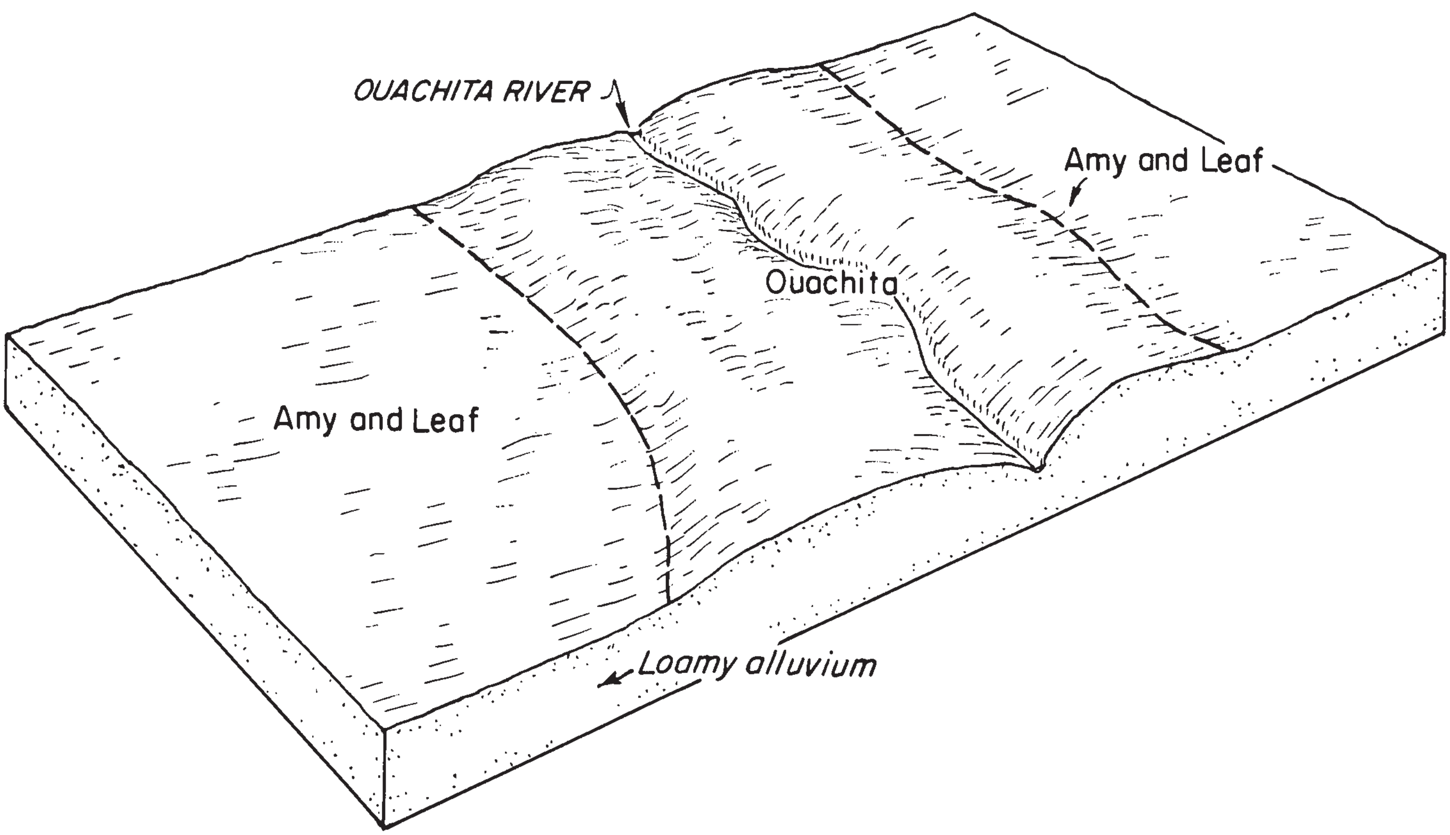

Figure 2.—**Typical pattern of soils of association 1 on the Ouachita River flood plain.**

gray or light brownish-gray fine sandy loam or loam mottled with shades of brown.

About 95 percent of this association is in hardwood and pine forest. The main crop on the cleared areas is soybeans, but some areas are in pasture. Most of these areas need surface drainage for more efficient management.

These soils have severe limitations for industrial, residential, or recreational development because of wetness. The slow percolation rate and seasonal high water table severely limit their use as sites for septic tank drainage fields.

3. *Norfolk-Cahaba-Saffell association*

Well-drained, nearly level to moderately sloping, loamy and gravelly soils on gently rolling uplands

This association consists of areas of gently rolling uplands scattered over the eastern two-thirds of the county. Slope ranges from 1 to 12 percent, but dominantly is less than 8 percent.

Norfolk soils make up about 42 percent of the association; Cahaba soils about 18 percent; Saffell soils, about 15 percent; and other soils, mainly Bibb, Goldsboro, Kirvin, Sacul, and Smithton, make up the remaining 25 percent. The total area is about 12 percent of the county. Most areas of gravelly soils and gravel pits are in this association.

The soils of this association are well drained. The surface layer of Norfolk soils is very dark grayish-brown to dark-brown fine sandy loam over a subsurface layer of pale-brown to yellowish-brown fine sandy loam. The subsoil is yellowish-brown to strong-brown sandy clay loam or loam, mottled in the lower part with shades of red, brown, and gray. The material beneath is red to yellowish-brown sandy loam mottled light gray in most areas.

Cahaba soils have a surface layer of dark grayish-brown or dark-brown fine sandy loam over a subsurface layer of pale-brown to yellowish-brown fine sandy loam. The subsoil is yellowish-red or red sandy clay loam to fine sandy loam. The material beneath is strong-brown or yellowish-red fine sandy loam or loamy sand.

Saffell soils have a surface layer of dark grayish-brown or dark-brown gravelly sandy loam over a subsurface layer of yellowish-brown to brown gravelly sandy loam. The subsoil is yellowish red to reddish brown. The upper few inches of the subsoil are gravelly sandy loam over gravelly sandy clay loam. The material beneath is yellowish-brown to light yellowish-brown gravelly sandy loam or gravelly loamy sand.

About 30 percent of the acreage of this association is used for crops and pasture and is mainly used for the production of row crops and pasture. The remaining acreage is used for hardwood and pine forest. The main crops are cotton, corn, soybeans, and small grain. Most farms have a few cattle.

These soils are considered good sites for industrial, residential, or recreational development. They have slight to moderate limitations for most uses for town and country planning.

4. *Kirvin-Sacul-Cahaba association*

Well drained and moderately well drained, nearly level to hilly, loamy soils on rolling uplands.

This association consists of areas of rolling uplands and makes up the major part of the county west of the Ouachita River. Slope ranges from 1 to 20 percent over most of the areas, but ranges to more than 40 percent on the breaks along the west side of the Ouachita River.

Kirvin soils make up about 30 percent of the area; Sacul soils, about 20 percent; Cahaba soils, about 15 percent; and other soils, mainly Alaga, Bibb, Goldsboro, Leaf, Norfolk, and Smithton, make up the remaining 35 percent (fig. 3). The total area is about 46 percent of the county. About half the Oil-waste land is in the southeastern part of this association in the areas near Smackover Creek.

Kirvin soils are well drained. They have a surface layer of very dark grayish-brown to brown fine sandy loam over a subsurface layer of yellowish-brown or brownish-yellow to reddish-yellow fine sandy loam. The upper part of the subsoil is yellowish-red or red clay or silty clay with dark-red and pale-brown mottles in the lower part. The next layer is clay or silty clay mottled with red and gray. The material beneath is alternate layers of red, brown, and gray silty clay loam, loam, or sandy clay loam.

Sacul soils are moderately well drained. Their surface layer is dark grayish-brown or brown fine sandy loam, and the subsurface layer is pale-brown or brown fine sandy loam. The upper part of the subsoil is yellowish-red or red clay or silty clay. The lower part is mottled red or yellowish red and gray or light brownish gray. Generally this lower part is clay or silty clay, but in many areas it grades with depth to silty clay loam. In places the underlying material is stratified layers of red, yellow, and gray sandy loam and sandy clay loam.

Cahaba soils are well drained. They have a surface layer of dark grayish-brown or dark-brown fine sandy loam. The subsurface layer is pale-brown to yellowish-brown fine sandy loam. The subsoil is yellowish-red or red sandy clay loam to fine sandy loam. The material beneath is strong-brown or yellowish-red fine sandy loam or loamy sand.

About 85 percent of this association is in hardwood and pine forest and is well suited to this use. Most of the cleared areas are in pasture or are idle.

This association has slight to severe limitations for industrial, residential, or recreational development. The slow percolation rate and the slopes of some areas of the Kirvin and Sacul soils severely limit their use as sites for septic tank drainage fields.

5. *Alaga-Kirvin association*

Somewhat excessively drained and well-drained, nearly level to moderately steep, sandy and loamy soils on rolling uplands

This association consists of areas of rolling uplands in the northwestern and south-central parts of the country. Slopes range from 1 to 20 percent.

Alaga soils make up about 43 percent of the association; Kirvin soils, about 31 percent; and other soils,

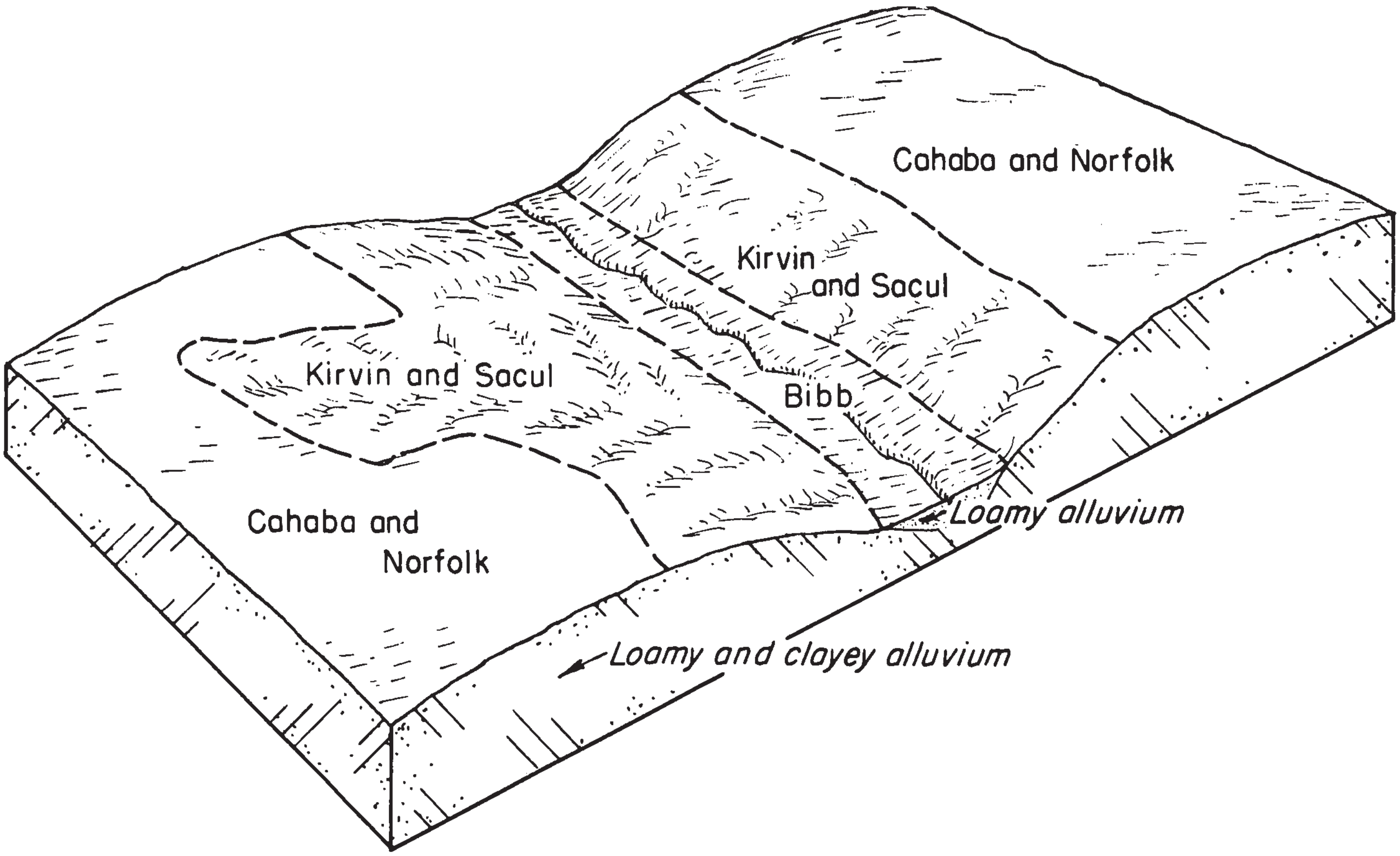

Figure 3.—**Relationship of soils to topography and parent materials in soil association 4.**

mainly Bibb, Cahaba, Lucy, Norfolk, and Sacul, make up the remaining 26 percent. The total area is about 11 percent of the county.

Alaga soils are somewhat excessively drained. They have a surface layer of dark grayish-brown to dark yellowish-brown loamy sand. Below this is pale-brown to strong-brown loamy sand or sand, underlain in many areas by white loamy sand or sand.

Kirvin soils are well drained. They have a surface layer of very dark grayish-brown to brown fine sandy loam over a subsurface layer of yellowish-brown or brownish-yellow to reddish-yellow fine sandy loam. The upper part of the subsoil is yellowish-red or red clay or silty clay with dark-red and pale-brown mottles in the lower part. The next layer is clay or silty clay mottled with red and gray. The material beneath is alternate layers of red, brown, and gray silty clay loam, loam, or sandy clay loam.

About 85 percent of this association is used for hardwood and pine forest and is well suited to this use. Most of the cleared areas are in pasture or are idle.

Alaga and Kirvin soils have slight to severe limitations for industrial, residential, or recreational development. The slow percolation rate and steeper slopes of the Kirvin soils severely limit their use as sites for septic tank drainage fields.

Descriptions of the Soils

In this section the soils of Ouachita County are described in detail and their use and management are discussed. Each soil series is described in detail, and then, briefly, the mapping units 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 is much more detailed and is for those who need to make thorough and precise studies of soils. The profile described in the soil series is representative for mapping units in that series. If a given mapping unit has a profile in some ways different from the one described in the series, these differences are stated in the description of the mapping unit, or they are apparent in the name of the mapping unit. The description of each mapping unit contains suggestions on how the soil can be managed.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Oil-waste land, for example, does not belong to a soil series, but nevertheless is listed in alphabetic order along with the soil series.

Following 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 are the capability unit and woodland group in which the mapping unit has been placed. The page for the description of each capability unit or other interpretative group can be learned by referring to the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the Glossary, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*11*).[1]

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent
	Acres	*Percent*
Alaga loamy sand, 1 to 8 percent slopes	12, 931	2. 8
Alaga loamy sand, 8 to 20 percent slopes	4, 471	1. 0
Alaga association, undulating	4, 186	. 9
Alaga association, rolling	3, 598	. 7
Amy silt loam	44, 433	9. 4
Amy association, frequently flooded	80, 019	16. 9
Bibb soils	25, 528	5. 4
Cahaba fine sandy loam, 1 to 3 percent slopes	8, 156	1. 7
Cahaba fine sandy loam, 3 to 8 percent slopes	6, 876	1. 4
Cahaba fine sandy loam, 8 to 12 percent slopes	1, 845	. 4
Cahaba-Norfolk association, undulating	34, 828	7. 4
Ennis silty clay loam	755	. 2
Goldsboro fine sandy loam, 1 to 3 percent slopes	3, 803	. 9
Kirvin fine sandy loam, 3 to 8 percent slopes	20, 513	4. 3
Kirvin fine sandy loam, 8 to 20 percent slopes	29, 645	6. 2
Kirvin-Norfolk association, undulating	2, 101	. 4
Kirvin-Sacul association, rolling	21, 867	4. 6
Kirvin-Sacul association, hilly	5, 136	1. 1
Leadvale silt loam, 1 to 3 percent slopes	6, 449	1. 4
Leaf silt loam	530	. 1
Lobelville fine sandy loam	661	. 1
Lucy loamy fine sand, 3 to 8 percent slopes	2, 204	. 5
Mashulaville silt loam	1, 342	. 3
Norfolk fine sandy loam, 1 to 3 percent slopes	17, 264	3. 6
Norfolk fine sandy loam, 3 to 8 percent slopes	11, 117	2. 3
Oil-waste land	2, 145	. 5
Ouachita silt loam	8, 654	1. 8
Ouachita association, frequently flooded	25, 444	5. 4
Pheba silt loam, 1 to 3 percent slopes	804	. 2
Sacul fine sandy loam, 1 to 3 percent slopes	4, 212	. 9
Sacul fine sandy loam, 3 to 8 percent slopes	5, 314	1. 1
Sacul fine sandy loam, 8 to 16 percent slopes	4, 502	1. 0
Sacul-Kirvin association, undulating	30. 485	6. 4
Saffell gravelly sandy loam, 1 to 3 percent slopes	1, 963	. 4
Saffell gravelly sandy loam, 3 to 10 percent slopes	8, 113	1. 7
Smithton fine sandy loam	25, 576	5. 4
Water	5, 490	1. 2
Total	472, 960	100. 0

[1] Italic numbers in parentheses refer to Literature Cited, p. 59.

Alaga Series

The Alaga series consists of nearly level to rolling, somewhat excessively drained, rapidly permeable soils. In a representative profile the surface layer is dark-brown loamy sand about 7 inches thick. The material beneath is yellowish-brown to strong-brown loamy sand to a depth of about 58 inches. Below this material is white sand.

Representative profile of Alaga loamy sand, 1 to 8 percent slopes, in a moist idle field in the SW¼NW¼SE¼ sec. 30, T. 12 S., R. 19 W.:

Ap—0 to 7 inches, dark-brown (10YR 4/3) loamy sand; single grain; loose; common fine and medium roots; medium acid; clear, smooth boundary.

C1—7 to 24 inches, yellowish-brown (10YR 5/6) loamy sand; single grain; loose; common fine and medium roots; medium acid; gradual, smooth boundary.

C2—24 to 46 inches, strong-brown (7.5YR 5/6) loamy sand; single grain; loose; most sand grains partially coated; strongly acid; gradual, smooth boundary.

C3—46 to 58 inches, yellowish-brown (10YR 5/6) and light-gray (10YR 7/1) loamy sand; single grain; loose; sand grains clean in gray part, partially coated in yellowish-brown part; few dark grains; strongly acid; gradual, smooth boundary.

C4—58 to 80 inches, white (10YR 8/1) sand; single grain; loose; few dark grains; strongly acid.

The A1 or Ap horizon ranges from dark brown or dark yellowish brown to dark grayish brown. The C1, C2, and C3 horizons are yellowish brown, strong brown, pale brown, or light yellowish brown. Texture of the C horizon is loamy sand or sand. Reaction is medium acid or strongly acid in the A horizon and medium acid to very strongly acid in the C horizon.

The Alaga soils are associated with Cahaba, Kirvin, Lucy, and Norfolk soils. Alaga soils are coarser textured and lack a B horizon that has structure and accumulated clay of the associated soils. They are not so red below the A horizon as the Cahaba, Kirwin and Lucy soils.

Alaga loamy sand, 1 to 8 percent slopes (AgC).—This soil has the profile described as representative for the series. It has a surface layer of dark grayish-brown to dark yellowish-brown loamy sand about 7 inches thick. Below this is pale-brown, yellowish-brown, and strong-brown, loose loamy sand or sand. Many areas have white, loose loamy sand or sand at a depth of about 58 inches. A few spots of Cahaba, Kirvin, Lucy, and Norfolk soils were included with this soil in mapping.

This soil is medium acid or strongly acid in the surface layer and medium acid to very strongly acid below. It is very low in natural fertility. Runoff is slow, because water moves rapidly into the soil. The erosion hazard is moderate. The available water capacity is low, and droughtiness is a severe limitation. This soil is easy to till. Response to lime and fertilizer is poor.

Most of the acreage is used for loblolly and shortleaf pines (fig. 4). A few areas are in hardwood forest, but most of the cleared land is idle. Some small areas are used for pasture, watermelons, and cantaloupes. Capability unit IVs-1; woodland group 3s3.

Alaga loamy sand, 8 to 20 percent slopes (AgE).—This soil has a surface layer, about 7 inches thick, of dark grayish-brown to dark yellowish-brown, loose loamy sand. Below this is pale-brown to strong-brown, loose loamy sand or sand. Many areas have white, loose loamy sand or sand at a depth of about 58 inches. A few spots

Figure 4.—Mixed, 27-year-old stand of loblolly and shortleaf pine on Alaga loamy sand, 1 to 8 percent slopes.

of Cahaba, Kirvin, and Lucy soils were included with this soil in mapping.

This soil is medium acid or strongly acid in the surface layer and medium acid to very strongly acid below. It is very low in natural fertility. Runoff is medium, and the erosion hazard is severe. Water moves rapidly into the soil. The available water capacity is low, and droughtiness is a severe limitation.

Most of the acreage is used for loblolly and shortleaf pines, but a few areas are used for hardwoods. Cleared areas are of small extent, and most are idle; a few are used for pasture. Capability unit VIs–1; woodland group 3s3.

Alaga association, undulating (ALB).—This association is on ridgetops in the northwestern and south-central parts of the county. The Alaga soils make up 75 to 95 percent of each area. The areas range from about 100 acres to more than 400 acres in size. Slopes range from 1 to 8 percent, but most are less than 5 percent. Included in mapping, and making up from 5 to 25 percent of each mapped area, were spots of Cahaba, Kirvin, Lucy, and Norfolk soils.

Alaga soils have a surface layer of dark grayish-brown to dark yellowish-brown, loose loamy sand about 7 inches thick. Below this is pale-brown to strong-brown, loose loamy sand or sand. Many areas have white, loose loamy sand or sand at a depth of about 58 inches.

465–709—73——2

These soils are medium acid or strongly acid in the surface layer and medium acid to very strongly acid below. They are very low in natural fertility. The available water capacity is low, and droughtiness is a severe limitation. Runoff is slow because water moves rapidly into the soil. The erosion hazard is moderate.

All of this association is forested with mixed shortleaf and loblolly pines, and hardwoods. Capability unit IVs–1; woodland group 3s3.

Alaga association, rolling (ALC).—This association is on sides of ridges in the northwestern and south-central parts of the county. The Alaga soils make up 70 to 90 percent of each area. The areas range from about 100 to more than 300 acres in size. Slopes range from 8 to 30 percent, but most are less than 20 percent. Included in mapping, and making up from 10 to 30 percent of each mapped area, were spots of Cahaba, Kirvin, and Lucy soils.

Alaga soils have a surface layer of dark grayish-brown to dark yellowish-brown, loose loamy sand about 7 inches thick. Below this is pale-brown to strong-brown, loose loamy sand or sand. Many areas have white, loose loamy sand or sand at a depth of about 58 inches.

These soils are medium acid or strongly acid in the surface layer and medium acid to very strongly acid below. They are very low in natural fertility. The available water capacity is low, and droughtiness is a severe limitation. Runoff is medium because water moves rapidly into the soil. The erosion hazard is severe.

All of this association is forested with mixed shortleaf and loblolly pines, and hardwoods. Capability unit VIs–1; woodland group 3s3.

Amy Series

The Amy series consists of nearly level, poorly drained, slowly permeable soils. They are mainly on broad upland flats but some large areas are on low stream terraces on flood plains. In a representative profile the surface layer is about 4 inches of grayish-brown silt loam and the subsurface layer is 14 inches of gray silt loam. The subsoil extends to a depth of about 52 inches. Its upper 23 inches is gray, mottled silt loam and the lower 11 inches is light-gray, mottled silty clay loam. The material below the subsoil is light gray, mottled silt loam.

Representative profile of Amy silt loam in a moist wooded area in the SE¼SE¼NW¼ sec. 2, T. 12 S., R. 16 W.:

O1—1 to ½ inch, oak leaves and pine needles.

O2—½ inch to 0, partly decayed organic debris.

A1—0 to 4 inches, grayish-brown (10YR 5/2) silt loam; weak, fine and medium, subangular blocky structure; friable; many roots; very strongly acid; clear, smooth boundary.

A2—4 to 18 inches, gray (10YR 6/1) silt loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; friable; common medium and fine roots; very strongly acid; clear, wavy boundary.

B21tg—18 to 41 inches, gray (10YR 6/1) silt loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; friable; many fine and medium pores; continuous thin clay films in pores and on peds; thin tongues of light-gray silt between peds in upper few inches; silt coatings on some vertical ped faces below; few fine and medium roots; strongly acid; clear, smooth boundary.

B22tg—41 to 52 inches, light-gray (10YR 7/1) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; firm; peds coated with continuous dark-gray clay films; very strongly acid; clear, smooth boundary.

Cg—52 to 68 inches, light-gray (2.5Y 7/2) silt loam; few, medium, distinct, yellowish-brown (10YR 5/6) mottles; massive; friable; common fine streaks of dark brown; very strongly acid.

The A1 or Ap horizon ranges from dark grayish brown to light brownish gray. The A2 horizon ranges from gray to grayish brown. The B21tg and B22tg horizons are light-gray, gray, or light brownish-gray silt loam or silty clay loam with common to many, fine or medium, yellowish-brown, brown, or dark-brown mottles. The C horizon is light gray to light brownish gray. Reaction is medium acid to very strongly acid in the A horizon and strongly acid or very strongly acid in the B and C horizons.

The Amy soils are associated with Bibb, Ennis, Leaf, Lobelville, Mashulaville, Ouachita, Pheba, and Smithton soils. Amy soils contain more clay than the Bibb, Pheba, and Smithton soils and less sand than the Bibb, Ennis, Lobelville, Mashulaville, and Smithton soils. They lack the fragipan of the Mashulaville and Pheba soils, and they contain less clay than Leaf soils. Amy soils are grayer than the Ennis, Lobelville, and Ouachita soils.

Amy silt loam (Am).—This nearly level soil has the profile described as representative for the series. The surface layer is light brownish-gray to dark grayish-brown silt loam about 4 inches thick. The subsurface layer is gray to grayish-brown silt loam about 14 inches thick. The subsoil extends to a depth of about 52 inches. It is light-gray or light brownish-gray silt loam or silty clay loam mottled with shades of brown. The material beneath is light-gray or light brownish-gray mottled silt loam. Small, rounded, loamy mounds 50 to 100 feet in diameter and 2 to 3 feet high make up 5 to 10 percent of some areas. A few spots of Mashulaville, Pheba, and Smithton soils were included with this soil in mapping.

This soil is medium acid to very strongly acid in the surface and subsurface layers and strongly acid or very strongly acid below. It is low in natural fertility. The available water capacity is high. Permeability is slow. Runoff is very slow to ponded, and wetness is a severe hazard (fig. 5). Water stands in depressions for several days after a rain. The water table is at or near the surface in winter and in spring. Response to fertilizer and lime is moderate.

Most areas of this soil are used for shortleaf and loblolly pines, but a few areas are in hardwoods. Most of the cleared areas are used for pasture. Some are used for soybeans. Capability unit IIIw-1; woodland group 2w9a.

Amy association, frequently flooded (AS).—This nearly level association is on low terraces on flood plains along streams throughout the county.

Amy soils make up 30 to 80 percent of each area and Leaf soils 15 to 60 percent. Included in mapping and making up 5 to 15 percent of each area were spots of Bibb, Ennis, Lobelville, and Ouachita soils.

The Amy soils have a surface layer of light brownish-gray to dark grayish-brown silt loam about 4 inches thick. The subsurface layer, about 14 inches thick, is gray or grayish-brown silt loam. The subsoil extends to a depth of about 52 inches. It is light-gray or light brownish-gray silt loam or silty clay loam mottled with shades of brown. The material beneath is light-gray or light brownish-gray mottled silt loam.

***Figure 5.*—Poor drainage is a severe hazard to farming on this Amy silt loam.**

The Leaf soils have a surface layer of grayish-brown or dark grayish-brown silt loam or silty clay loam about 6 inches thick. The subsoil is light brownish-gray or gray silty clay or clay mottled with shades of red and brown.

They are medium acid to very strongly acid in the surface and subsurface layers, and strongly acid to very strongly acid below. These soils are low in natural fertility. The available water capacity is high. Permeability is slow to very slow. Runoff is very slow to ponded. Wetness is a severe hazard, and these soils are frequently flooded. The water table is at or near the surface in winter and in spring.

Most of the acreage is used for hardwood timber, but a few areas have been planted to loblolly pine. A small acreage is cleared and used for pasture. Capability unit Vw-1; woodland group 2w9.

Bibb Series

The Bibb series consists of nearly level, poorly drained, moderately permeable soils on bottom lands along creeks. In a representative profile the surface layer is dark grayish-brown and grayish-brown fine sandy loam about 7 inches thick. The material beneath is light brownish-gray fine sandy loam mottled with shades of brown.

Representative profile of Bibb fine sandy loam in an area of Bibb soils in a moist pasture in the NW¼SW¼SE¼ sec. 7, T. 14 S., R. 17 W.:

Ap1—0 to 1 inch, dark grayish-brown (10YR 4/2) fine sandy loam; moderate, medium, granular structure; friable; many fine roots; very strongly acid; clear, smooth boundary.

Ap2—1 to 7 inches, grayish-brown (10YR 5/2) fine sandy loam; weak, fine, subangular blocky structure; friable; many fine roots; very strongly acid; clear, smooth boundary.

C1g—7 to 45 inches, light brownish-gray (10YR 6/2) fine sandy loam; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; common thin strata of silt loam; massive; friable; very strongly acid; gradual, smooth boundary.

C2g—45 to 65 inches, light brownish-gray (10YR 6/2) fine sandy loam; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; common thin strata of silt loam; massive; friable; extremely acid.

The A11 or Ap1 horizon is dark-brown or dark grayish-brown silt loam or fine sandy loam. The C horizon is light brownish-gray or gray sandy loam with or without common thin strata of silt loam and common to many, medium and coarse, yellowish-brown, brown, or dark-brown mottles. Reaction is strongly acid or very strongly acid in the A horizon and strongly acid to extremely acid in the C horizon.

The Bibb soils are associated with Amy, Leaf, Lobelville, and Ouachita soils. They are too young to have developed B horizons as associated soils have. They have a lower clay content than the associated soils. They are grayer and more poorly drained than Lobelville soils and have a higher content of sand than Amy and Leaf soils. Bibb soils are grayer and contain more sand and less clay than the Ouachita soils.

Bibb soils (BB).—This undifferentiated group of nearly level Bibb soils is on bottom lands along creeks. The surface layer is about 7 inches thick. It is dark grayish-brown or dark-brown silt loam or fine sandy loam in the upper 1 to 3 inches and grayish-brown silt loam or fine sandy loam in the lower part. The material beneath is light brownish-gray or gray fine sandy loam or stratified silt loam and fine sandy loam mottled with shades of brown.

Soils with a fine sandy loam surface layer make up about 25 to 90 percent of each area. Those with a silt loam surface layer make up 10 to 70 percent of most areas but are lacking in some. Spots of Amy, Leaf, Lobelville, and Ouachita soils were included with this soil in mapping.

These soils are strongly acid or very strongly acid in the surface layer and strongly acid to extremely acid below. They are low in natural fertility. The available water capacity is moderate to high. Permeability is moderate. Runoff is very slow to ponded. Wetness is a severe hazard. These soils are frequently flooded and are saturated with water 6 to 8 months of the year.

Most of the acreage is forested and mainly is in hardwood, and a few areas have been planted to loblolly pine. A few small areas are cleared and used for pasture. Capability unit Vw–1; woodland group 2w9.

Cahaba Series

The Cahaba series consists of nearly level to moderately sloping, moderately permeable, well-drained soils. In a representative profile the surface layer is dark-brown fine sandy loam about 3 inches thick, and the subsurface layer is yellowish-brown fine sandy loam about 6 inches thick. The subsoil is about 39 inches of yellowish-red or red, predominantly sandy clay loam. The material below the subsoil is strong-brown fine sandy loam.

Representative profile of Cahaba fine sandy loam, 1 to 3 percent slopes, in a moist wooded area in the SE¼NE¼NW¼ sec. 8, T. 13 S., R. 16 W.:

O1—½ inch to 0, loose pine needles.

A1—0 to 3 inches, dark-brown (10YR 4/3) fine sandy loam; moderate, medium, granular structure; very friable; common fine roots; medium acid; clear, smooth boundary.

A2—3 to 9 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, fine, subangular blocky structure; very friable; few fine roots; medium acid; clear, wavy boundary.

B1—9 to 12 inches, yellowish-red (5YR 4/6) fine sandy loam; weak, fine, subangular blocky structure; friable; strongly acid; clear, smooth boundary.

B21t—12 to 24 inches, yellowish-red (5YR 4/6) sandy clay loam; moderate, medium, subangular blocky structure; friable; common, thin, patchy clay films; strongly acid; clear, smooth boundary.

B22t—24 to 39 inches, yellowish-red (5YR 4/8) sandy clay loam; moderate, medium, subangular blocky structure; friable; common, thin, patchy clay films; strongly acid; clear, smooth boundary.

B23t—39 to 48 inches, yellowish-red (5YR 5/6) sandy clay loam; weak, medium, subangular blocky structure; friable; common, thin, patchy clay films; strongly acid; clear, smooth boundary.

C—48 to 72 inches, strong-brown (7.5YR 5/6) fine sandy loam; massive; very friable; strongly acid.

The A1 or Ap horizon is dark grayish brown or dark brown. The A2 horizon ranges from pale brown to yellowish brown. The B2t horizon is yellowish-red or red sandy clay loam to fine sandy loam. Some profiles have a B3 horizon of yellowish-red or red fine sandy loam. The C horizon is strong-brown or yellowish-red fine sandy loam or loamy sand. Reaction is medium acid or strongly acid in the A horizon and strongly acid or very strongly acid in the B and C horizons. In some areas gravel content ranges up to 10 percent throughout the profile.

Some of the soils in the Cahaba series are more than 44 inches thick above the C horizon. They have a Bt horizon with more than a 20 percent clay decrease within 60 inches of the surface, and lack evidence of secondary clay eluviation. The soils are enough alike in other characteristics that their behavior and usefulness are not altered and a new series is not warranted.

The Cahaba soils are associated with the Alaga, Goldsboro, Kirvin, Leadvale, Lucy, Norfolk, and Saffell soils. Cahaba soils have redder B horizons than the Alaga, Goldsboro, Leadvale, and Norfolk soils and have thinner, finer textured A horizons than the Lucy soils. They are finer textured and have B horizons with accumulated clay which Alaga soils lack. Cahaba soils lack the high gravel content of the Saffell soils and lack the gray mottling of Goldsboro soils. They are more sandy in the B horizon than the Kirvin soils.

Cahaba fine sandy loam, 1 to 3 percent slopes (CaB).—This soil has the profile described as representative for the series. The surface layer is dark grayish-brown or dark-brown fine sandy loam about 3 inches thick. The subsurface layer is about 6 inches of pale-brown to yellowish-brown fine sandy loam. The subsoil is about 39 inches of yellowish-red or red sandy clay loam to fine sandy loam. The material beneath is strong-brown or yellowish-red fine sandy loam or loamy sand. A few spots of Alaga, Goldsboro, Kirvin, Leadvale, Lucy, Norfolk, and Saffell soils were included with this soil in mapping.

This soil is medium acid or strongly acid in the surface and subsurface layers and strongly acid or very strongly acid below. It is low in natural fertility. The available water capacity is moderate. Permeability is moderate. Runoff is slow to medium, and erosion is a moderate hazard. This soil is easy to till. Response to fertilizer and lime is moderate.

About one half of the acreage is forested with shortleaf and loblolly pines or mixed pine and hardwoods.

The rest is used for cotton, soybeans, corn, small grain (fig. 6), and pasture. Capability unit IIe–1; woodland group 3o1.

Cahaba fine sandy loam, 3 to 8 percent slopes (CaC).—The surface layer of this soil is dark-brown or dark grayish-brown fine sandy loam 1 to 5 inches thick. The subsurface layer is 4 to 14 inches of pale-brown to yellowish-brown fine sandy loam. The subsoil is yellowish-red or red sandy clay loam to fine sandy loam and extends to a depth of 38 to 72 inches below the surface. The material beneath is strong-brown or yellowish-red fine sandy loam or loamy sand. A few spots of Alaga, Kirvin, Lucy, Norfolk, and Saffell soils were included with this soil in mapping.

This soil is medium acid or strongly acid in the surface and subsurface layers and strongly acid or very strongly acid below. It is low in natural fertility. The available water capacity is moderate. Permeability is moderate. Runoff is medium to rapid and erosion is a severe hazard. This soil is easy to till. Response to fertilizer and lime is moderate.

Most of the acreage is used for shortleaf and loblolly pine or mixed pine and hardwood forest. The rest is used for cotton, soybeans, corn, small grains, and pasture. Capability unit IIIe–1; woodland suitability group 3o1.

Cahaba fine sandy loam, 8 to 12 percent slopes (CaD).—The surface layer of this soil is dark-brown or dark grayish-brown fine sandy loam 1 to 3 inches thick. The subsurface layer is 4 to 12 inches of pale-brown to yellowish-brown fine sandy loam. The subsoil is yellowish-red or red sandy clay loam to fine sandy loam and extends to a depth of 38 to 72 inches below the surface. The material beneath is strong-brown or yellowish-red fine sandy loam or loamy sand. A few spots of Alaga, Kirvin, Lucy, and Norfolk soils were included with this soil in mapping.

This soil is medium acid or strongly acid in the surface and subsurface layers and strongly acid or very strongly acid below. It is low in natural fertility. The available water capacity is moderate. Permeability is moderate. Runoff is rapid, and erosion is a very severe hazard. Response to fertilizer and lime is moderate.

Most of the acreage is used for shortleaf and loblolly pines or mixed pine and hardwood forest. A few small areas are used for pasture. Capability unit IVe–1; woodland suitability group 3o1.

Cahaba-Norfolk association, undulating (CNB).—This association is on ridgetops, mainly in the western two-thirds of the county. The Cahaba soils make up 45 to 80 percent of each area and the Norfolk soils, 15 to 45 percent. Included in mapping and making up 5 to 20 percent of each mapped area were spots of Alaga, Kirvin, and Lucy soils.

The Cahaba soils have a surface layer of dark grayish-brown or dark-brown fine sandy loam 1 to 5 inches thick and a subsurface layer, 4 to 14 inches thick, of pale-brown to yellowish-brown fine sandy loam. The subsoil extends to depth of 38 to 72 inches below the surface. It is yellowish-red or red sandy clay loam to fine sandy loam. Below the subsoil is strong-brown or yellowish-red fine sandy loam or loamy sand.

The Norfolk soils have a surface layer of very dark grayish-brown to dark-brown fine sandy loam 2 to 9 inches thick and a subsurface layer, 2 to 20 inches thick, of pale-brown to yellowish-brown fine sandy loam. The

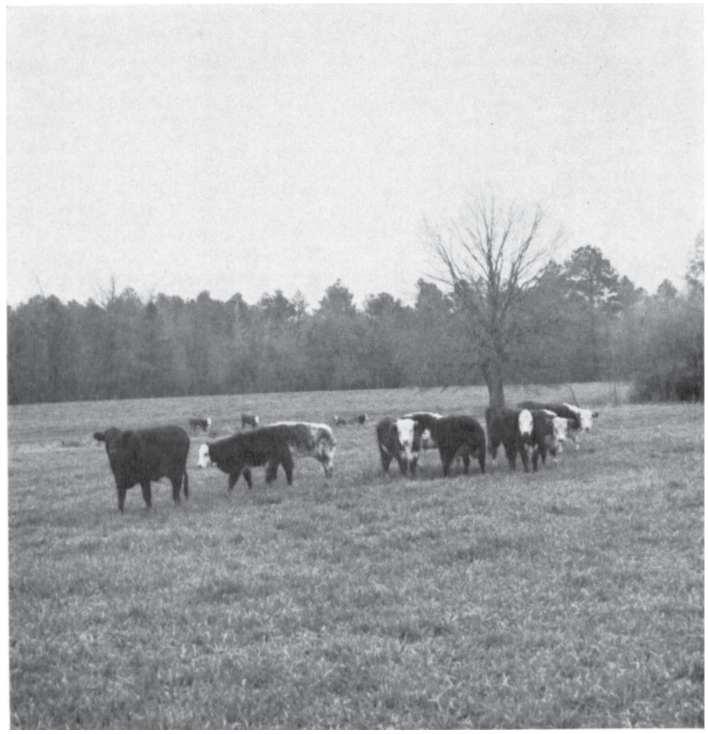

Figure 6.—**Cattle grazing winter oats growing on Cahaba fine sandy loam, 1 to 3 percent slopes. Mixed pine and hardwood forest is in the background.**

subsoil is yellowish-brown to strong-brown sandy clay loam or loam mottled in the lower part with shades of red, brown, and gray. The material, 60 to more than 72 inches below the surface, is yellowish-brown to red sandy loam mottled light gray in most areas.

These soils are low in natural fertility. They are medium acid to very strongly acid in the surface and subsurface layers, and strongly acid or very strongly acid below. Permeability is moderate. The available water capacity is moderate. Runoff is slow to medium, and erosion is a moderate to severe hazard.

All areas are used for shortleaf and loblolly pines or mixed pine and hardwood forest. Capability unit IIIe–1; woodland group 3o1.

Ennis Series

The Ennis series consists of level and nearly level, well-drained, moderately slowly permeable soils on low stream terraces and natural levees on flood plains. In a representative profile the surface layer is very dark grayish-brown silty clay loam in the upper 3 inches and dark brown silty clay loam in the lower 3 inches. The subsoil extends to a depth of about 48 inches below the surface and is yellowish brown. Its upper 23 inches is sandy clay loam, and its lower part is fine sandy loam. The material below the subsoil is yellowish-brown, mottled fine sandy loam.

Representative profile of Ennis silty clay loam in a moist wooded area in the SW¼SE¼SW¼ sec. 18, T. 11 S., R. 19 W.:

O1—½ inch to 0, hardwood leaves and twigs.
A11—0 to 3 inches, very dark grayish-brown (10YR 3/2) silty clay loam; moderate, fine and medium, granular structure; friable; many roots; strongly acid; clear, smooth boundary.
A12—3 to 6 inches, dark-brown (10YR 4/3) silty clay loam; weak, fine, subangular blocky structure; firm; many roots; strongly acid; clear, smooth boundary.
B12—6 to 17 inches, yellowish-brown (10YR 5/4) sandy clay loam; weak, medium, subangular blocky structure; friable; few roots; strongly acid; gradual, smooth boundary.
B22—17 to 29 inches, yellowish-brown (10YR 5/6) sandy clay loam; weak, medium, subangular blocky structure; friable; few roots; strongly acid gradual, smooth boundary.
B3—29 to 48 inches, yellowish-brown (10YR 5/6) fine sandy loam; weak, medium, subangular blocky structure; friable; few fine pebbles; very strongly acid; gradual, smooth boundary.
C—48 to 72 inches, yellowish-brown (10YR 5/6) fine sandy loam; common, medium, distinct, pale-brown (10YR 6/3) mottles; massive; very friable; few fine pebbles; very strongly acid.

The A11 or Ap horizon ranges from very dark grayish brown to dark brown or dark yellowish brown. The A12 horizon is brown or dark brown. The B horizon is yellowish brown or brown. The C horizon is mottled with pale brown or brown. Reaction is medium acid or strongly acid in the A horizon and strongly acid or very strongly acid in the B and C horizons.

The Ennis soils in this survey area are outside the defined range for the series in that they lack chert fragments in the subsoil. They are enough like Ennis soils in other characteristics that their behavior and usefulness are not significantly different and a new series is not warranted.

The Ennis soils are associated with the Amy and Ouachita soils. They are browner, better drained, and contain more sand than the Amy soils. They have higher sand content than Ouachita soils.

Ennis silty clay loam (En).—This is the only Ennis soil mapped in the county. This level to nearly level soil has a surface layer of very dark grayish-brown to dark yellowish-brown silty clay loam, about 3 inches thick, that overlies about 3 inches of brown or dark-brown silty clay loam. The subsoil extends to a depth of 48 inches below the surface and is yellowish brown or brown. Its upper 23 inches is sandy clay loam, and the lower part is fine sandy loam. The material below the subsoil is yellowish-brown fine sandy loam mottled with shades of brown. A few spots of Amy and Ouachita soils were included with this soil in mapping.

This soil is medium acid or strongly acid in the surface layer and strongly acid or very strongly acid below. It is moderate in natural fertility. The available water capacity is moderate to high. Permeability is moderately slow. Runoff is medium to slow. This soil is subject to frequent flooding, mainly during winter and spring.

This soil is well suited to forest. Most of the acreage is used for hardwoods, but a few old fields have been planted to loblolly pine. Where it is not subject to scouring by rapidly flowing floodwater, this soil is suited to soybeans, grain sorghum, and other crops that require a short growing season. It is moderately well suited to pasture. Capability unit IVw-2; woodland group 1w8.

Goldsboro Series

The Goldsboro series consists of nearly level, moderately well drained, moderately permeable soils. In a representative profile the surface layer is dark grayish-brown fine sandy loam about 3 inches thick, and the subsurface layer is light yellowish-brown fine sandy loam about 9 inches thick. The upper 6 inches of the subsoil is yellowish-brown sandy clay loam. Below this is 6 inches of yellowish-brown sandy clay loam mottled with shades of brown. Below this, the subsoil is gray or light brownish gray sandy clay loam mottled with shades of brown, red, and yellow to a depth of 72 inches or more.

Representative profile of Goldsboro fine sandy loam, 1 to 3 percent slopes, in a moist wooded area in the SW¼SW¼SE¼ sec. 20, T. 15 S., R 16. W.:

O1—½ to ¼ inch, hardwood leaves and pine needles.
O2—¼ inch to 0, partially decayed organic debris.
A1—0 to 3 inches, dark grayish-brown (10YR 4/2) fine sandy loam; moderate, medium, granular structure; very friable; many fine roots; very strongly acid; clear, smooth boundary.
A2—3 to 12 inches, light yellowish-brown (10YR 6/4) fine sandy loam; weak, fine, subangular blocky structure; very friable; many roots; very strongly acid; clear, smooth boundary.
B21t—12 to 18 inches, yellowish-brown (10YR 5/6) sandy clay loam; moderate, medium, subangular blocky structure; firm; common, thin, patchy clay films; few roots; very strongly acid; clear, smooth boundary.
B22t—18 to 24 inches, yellowish-brown (10YR 5/6) sandy clay loam; common, medium, distinct, pale-brown (10YR 6/3) mottles; moderate, medium, subangular blocky structure; firm; common, thin, patchy clay films; few roots; very strongly acid; gradual, smooth boundary.
B23tg—24 to 55 inches, gray (10YR 6/1) sandy clay loam; common, medium, distinct, yellowish-brown (10YR 5/4) mottles and common, medium, prominent, red (2.5YR 5/8) mottles; moderate, medium, subangular blocky structure; firm; common, thin, patchy clay films; very strongly acid; gradual, smooth boundary.
B24tg—55 to 72 inches, coarsely mottled gray (10YR 6/1) and red (2.5YR 5/8) sandy clay loam; weak, medium, subangular blocky structure; sand grains coated and bridged with clay; very strongly acid.

The A1 or Ap horizon ranges from dark grayish brown to dark brown. The A2 horizon ranges from light yellowish brown to brown. The B21t and B22t horizons are sandy clay loam or loam with common to many, medium, distinct, yellowish-brown mottles and common to many, medium, prominent, red mottles. Reaction is medium acid to very strongly acid in the A horizon and strongly acid or very strongly acid in the B horizon.

The Goldsboro soils are associated with Cahaba, Norfolk, and Smithton soils. They have a browner B horizon and higher clay content than the Smithton soils. They have a browner and thicker B horizon than Cahaba soils and have gray mottles in the lower part of the B horizon, which Cahaba and Norfolk soils lack.

Goldsboro fine sandy loam, 1 to 3 percent slopes (GoB).—This is the only Goldsboro soil mapped in the county. It has a surface layer of dark grayish-brown fine sandy loam about 3 inches thick. The subsurface layer is about 9 inches of light yellowish-brown fine sandy loam. The subsoil extends to a depth of 72 inches or more. The upper part of the subsoil is yellowish-brown sandy clay loam. The middle part is yellowish-brown sandy clay loam mottled with shades of brown. The lower part is gray or light brownish-gray sandy clay loam or loam mottled with shades of red, brown, and yellow. A few spots of Cahaba, Norfolk, and Smithton soils were included with this soil in mapping.

This soil is medium acid to very strongly acid in the surface and subsurface layers, and strongly acid or very strongly acid in the subsoil. It is low in natural fertility.

The available water capacity is moderate to high. Water moves through this soil at a moderate rate. Runoff is medium, and erosion is a moderate hazard.

Most of the acreage is used for mixed loblolly and shortleaf pines or for mixed pine and hardwoods. Some small areas are cleared and used for pasture. This soil is fairly well suited to cotton, corn, and soybeans. Capability unit IIe–1; woodland group 2o7.

Kirvin Series

The Kirvin series consists of gently sloping to hilly, well-drained soils. Permeability is moderately slow. In a representative profile the surface layer is dark grayish-brown fine sandy loam about 6 inches thick. The subsurface layer is reddish-yellow fine sandy loam about 3 inches thick. The subsoil extends to 55 inches below the surface. The upper part is red clay. The middle part is red clay with dark-red and pale-brown mottles. The lower part is mottled red and gray clay. The material below the subsoil is alternate layers of silty clay loam, loam, or sandy clay loam in shades of red, brown, and gray.

Representative profile of Kirvin fine sandy loam, 3 to 8 percent slopes, in a moist wooded area in the SE¼NW¼-SE¼ sec. 30, T. 11 S., R. 19 W.:

A1—0 to 6 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine, granular structure; friable; many fine roots; few pebbles ranging to ½ inch in diameter; strongly acid; abrupt, smooth boundary.

A2—6 to 9 inches, reddish-yellow (7.5YR 6/6) fine sandy loam; weak, fine, granular structure; friable; common fine roots; few pebbles ranging to ½ inch in diameter; medium acid; clear, smooth boundary.

B21t—9 to 24 inches, red (2.5YR 4/6) clay; strong, medium, subangular blocky structure; firm; plastic; thick, continuous clay films; common roots; few pebbles ranging to ¼ inch in diameter in upper few inches; strongly acid; gradual, smooth boundary.

B22t—24 to 38 inches, red (2.5YR 4/6) clay; many, fine, prominent, pale-brown mottles and few, fine, faint, dark-red mottles; moderate, medium, subangular blocky structure; firm; plastic; medium continuous clay films; few fine roots; very strongly acid; gradual, smooth boundary.

B23t—38 to 55 inches, mottled red (2.5YR 4/6) and light brownish-gray (10YR 6/2) clay; moderate, medium, subangular blocky structure grading to weak in lower few inches; firm; plastic; continuous clay films; few fine roots; very strongly acid; clear, smooth boundary.

C1—55 to 63 inches, alternate thin lenses of red (2.5YR 4/6) and light brownish-gray (10YR 6/2) silty clay loam and loam; mixed texture is loam; platy rock structure; firm; extremely acid; clear, smooth boundary.

C2—63 to 73 inches, brown (7.5YR 5/2) silty clay loam; firm; horizontally bedded shale-like plates, coated with gray (5YR 5/1); thin lenses of very fine sandy loam between plates; mixed texture is loam; extremely acid.

The A1 or Ap horizon ranges from very dark grayish brown to brown. The A2 horizon ranges from brownish yellow or yellowish brown to reddish yellow. The B21t and B22t horizons are yellowish-red to red clay or silty clay. The B22t horizon in most profiles has few to common, fine and medium, red, brown, or pale-brown mottles. The B23t horizon is clay with mottles of red or yellowish red and light brownish gray or gray. Some profiles have a B3 horizon, about 6 inches thick, of silty clay loam or sandy clay loam with the same colors as the B23t horizon. The C horizon is alternate thin layers of red, yellowish-red, brown and light brownish-gray, or gray silty clay loam, loam, or sandy clay loam. Reaction is medium acid or strongly acid in the A horizon and strongly acid to extremely acid in the B and C horizons.

Some of the Kirvin soils have a solum less than 40 inches thick and are outside the defined range of the series. This characteristic does not alter their usefulness or behavior.

The Kirvin soils are associated with Cahaba, Leaf, Norfolk, and Sacul soils. Kirvin soils are not mottled with gray as near the surface as the Sacul soils. They are redder and better drained than Leaf soils. The Kirvin soils are finer textured and more mottled than Cahaba and Norfolk soils and have a redder B horizon than the Norfolk soils.

Kirvin fine sandy loam, 3 to 8 percent slopes (KfC).—This soil has the profile described as representative for the series. It has a surface layer of very dark grayish-brown to brown fine sandy loam about 6 inches thick. The subsurface layer is yellowish-brown or brownish-yellow to reddish-yellow fine sandy loam about 15 inches thick. The subsoil extends to a depth of 55 inches below the surface. The upper 29 inches of the subsoil is yellowish-red or red clay or silty clay with dark-red and pale-brown mottles in the lower part. The lower part is mottled red, yellowish-red, and gray or light brownish-gray clay or silty clay. The material below the subsoil is alternate layers of red, yellowish-red or brown, and gray or light brownish-gray silty clay loam, loam, or sandy clay loam. A few spots of Cahaba, Leaf, Norfolk, and Sacul soils were included with this soil in mapping.

This soil is medium acid or strongly acid in the surface and subsurface layers and strongly acid to extremely acid below. It is low in natural fertility. The available water capacity is moderate. Permeability is moderately slow. Runoff is rapid, and erosion is a severe hazard. Response to fertilizer and lime is moderate.

Most of the acreage is used for shortleaf and loblolly pine or mixed pine and hardwood forest. A few small areas are used for pasture, and others are idle. Capability unit IIIe–2; woodland group 3o1.

Kirvin fine sandy loam, 8 to 20 percent slopes (KfE).—This soil has a surface layer of very dark grayish-brown to brown fine sandy loam 1 to 5 inches thick. The subsurface layer is 2 to 8 inches of yellowish-brown or brownish-yellow to reddish-yellow fine sandy loam. The subsoil extends to a depth of 45 to 60 inches below the surface. The upper part of the subsoil is yellowish-red or red clay or silty clay. The next layer is yellowish-red or red clay or silty clay that has dark-red and pale-brown mottles. The lower part has mottles of red, yellowish-red and gray, or light brownish-gray clay or silty clay. The material below the subsoil is alternate layers of red, yellowish-red, brown and gray, or light-brownish-gray silty clay loam, loam, or sandy clay loam. A few spots of Cahaba, Norfolk, and Sacul soils were included with this soil in mapping.

This soil is medium acid or strongly acid in the surface and subsurface layers and strongly acid to extremely acid below. It is low in natural fertility. The available water capacity is moderate. Runoff is very rapid, and erosion is a severe hazard.

Most of the acreage is used for shortleaf and loblolly pines or mixed pine and hardwood forest. A few small areas are used for pasture, and others are idle. Capability unit VIe–1; woodland group 3o1.

Kirvin-Norfolk association, undulating (KNB).—This association is on ridgetops throughout the western two-thirds of the county. The areas range from about 100 acres to more than 200 acres in size. Slopes range from

1 to 8 percent. The Kirvin soils make up 35 to 75 percent of each area and the Norfolk soils 15 to 50 percent. Included in mapping, and making up from 10 to 25 percent of each mapped area, were spots of Cahaba and Sacul soils.

Kirvin soils have a surface layer of very dark grayish-brown to brown fine sandy loam 1 to 6 inches thick. The subsurface layer is 6 to 10 inches of yellowish-brown or brownish-yellow to reddish-yellow fine sandy loam. The subsoil extends to depths of 45 to 60 inches below the surface. The upper part of the subsoil is yellowish-red or red clay or silty clay. The middle part is yellowish-red or red clay or silty clay mottled dark red and pale brown. The lower part is mottled shades of red and gray clay or silty clay. The material below the subsoil is alternate layers of red, brown, and gray silty clay loam, loam, or sandy clay loam.

Norfolk soils have a surface layer of very dark grayish-brown to dark-brown fine sandy loam 2 to 8 inches thick. The subsurface layer is 9 to 20 inches of pale-brown to yellowish-brown fine sandy loam. The subsoil extends from 60 inches to more than 72 inches below the surface. It is yellowish-brown to strong-brown sandy clay loam or loam mottled in the lower part with shades of brown, red, and gray. Below the subsoil is red to yellowish-brown sandy loam mottled light gray in most areas.

These soils are medium acid to very strongly acid in the surface and subsurface layers. Below, they are strongly acid to extremely acid. They are low in natural fertility. Permeability is moderate in the Norfolk soils and moderately slow in the Kirvin soils. The available water capacity is moderate. Runoff is medium to rapid, and erosion is a severe hazard.

All areas are used for loblolly and shortleaf pines or mixed pine and hardwood forest. Kirvin soils in capability unit IIIe-2, Norfolk soils in capability unit IIIe-1; both soils in woodland group 3o1.

Kirvin-Sacul association, rolling (KSC).—This association is on sides of ridges throughout the western two-thirds of the county. The areas range from about 100 acres to more than 2,000 acres in size. Slopes range from 8 to 20 percent. The Kirvin soils make up 40 to 75 percent of each area and the Sacul soils 15 to 40 percent. Included in mapping, and making up from 10 to 25 percent of each mapped area, were spots of Cahaba and Norfolk soils.

Kirvin soils have a surface layer of very dark grayish-brown to brown fine sandy loam 1 to 5 inches thick. The subsurface layer is 4 to 11 inches of yellowish-brown or brownish-yellow to reddish-yellow fine sandy loam. The subsoil extends 45 to 60 inches below the surface. The upper part of the subsoil is yellowish-red or red clay or silty clay. The next layer is yellowish-red clay or silty clay mottled dark red and pale brown. The lower part is mottled shades of red and gray clay or silty clay. The material below the subsoil is alternate layers of shades of red, brown, and gray silty clay loam, loam, or sandy clay loam.

Sacul soils have a surface layer of dark grayish-brown or brown fine sandy loam 1 to 4 inches thick. The subsurface layer is 4 to 10 inches of pale-brown or brown fine sandy loam. The subsoil extends to a depth of 60 to 72 inches or more below the surface. The upper part of the subsoil is 10 to 16 inches of yellowish-red or red clay or silty clay. The lower part is mottled red or yellowish-red and gray or light brownish-gray clay or silty clay that grades with depth into silty clay loam. In places below the subsoil are layers of red, yellow, and gray sandy loam and sandy clay loam.

The Sacul and Kirvin soils are similar in many respects. Sacul soils are mottled with shades of gray higher in the subsoil than are Kirvin soils. These soils are medium acid or strongly acid in the surface and subsurface layers, and strongly acid to extremely acid below. They are low in natural fertility. Permeability is slow in the Sacul soils and moderately slow in the Kirvin soils. Available water capacity is moderate to high. Runoff is very rapid, and erosion is a severe hazard.

All areas are used for shortleaf and loblolly pines or mixed pine and hardwood forest. Both soils in capability unit VIe-1; Kirvin soils in woodland group 3o1, Sacul soils in woodland group 3c2.

Kirvin-Sacul association, hilly (KSD).—This association is on steep breaks of the sides of ridges that border the west side of the Ouachita River flood plains. The areas are 100 acres to more than 2,000 acres in size. Slopes range from 20 to 40 percent. The Kirvin soils make up 50 to 80 percent of each area and the Sacul soils 10 to 35 percent. Included in mapping, and making up from 10 to 15 percent of each mapped area, were spots of Cahaba and Norfolk soils.

Kirvin soils have a surface layer of very dark grayish-brown to brown fine sandy loam 1 to 4 inches thick. The subsurface layer is 3 to 8 inches of yellowish-brown or brownish-yellow to reddish-yellow fine sandy loam. The subsoil extends 45 to 60 inches below the surface. The upper part of the subsoil is yellowish-red or red clay or silty clay. The next layer is yellowish-red or red clay or silty clay mottled dark red and pale brown. The lower part is mottled shades of red and gray clay or silty clay. The material below the subsoil is alternate layers of red, brown, and gray silty clay loam, loam, or sandy clay loam.

Sacul soils have a surface layer of dark grayish-brown or brown fine sandy loam 1 to 3 inches thick. The subsurface layer is 4 to 8 inches of pale-brown or brown fine sandy loam. The subsoil extends 72 inches or more below the surface. The upper part of the subsoil, 10 to 16 inches thick, is yellowish-red or red clay or silty clay. The lower part is mottled red or yellowish-red and gray or light brownish-gray clay or silty clay that grades into silty clay loam. In places below the subsoil are layers of red, yellow, and gray sandy clay loam and sandy loam.

The Sacul and Kirvin soils are similar in many respects. Sacul soils are mottled with shades of gray higher in the subsoil than the Kirvin soils. The Sacul and Kirvin soils are medium acid or strongly acid in the surface and subsurface layers and strongly acid to extremely acid below. They are low in natural fertility. Permeability is slow in the Sacul soils and moderately slow in the Kirvin soils. Available water capacity is moderate to high. Runoff is rapid, and erosion is a very severe hazard.

All areas are used for shortleaf and loblolly pines or mixed pine and hardwood forest. Both soils in capability unit VIIe-1; Kirvin soils in woodland group 3r2, Sacul soils in woodland group 3c2.

Leadvale Series

The Leadvale series consists of nearly level, moderately well drained soils. Permeability is moderately slow. In a representative profile the surface layer is dark grayish-brown silt loam about 2 inches thick. The subsurface layer is brown silt loam about 6 inches thick. The upper 15 inches of the subsoil is strong-brown silt loam. Below this is a firm, brittle fragipan of strong-brown silt loam mottled with pale brown and light brownish gray.

Representative profile of Leadvale silt loam, 1 to 3 percent slopes, in a moist wooded area in the SW¼SW¼NW¼ sec. 23, T. 11 S., R. 17 W.:

A1—0 to 2 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; friable; strongly acid; clear, smooth boundary.

A2—2 to 8 inches, brown (10YR 5/3) silt loam; weak, fine, subangular blocky structure; friable; strongly acid; clear, smooth boundary.

B2t—8 to 23 inches, strong-brown (7.5YR 5/6) silt loam; moderate, medium, subangular blocky structure; firm; common, thin, patchy clay films on peds; strongly acid; clear, smooth boundary.

Bx1—23 to 40 inches, strong-brown (7.5YR 5/8) silt loam; many, medium, distinct, pale-brown (10YR 6/3) mottles; moderate, medium, subangular blocky structure; firm; compact and brittle; common, thin clay films on peds; common dark concretions; black stains on some ped faces; very strongly acid; gradual, smooth boundary.

Bx2—40 to 63 inches, strong-brown (7.5YR 5/8) silt loam; many, medium, distinct, light brownish-gray (10YR 6/2) mottles and common, medium, distinct, pale-brown (10YR 6/3) mottles; moderate, medium, subangular blocky structure; firm; compact and brittle; common, thin clay films on peds; few dark concretions; very strongly acid.

The A1 or Ap horizon is dark grayish brown or dark brown. The A2 horizon is brown or pale brown. The B2t horizon is brown or strong brown. The Bx horizons are strong brown or yellowish brown with common to many, medium and coarse, pale-brown, light yellowish-brown, or light brownish-gray mottles. Reaction is medium acid or strongly acid in the A horizon and strongly acid to very strongly acid in the B horizon.

The Leadvale soils are associated with the Cahaba and Pheba soils. They have a browner B horizon, are not so well drained, and have a mottled fragipan which the Cahaba soils lack. Leadvale soils are browner in the B horizon, better drained, and contain more clay than the Pheba soils.

Leadvale silt loam, 1 to 3 percent slopes (LeB).—This is the only Leadville soil mapped in the county. It has a surface layer of dark grayish-brown or dark-brown silt loam about 2 inches thick. The subsurface layer is brown or pale-brown silt loam about 6 inches thick. The upper 15 inches of the subsoil is strong-brown or brown silt loam. Below this is a firm, brittle fragipan of strong-brown or yellowish-brown silt loam mottled with pale brown, light yellowish-brown, or light brownish gray. A few spots of Cahaba and Pheba soils were included with this soil in mapping.

This soil is medium acid or strongly acid in the surface and subsurface layers and strongly acid or very strongly acid below. It is low in natural fertility. Available water capacity is moderate. Runoff is medium, and erosion is a moderate hazard. Permeability is moderately slow. Response to fertilizer and lime is moderate.

About one-half of the acreage is used for shortleaf and loblolly pines or mixed pine and hardwood forest. The rest is used for cotton, soybeans, corn, small grain, and pasture. Capability unit IIe-1; woodland group 3o7.

Leaf Series

The Leaf series consists of level to nearly level, poorly drained, slowly permeable to very slowly permeable soils on uplands and on low stream terraces on flood plains. In a representative profile, the surface layer is grayish-brown silt loam 6 inches thick. The subsoil extends 65 inches or more below the surface. It is light brownish-gray silty clay mottled with shades of red and brown.

Representative profile of Leaf silt loam in a moist wooded area in the NW¼NW¼SW¼ sec. 17, T. 15 S., R. 17 W.:

O1—¾ to ¼ inch, loose hardwood leaves and pine needles.

O2—¼ inch to 0, partially decayed organic debris.

A1—0 to 6 inches, grayish-brown (10YR 5/2) silt loam; weak, fine, subangular blocky structure; firm; many fine roots; very strongly acid; clear, smooth boundary.

B21tg—6 to 10 inches, light brownish-gray (10YR 6/2) silty clay; many, medium, distinct, yellowish-brown (10YR 5/8) mottles; moderate, fine and medium, subangular blocky structure; firm; common clay films; many fine roots; very strongly acid; clear, smooth boundary.

B22tg—10 to 28 inches, light brownish-gray (10YR 6/2) silty clay; common, medium, prominent, yellowish-red (5YR 5/6) mottles; moderate, fine and medium, subangular blocky structure; firm; many clay films; few medium roots; very strongly acid; gradual, smooth boundary.

B23tg—28 to 65 inches, light brownish-gray (10YR 6/2) silty clay; common, medium, prominent, yellowish-red (5YR 4/6) mottles and distinct, yellowish-brown (10YR 5/8) mottles; moderate, medium, subangular blocky structure; firm; many clay films; very strongly acid.

The A1 or Ap horizon is dark grayish-brown or grayish-brown silt loam or silty clay loam. The B horizon is light brownish-gray or gray silty clay or clay mottled with yellowish brown, yellowish red, and brown. Reaction is medium acid to very strongly acid in the A horizon and strongly acid or very strongly acid in the B horizon.

The Leaf soils are associated with Amy, Bibb, Kirvin, and Sacul soils. They have a grayer B horizon and are more poorly drained than Sacul and Kirvin soils. They contain more clay than Amy and Bibb soils and have a developed B horizon which Bibb soils lack.

Leaf silt loam (Lf).—This is the only Leaf soil mapped in the county. It is a level and nearly level soil and has a surface layer of dark grayish-brown or grayish-brown silt loam about 6 inches thick. The subsoil extends 65 inches or more below the surface. It is light brownish-gray or gray silty clay or clay mottled with shades of red and brown. A few spots of Sacul and Kirvin soils were included with this soil in mapping.

This soil is medium acid to very strongly acid in the surface layer and strongly acid or very strongly acid below. It is low in natural fertility. The available water capacity is high. Permeability is slow to very slow. Runoff is slow, and wetness is a severe hazard. The erosion hazard is moderate because of the limited thickness of the surface layer overlying the very slowly permeable clayey subsoil. Response to fertilizer and lime is moderate.

Most of the acreage is used for mixed loblolly and shortleaf pines and hardwoods. Most of the cleared areas are used for pasture, but a few are idle. Capability unit IVw-1; woodland group 2w9a.

Lobelville Series

The Lobelville series consists of level, moderately well drained, moderately permeable soils on low stream terraces and natural levees on flood plains. In a representative profile the surface layer is stratified dark-brown fine sandy loam about 16 inches thick. The upper 8 inches of the subsoil is brown, mottled silty clay loam. The lower part, 32 inches thick, is light brownish-gray, mottled silty clay loam. Below the subsoil is gray, mottled silty clay loam.

Representative profile of Lobelville fine sandy loam in a moist wooded area in the SW¼SE¼NW¼ sec. 29, T. 15 S., R. 19 W.:

O1—½ to ¼ inch, loose hardwood leaves.
O2—¼ inch to 0, partly decayed organic debris.
A11—0 to 4 inches, dark-brown (10YR 4/3) fine sandy loam; moderate, medium, granular structure; very friable; many fine roots; very strongly acid; clear, smooth boundary.
A12—4 to 11 inches, brown (10YR 5/3) fine sandy loam; weak, fine, subangular blocky structure; very friable; many roots; very strongly acid; clear, wavy boundary.
Ab—11 to 16 inches, dark-brown (10YR 4/3) fine sandy loam; weak, fine, subangular blocky structure; friable; common fine roots; few large roots; very strongly acid; clear, smooth boundary.
B21—16 to 24 inches, brown (10YR 5/3) silty clay loam; many, medium, distinct, light brownish-gray (10YR 6/2) mottles; weak, medium, subangular blocky structure; firm; common fine roots; very strongly acid; clear, smooth boundary.
B22g—24 to 56 inches, light brownish-gray (10YR 6/2) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; firm; extremely acid; gradual, smooth boundary.
Cg—56 to 72 inches, gray (10YR 6/1) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; massive; firm; extremely acid.

The A11 or Ap horizon is dark brown or dark grayish brown. The A12 horizon is brown or grayish brown. The Ab horizon is dark brown or dark grayish brown. The B21 horizon is brown or pale-brown silty clay loam or clay loam with common to many, medium and coarse, gray or light brownish-gray mottles. The B22g and Cg horizons are light brownish-gray or gray silty clay loam or clay loam with common to many, medium and coarse, yellowish-brown mottles. Reaction is medium acid to very strongly acid in the A horizon and very strongly acid or extremely acid in the B and C horizons.

The Lobelville soils in this survey lack chert fragments. The soils are enough like the defined series in other characteristics that their behavior and usefulness are not altered and a new series is not warranted.

The Lobelville soils are associated with the Amy and Bibb soils. Lobelville soils are browner and better drained than Amy and Bibb soils. They contain more clay than the Bibb soils and more sand than the Amy soils.

Lobelville fine sandy loam (Lo).—This is the only Lobelville soil mapped in the county. It has a surface layer of fine sandy loam about 16 inches thick. The surface layer is dark brown or dark grayish brown in the upper part, brown in the middle part, and dark brown to dark grayish brown in the lower part. The upper 8 inches of the subsoil is brown silty clay loam mottled with gray or light brownish gray. The lower part, about 32 inches thick, is brownish-gray silty clay loam mottled with yellowish brown. Below the subsoil is similar material that lacks structure and is massive. A few spots of Amy and Bibb soils were included with this soil in mapping.

This soil is medium acid to very strongly acid in the surface layer and very strongly acid or extremely acid below. It has moderate natural fertility. The available water capacity is moderate. Water moves through this soil at a moderate rate. Runoff is slow, and excess water is a severe hazard because of frequent overflow. The water table is near the surface in winter and early in spring.

Frequent floods severely limit the choice of crops that can be grown. Where it is not subject to scouring by rapidly flowing flood water, this soil is suited to crops that require only a short growing season, such as soybeans. Most of the acreage is used for pasture and for hardwood forest. There are a few areas of loblolly pine. Capability unit IVw-2; woodland group 1w8.

Lucy Series

The Lucy series consists of gently sloping, well-drained, moderately permeable soils. In a representative profile the surface layer is dark grayish-brown loamy fine sand about 1 inch thick. The subsurface layer is light yellowish-brown loamy fine sand about 29 inches thick. The subsoil is about 34 inches of red sandy clay loam over about 8 inches of red loam.

Representative profile of Lucy loamy fine sand, 3 to 8 percent slopes, in a moist wooded area in the SE¼SE¼NW¼ sec. 35, T. 12 S., R. 19 W.:

O1—½ to ¼ inch, pine needles and hardwood leaves.
O2—¼ inch to 0, partially decayed organic debris.
A1—0 to 1 inch, dark grayish-brown (10YR 4/2) loamy fine sand; single grain; loose; many fine roots; medium acid; abrupt, smooth boundary.
A2—1 to 30 inches, light yellowish-brown (10YR 6/4) loamy fine sand; single grain; loose; common fine and medium roots; medium acid; clear, smooth boundary.
B2t—30 to 64 inches, red (2.5YR 5/8) sandy clay loam; weak to moderate, medium, subangular blocky structure; friable; few medium roots; common, thin, patchy clay films; strongly acid; clear, smooth boundary.
B3—64 to 72 inches, red (2.5YR 4/6) loam; weak, fine, subangular blocky structure; friable; strongly acid.

The A1 or Ap horizon ranges from dark grayish brown to dark brown. The A2 horizon ranges from pale brown to yellowish brown. The B2t horizon is yellowish red or red sandy loam, loam, or sandy clay loam. The B3 horizon is yellowish-red or red loam or sandy loam. Reaction is medium acid or strongly acid in the A horizon and strongly acid to very strongly acid in the B horizon.

The Lucy soils are associated with the Alaga, Cahaba, and Norfolk soils. Lucy soils have a thicker, coarser textured A horizon than Cahaba and Norfolk soils and are redder in the B horizon than Norfolk soils. The Lucy soils have a B horizon with accumulated clay which the Alaga soils lack.

Lucy loamy fine sand, 3 to 8 percent slopes (LuC).—This is the only Lucy soil mapped in the county. It has a surface layer of dark grayish-brown or dark-brown loamy fine sand 1 to 4 inches thick. The subsurface layer is 20 to 35 inches of pale-brown to yellowish-brown loamy fine sand. The subsoil is about 34 inches of yellowish-red to red sandy loam, loam, or sandy clay loam. It overlies yellowish-red or red loam or sandy loam. A few spots of Alaga, Cahaba, and Norfolk soils were included with this soil in mapping.

This soil is medium acid or strongly acid in the surface and subsurface layers and strongly acid or very strongly acid below. It is low in natural fertility. The available water capacity is low in the upper 21 to 39 inches and moderate below. The soil is droughty. Runoff is slow, because water moves rapidly into the upper layers of the soil. Permeability is moderate. Erosion is a moderate hazard. Response to fertilizer and lime is poor.

Most of the acreage is used for shortleaf and loblolly pine or mixed pine and hardwood forest. Most of the cleared areas are used for pasture, watermelons, or cantaloupes, and some are idle. Capability unit IIIs–1; woodland group 3s2.

Mashulaville Series

The Mashulaville series consists of level, poorly drained, slowly permeable soils. In a representative profile the surface layer is dark grayish-brown silt loam about 2 inches thick. The subsurface layer is light brownish-gray silt loam about 7 inches thick. The subsoil extends to about 60 inches below the surface. The upper part is 16 inches of gray silt loam mottled with yellowish brown. The middle part is a firm, brittle fragipan about 21 inches thick. It is silt loam mottled with shades of gray and brown. The lower part of the subsoil is grayish-brown, mottled silty clay.

Representative profile of Mashulaville silt loam, in a moist wooded area in the NW¼NW¼SW¼ sec. 22, T. 12 S., R. 16 W.:

A1—0 to 2 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; friable; many fine roots; strongly acid; clear, smooth boundary.

A2—2 to 9 inches, light brownish-gray (10YR 6/2) silt loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, fine, subangular blocky structure; friable; few fine roots; strongly acid; clear, smooth boundary.

B21g—9 to 25 inches, gray (10YR 6/1) silt loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; friable; few roots; strongly acid; clear, smooth boundary.

Bx—25 to 46 inches, mottled, gray (10YR 6/1) and yellowish-brown (10YR 5/8) silt loam; weak, medium, subangular blocky structure; firm; compact and brittle; common, thin, patchy clay films; few, fine, dark concretions; very strongly acid; clear, smooth boundary.

B22t—46 to 60 inches, grayish-brown (10YR 5/2) silty clay; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; firm; continuous clay films on peds; very strongly acid.

The A1 or Ap horizon is dark grayish brown or dark brown. The A2 horizon is gray or light brownish gray with common to many, medium and coarse, yellowish-brown or brown mottles. The B21g horizon is gray or light brownish gray with common to many, medium or coarse, yellowish-brown mottles. The Bx horizon is mottled gray, light brownish gray, yellowish brown, or brown. The B22t horizon is grayish-brown or light brownish-gray silty clay loam or silty clay with common to many, medium and coarse, yellowish-brown mottles. Reaction is medium acid or strongly acid in the A horizon and strongly acid or very strongly acid in the B horizon.

The Mashulaville soils are associated with the Amy and Pheba soils. Mashulaville soils are grayer and more poorly drained than the Pheba soils. They contain more sand than the Amy soils, which do not have a fragipan.

Mashulaville silt loam (Ma).—This is the only Mashulaville soil mapped in the county. It is level and has a surface layer of grayish-brown or dark-brown silt loam about 2 inches thick. The subsurface layer is gray or light brownish-gray mottled silt loam about 7 inches thick. The upper 16 inches of the subsoil is light brownish-gray or gray silt loam mottled with yellowish brown. The next layer is a firm, brittle fragipan about 21 inches thick. It is silt loam mottled with shades of gray and brown. Below this is grayish-brown or light brownish-gray silty clay loam or silty clay mottled with yellowish brown. A few spots of Amy and Pheba soils were included with this soil in mapping.

This soil is medium acid or strongly acid in the surface and subsurface layers and strongly acid or very strongly acid below. It is low in natural fertility. The available water capacity is moderate. Permeability is slow. Runoff is very slow to ponded, and wetness is a severe hazard. The water table is at or near the surface during winter and early in spring. Response to fertilizer and lime is moderate.

Most of this soil is used for shortleaf and loblolly pines or mixed pine and hardwood forest. Most of the cleared areas are used for pasture, and some are used for soybeans. Capability unit IVw–1; woodland group 3w9.

Norfolk Series

The Norfolk series consists of nearly level to gently sloping, well-drained, moderately permeable soils. In a representative profile the surface layer is dark grayish-brown fine sandy loam about 7 inches thick. The subsurface layer is pale-brown fine sandy loam about 14 inches thick. The subsoil is yellowish-brown sandy clay loam mottled with shades of red, brown, and gray in the lower part. The underlying material, at a depth of about 63 inches to more than 72 inches, is red sandy loam mottled with light gray.

Representative profile of Norfolk fine sandy loam, 1 to 3 percent slopes, in a moist wooded area in the NW¼NW¼NE¼ sec. 12, T. 14 S., R. 18 W.:

O2—1 inch to 0, organic debris.

A1—0 to 7 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine, granular structure; very friable; many fine roots; very strongly acid; clear, smooth boundary.

A2—7 to 21 inches, pale-brown (10YR 6/3) fine sandy loam; weak, fine, granular structure; very friable; common fine roots; medium acid; gradual, smooth boundary.

B21t—21 to 36 inches, yellowish-brown (10YR 5/6) sandy clay loam; weak, medium, subangular blocky structure; friable; patchy clay films on peds; sand grains coated and bridged with clay; few roots; strongly acid; gradual, wavy boundary.

B22t—36 to 49 inches, yellowish-brown (10YR 5/6) sandy clay loam; common, medium, faint, brown (10YR 5/3) mottles; moderate, medium, subangular blocky structure; friable; patchy clay films; sand grains coated and bridged with clay; few roots; common, fine and medium, black concretions; few, soft, dark-brown masses with firm centers; strongly acid; gradual, wavy boundary.

B23t—49 to 63 inches, yellowish-brown (10YR 5/6) sandy clay loam; common, coarse, prominent, red (2.5YR 4/8) mottles and many, medium, faint, light brownish-gray (10YR 6/2) mottles; moderate, medium, subangular blocky structure; friable; many pores; patchy clay films on peds and in pores; sand grains coated and bridged with clay; few dark concretions; strongly acid; abrupt, wavy boundary.

C—63 to 72 inches, red (2.5YR 4/6) sandy loam; common, coarse, prominent, light-gray (10YR 7/2) mottles; massive; firm; boundaries between mottles and matrix are abrupt and distinct; some mottles have strong-brown (7.5YR 5/6) stains along outer edges; strongly acid.

The A1 or Ap horizon ranges from very dark grayish brown to dark brown. The A2 horizon ranges from pale brown to yellowish brown. The B21t and B22t horizons are yellowish-brown or strong-brown sandy clay loam or loam. The B23t horizon has common to many, medium and coarse, red and pale-brown or light brownish-gray mottles. The C horizon is red to yellowish brown and lacks mottling in many profiles. Reaction is medium acid to very strongly acid in the A horizon and strongly acid or very strongly acid in the B and C horizons.

The Norfolk soils are associated with Alaga, Cahaba, Goldsboro, Kirvin, Lucy, and Saffell soils. They are yellower in the B horizon than Cahaba, Kirvin, Lucy, and Saffell soils. They are coarser textured in the B horizon than Kirvin soils, have a thinner, finer textured A horizon than Lucy soils, and lack the high gravel content of Saffell soils. Norfolk soils lack mottles in the upper part of the B horizon which Goldsboro soils have. They are finer textured and have a developed B horizon, which Alaga soils lack.

Norfolk fine sandy loam, 1 to 3 percent slopes (NoB).—This soil has the profile described as representative for the series. The surface layer is very dark grayish-brown to dark-brown fine sandy loam about 7 inches thick. The subsurface layer is pale-brown to yellowish-brown fine sandy loam about 14 inches thick. The subsoil is yellowish-brown to strong-brown sandy clay loam or loam mottled in the lower part with shades of red, brown, and gray. The material below the subsoil, at a depth of 60 inches to more than 72 inches, is red to yellowish-brown sandy loam mottled with light-gray in most areas. A few spots of Alaga, Cahaba, Goldsboro, and Saffell soils were included with this soil in mapping.

This soil is medium acid to very strongly acid in the surface layer and strongly acid or very strongly acid below. It is low in natural fertility. The available water capacity is moderate. Permeability is moderate. Runoff is slow to medium, and erosion is a moderate hazard. This soil is easy to till. Response to fertilizer and lime is moderate.

About one-half of the acreage is used for shortleaf and loblolly pine or mixed pine and hardwood forest. The rest is used for cotton, soybeans, corn, small grain, and pasture. Capability unit IIe–1; woodland group 3o1.

Norfolk fine sandy loam, 3 to 8 percent slopes (NoC).—This soil has a surface layer of very dark grayish-brown to dark-brown fine sandy loam 2 to 6 inches thick. The subsurface layer is 9 to 20 inches of pale-brown to yellowish-brown fine sandy loam. The subsoil is yellowish-brown to strong-brown sandy clay loam or loam mottled in the lower part with shades of red, brown, and gray. The material below the subsoil, at a depth of 60 inches to more than 72 inches, is red to yellowish-brown sandy loam mottled with light gray in most areas. A few spots of Alaga, Cahaba, Goldsboro, Kirvin, Lucy, and Saffell soils were included with this soil in mapping.

This soil is medium acid to very strongly acid in the surface layer and strongly acid or very strongly acid below. It is low in natural fertility. The available water capacity is moderate. Permeability is moderate. Runoff is medium to rapid, and erosion is a severe hazard. This soil is easy to till. Response to fertilizer and lime is moderate.

Most of the acreage is used for shortleaf and loblolly pines (fig. 7) or mixed pine and hardwood forest. The rest is used for cotton, soybeans, corn, small grain, and pasture. Capability unit IIIe–1; woodland group 3o1.

Oil-Waste Land

Oil-waste land (Os) occurs throughout the southeastern part of the county. It has been severely polluted with crude oil and salt water from oil fields. Most of the areas are in level creek bottoms where the oil and salt water have spread out after rainfall. They are ordinarily denuded of vegetation (fig. 8) and are so polluted with oil and salt that soil characteristics cannot be determined with any degree of accuracy. During dry seasons the oil and salt form a crust on the land, and during wet periods the material is soft and mushy.

This land is not suited to any farm use. A few spots of Bibb, Smithton, and Norfolk soils were included in mapping. Capability unit VIIIs–1; woodland group 5t0.

Ouachita Series

The Ouachita series consists of level and nearly level, well-drained soils on low terraces and natural levees on flood plains. Permeability is moderately slow. In a rep-

Figure 7.—**Typical stand of uneven-aged shortleaf and loblolly pine on Norfolk fine sandy loam, 3 to 8 percent slopes.**

Figure 8.—**Oil-waste land showing stumps of dead trees and lack of vegetation. Oil and salt water that caused this damage is from the oil wells in the background.**

resentative profile the surface layer is brown silt loam about 5 inches thick. The subsurface layer is dark yellowish-brown silt loam about 14 inches thick. The subsoil extends to nearly 6 feet below the surface. It is dark yellowish-brown, dark grayish-brown, and yellowish-brown silty clay loam. The material beneath the subsoil is yellowish-brown fine sandy loam.

Representative profile of Ouachita silt loam in a moist wooded area in the SW¼SW¼NE¼ sec. 10, T. 13 S., R. 17 W.:

A11—0 to 5 inches, brown (10YR 4/3) silt loam; weak, medium, granular structure; friable; many fine roots; medium acid; clear, smooth boundary.

A12—5 to 19 inches, dark yellowish-brown (10YR 4/4) silt loam; many, medium and common, fine, distinct, strong-brown (7.5YR 5/6) mottles; weak, medium, subangular blocky structure; friable; common fine roots; common fine pores; strongly acid; clear, smooth boundary.

B21—19 to 34 inches, dark yellowish-brown (10YR 4/4) silty clay loam; common, fine, faint, pale-brown (10YR 6/3) mottles; weak, medium, subangular blocky structure; firm; common fine pores; few fine roots; very strongly acid; abrupt, smooth boundary.

B22—34 to 42 inches, dark grayish-brown (10YR 4/2) silty clay loam; weak, medium, subangular blocky structure; firm; few fine roots; strongly acid; gradual, smooth boundary.

B23—42 to 69 inches, yellowish-brown (10YR 5/4) silty clay loam; weak, medium, subangular blocky structure; firm; strongly acid; gradual, smooth boundary.

C—69 to 77 inches, yellowish-brown (10YR 5/8) fine sandy loam; massive; friable; common fine pores; very strongly acid.

The A1, A11, or Ap horizon is brown or dark grayish brown. The A12 horizon is brown or dark yellowish brown. The B2 horizon ranges from dark grayish brown to yellowish brown. Its texture is silt loam or silty clay loam. Common to many, medium, distinct mottles of light brownish gray and gray are in some profiles at depths more than 24 inches from the surface. The C horizon is silty clay loam, fine sandy loam, or loam. In many profiles it is mottled with gray or light brownish gray. Reaction is medium acid or strongly acid in the A horizon and strongly acid or very strongly acid in the B and C horizons.

The Ouachita soils are associated with Amy, Bibb, and Ennis soils. Ouachita soils have lower sand content than the Ennis soils. They are browner than the Amy and Bibb soils and have lower sand content and higher clay content than Bibb soils.

Ouachita silt loam (Ot).—This level to nearly level soil has the profile described as representative for the series. The surface layer is brown or dark grayish-brown silt loam about 5 inches thick. The subsurface layer is brown to dark yellowish-brown silt loam about 4 inches thick. The subsoil extends to nearly 6 feet below the surface. It is dark yellowish-brown, dark grayish-brown, and yellowish-brown silt loam or silty clay loam. In some areas it is mottled with shades of gray in the lower parts. Below the subsoil is yellowish-brown loam, fine sandy loam, or silty clay loam commonly mottled with gray. A few spots of Amy, Bibb, Ennis, and Leaf soils were included with this soil in mapping.

This soil is medium acid or strongly acid in the surface layer and strongly acid or very strongly acid below. It is moderate in natural fertility. The available water capacity is high. Water moves through this soil at a moderately slow rate. Runoff is medium. This soil is subject to frequent flooding, but mainly in the winter and early in spring. Floods recede by June in most years. In areas not subject to scouring by rapidly flowing floodwater, this soil can be cultivated for crops that require only a short growing season.

Most of the acreage is used for soybeans and pasture. It is fairly well suited to grain sorghum. This soil is well suited to forest, and some areas are used for hardwoods and loblolly pine. Capability unit IVw–2; woodland group 1w8.

Ouachita association, frequently flooded (OU).—This association of level soils is on low stream terraces and natural levees along the larger streams. Ouachita soils make up from 55 to 88 percent of each area. Five to 25 percent of most areas are soils similar to the Ouachita soils, except that they have gray mottles at a depth of 15 to 24 inches. These soils are transitional between the Ouachita and Amy soils. Amy silt loam makes up 10 to 20 percent of each area. Spots of Bibb and Lobelville soils were included with this soil in mapping.

The well-drained Ouachita soils have a surface layer of dark grayish-brown or brown silt loam 2 to 6 inches thick. The subsurface layer is brown to dark yellowish-brown silt loam 7 to 15 inches thick. The subsoil extends from 4 to more than 6 feet below the surface. It is dark yellowish-brown, dark grayish-brown, and yellowish-brown silt loam or silty clay loam. It generally is mottled with gray in the lower part. Below the subsoil is yellowish-brown sandy loam to silty clay loam, usually mottled with gray.

The poorly drained Amy soils have a surface layer of dark grayish-brown to light brownish-gray silt loam 1 to 4 inches thick. The subsurface layer is grayish-brown silt loam 6 to 13 inches thick. The subsoil extends to about 25 inches below the surface. It is light gray or light brownish-gray silt loam or silty clay loam mottled with brown. Below the subsoil is light-gray or light brownish-gray, mottled silt loam.

The soils of this association are moderate to low in natural fertility. They are medium acid to very strongly acid in the upper part and strongly acid or very strongly acid in the lower part. Runoff is slow to ponded. Water moves through these soils at a moderately slow to slow rate. The available water capacity is high.

These soils are subject to frequent flooding, mainly in the winter and early in spring. Floods recede by June in most years.

All of the acreage is used for mixed hardwood and loblolly pine forest and is well suited to this use. In areas not subject to scouring by rapidly flowing floodwater, these soils can be used for pasture and for row crops that require only a short growing season. They are fairly well suited to soybeans and grain sorghum. Capability unit IVw–2; woodland group 1w8.

Pheba Series

The Pheba series consists of nearly level, somewhat poorly drained soils. Permeability is moderately slow. In a representative profile, the surface layer is very dark grayish-brown silt loam about 3 inches thick. The subsurface layer is brown silt loam 9 inches thick. The subsoil extends to more than 6 feet below the surface. The upper 12 inches of the subsoil is silt loam mottled pale brown, yellowish brown, brown, and light brownish gray. The lower part is a firm, brittle fragipan of silt loam mottled brown and gray.

Representative profile of Pheba silt loam, 1 to 3 percent slopes, in a moist wooded area in the NW¼NE¼SE¼ sec. 23, T. 13 S., R. 16 W.:

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; friable; medium acid; clear, smooth boundary.

A2—3 to 12 inches, brown (10YR 5/3) silt loam; weak, fine, subangular blocky structure; friable; few black concretions; medium acid; clear, smooth boundary.

B2—12 to 24 inches, mottled, pale-brown (10YR 6/3), light brownish-gray (10YR 6/2), brown (10YR 5/3), and yellowish-brown (10YR 5/4) silt loam; weak, medium, subangular blocky structure; friable; common black concretions; black stains on some ped faces; strongly acid; clear, smooth boundary.

Bx1—24 to 42 inches, mottled light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/4) silt loam; weak, medium, subangular blocky structure; firm; compact and brittle; common black concretions; black stains on some ped faces; few, thin, patchy clay films; strongly acid; clear, smooth boundary.

Bx2—42 to 54 inches, yellowish-brown (10YR 5/6) silt loam; common, medium, distinct, light brownish-gray (10YR 6/2) mottles; weak, medium, subangular blocky structure; firm; compact and brittle; patchy clay films on peds; black stains on some ped faces; strongly acid; clear, smooth boundary.

Bx3—54 to 72 inches, brown (10YR 5/3) silt loam; common, medium, distinct, light brownish-gray (10YR 6/2) mottles; weak, medium, subangular blocky structure; firm; compact and brittle; patchy clay films on peds; strongly acid.

The A1 or Ap horizon is very dark grayish brown or dark grayish brown. The A2 horizon is brown or pale brown. The Bx2 and Bx3 horizons are silt loam or silty clay loam. Reaction is medium acid or strongly acid in the A horizon and strongly acid or very strongly acid in the B horizon.

Pheba soils are associated with the Amy, Leadvale, and Mashulaville soils. They are grayer in the B horizon and more poorly drained than the Leadvale soils. They are browner and better drained than the Amy and Mashulaville soils. Pheba soils have a fragipan which the Amy soils lack. They contain less clay in the B horizon than the Amy and Leadvale soils.

Pheba silt loam, 1 to 3 percent slopes (PhB).—This is the only Pheba soil mapped in the county. It is a somewhat poorly drained soil that has a surface layer of very dark grayish-brown silt loam about 3 inches thick and a subsurface layer of brown silt loam 9 inches thick. The subsoil extends to more than 6 feet below the surface. The upper 12 inches of the subsoil is silt loam mottled pale brown, light brownish gray, brown, and yellowish brown. The lower part is a firm, brittle fragipan of silt loam or silty clay loam mottled with brown and gray. A few spots of Amy, Leadvale, and Mashulaville soils were included with this soil in mapping.

This soil is medium acid or strongly acid in the surface layer and strongly acid or very strongly acid below. It is low in natural fertility. The available water capacity is moderate. Permeability is moderately slow. Runoff is slow. Erosion is a slight hazard, and wetness is a severe hazard. Response to fertilizer and lime is moderate. Most of the acreage is used for shortleaf and loblolly pines or mixed pine and hardwood forest. The rest is used for pasture and soybeans. Capability unit IIIw–1; woodland group 2w8.

Sacul Series

The Sacul series consists of nearly level to hilly, moderately well drained, slowly permeable soils. In a representative profile the surface layer is dark grayish-brown fine sandy loam about 2 inches thick. The subsurface layer is brown fine sandy loam 8 inches thick. The upper 15 inches of the subsoil is red clay. The next layer is about 19 inches of red and light brownish-gray, mottled clay and silty clay. The lower part of the subsoil is mottled red and light brownish-gray silty clay loam.

Representative profile of Sacul fine sandy loam, 3 to 8 percent slopes, in a moist wooded area in the NE¼NW¼SW¼ sec. 17, T. 15 S., R. 19 W.:

O1—¾ to ¼ inch, loose, hardwood leaves.

O2—¼ inch to 0, partially decayed organic debris.

A1—0 to 2 inches, dark grayish-brown (10YR 4/2) fine sandy loam; moderate, medium, granular structure; very friable; many roots; strongly acid; abrupt, smooth boundary.

A2—2 to 10 inches, brown (10YR 5/3) fine sandy loam; weak, fine, subangular blocky structure; very friable; many roots; strongly acid; clear, smooth boundary.

B21t—10 to 25 inches, red (2.5YR 5/6) clay; strong, medium, angular blocky structure; firm; plastic; common fine roots; continuous clay films on peds; very strongly acid; clear, smooth boundary.

B22t—25 to 31 inches, red (2.5YR 5/6) clay; many, medium, prominent, light brownish-gray (10YR 6/2) mottles; strong, medium, angular blocky structure; firm; plastic; few fine roots; continuous thick clay films on peds; very strongly acid; clear, smooth boundary.

B23t—31 to 44 inches, mottled light brownish-gray (10YR 6/2) and red (2.5YR 5/6) silty clay; moderate, medium, angular blocky structure; firm; plastic; continuous thick clay films on peds; extremely acid; clear, smooth boundary.

B24t—44 to 56 inches, mottled light brownish-gray (10YR 6/2) and red (2.5YR 5/6) silty clay loam; moderate, medium, angular blocky structure; firm; plastic; continuous thick clay films on peds; extremely acid; clear, smooth boundary.

B3—56 to 72 inches, light brownish-gray (10YR 6/2) and yellowish-red (5YR 5/8), mottled silty clay loam with lenses of red (2.5YR 5/6) sandy loam; moderate, fine and medium, angular blocky and platy rock structure; firm; clay films on angular blocky peds; very strongly acid.

The A1 or Ap horizon is dark grayish brown or brown. The A2 horizon is brown or pale brown. The B21t and B22t horizons are red or yellowish-red clay or silty clay. The B22t horizon has common to many, medium and coarse, light brownish-gray or gray mottles. The B23t, B24t, and B3 horizons are mottled red or yellowish-red and light brownish-gray or gray silty clay or silty clay loam. Some profiles have a C horizon of stratified sandy loam and sandy clay loam in shades of red, yellow, and gray. Reaction is medium acid or strongly acid in the A horizon and strongly acid to extremely acid in the B and C horizons.

The Sacul soils are associated with the Kirvin and Leaf soils. Sacul soils are redder in the B horizon and better drained than the Leaf soils. They have mottles of gray higher in the profile than the Kirvin soils.

Sacul fine sandy loam, 1 to 3 percent slopes (SaB).—This soil has a surface layer of dark grayish-brown or brown fine sandy loam 2 to 4 inches thick. The subsurface layer is 6 to 10 inches of brown or pale-brown fine sandy loam. The subsoil extends to depths of 60 to 72 inches or more below the surface. The upper 10 to 16 inches of the subsoil is yellowish-red or red clay or silty clay. The lower part is mottled red or yellowish-red and gray or light brownish-gray clay or silty clay that grades with depth to silty clay loam. In places below the subsoil is stratified material of red, yellow, and gray sandy loam and sandy clay loam. A few spots of Leaf and Kirvin soils were included with this soil in mapping.

This soil is medium acid or strongly acid in the surface layer and strongly acid to extremely acid below. It is low in natural fertility. The available water capacity is moderate to high. Permeability is slow. Runoff is medium, and erosion is a severe hazard. Response to fertilizer and lime is moderate. Most of the acreage is used for shortleaf and loblolly pines or mixed pine and hardwood forest. A few small areas are used for pasture, and a few are idle. Capability unit IIIe–2; woodland group 3c2.

Sacul fine sandy loam, 3 to 8 percent slopes (SaC).—This soil has the profile described as representative for the series. It has a surface layer of dark grayish-brown or brown fine sandy loam 1 to 3 inches thick. The subsurface layer is 5 to 10 inches of brown or pale-brown fine sandy loam. The subsoil extends 60 to 72 inches or more below the surface. The upper 10 to 16 inches of the subsoil is yellowish-red or red clay or silty clay. The lower part is mottled red or yellowish-red and gray or light brownish-gray clay or silty clay that grades with depth to silty clay loam. In places below the subsoil is stratified material of red, yellow, and gray sandy loam and sandy clay loam. A few spots of Kirvin soils were included with this soil in mapping.

This soil is medium acid or strongly acid in the surface layer and strongly acid to extremely acid below. It is low in natural fertility. The available water capacity is moderate to high. Permeability is slow. Runoff is rapid, and erosion is a very severe hazard. Response to fertilizer and lime is moderate. Most of the acreage is used for shortleaf and loblolly pines or mixed pine and hardwood forest. A few small areas are used for pasture, and a few are idle. Capability unit IVe–2; woodland group 3c2.

Sacul fine sandy loam, 8 to 16 percent slopes (SaE).—This soil has a surface layer of dark grayish-brown or brown fine sandy loam 1 to 3 inches thick. The subsurface layer is 4 to 8 inches of brown or pale-brown fine sandy loam. The subsoil extends 60 to 72 inches or more below the surface. The upper 10 to 16 inches of the subsoil is yellowish-red or red clay or silty clay. The lower part is mottled red or yellowish-red and gray or light brownish-gray clay or silty clay that grades with depth to silty clay loam. In places below the subsoil is stratified material of red, yellow, and gray sandy loam and sandy clay loam. A few spots of Kirvin soils were included with this soil in mapping.

This soil is medium acid or strongly acid in the surface layer and strongly acid to extremely acid below. It is low in natural fertility. The available water capacity is moderate to high. Permeability is slow. Runoff is rapid, and erosion is a severe hazard. Practically all of the acreage is used for shortleaf and loblolly pines or mixed pine and hardwood forest. Capability unit VIe–1; woodland group 3c2.

Sacul-Kirvin association, undulating (SKB).—This association is on ridgetops throughout the western two-thirds of the county. The Sacul soils make up 45 to 75 percent of each area, and the Kirvin soils, 15 to 35 percent. The areas range from about 100 acres to more than 1,000 acres in size. Slopes range from 1 to 8 percent, but most are more than 3 percent. Included in mapping, and making up about 10 to 20 percent of each mapped area, were spots of Cahaba, Leaf, and Norfolk soils.

The moderately well drained Sacul soils have a surface layer of dark grayish-brown or brown fine sandy loam 1 to 4 inches thick. The subsurface layer is 4 to 10 inches of pale-brown or brown fine sandy loam. The subsoil extends 60 to 72 inches or more below the surface. The upper 10 to 16 inches of the subsoil is yellowish-red or red silty clay or clay. The lower part is mottled red or yellowish-red and gray or light brownish-gray clay or silty clay that grades with depth to silty clay loam. In places below the subsoil is stratified red, yellow, and gray sandy loam and sandy clay loam.

The well-drained Kirvin soils have a surface layer of very dark grayish-brown to brown fine sandy loam 1 to 5 inches thick. The subsurface layer is 4 to 11 inches of yellowish-brown or brownish-yellow to reddish-yellow fine sandy loam. The subsoil extends 45 to 60 inches below the surface. The upper part of the subsoil is yellowish-red or red clay or silty clay. The next layer is yellowish-red or red clay or silty clay mottled dark red and pale brown. The lower part of the subsoil is mottled shades of red and gray clay or silty clay. The material below the subsoil is alternate layers of red, brown, and gray silty clay loam, loam, or sandy clay loam.

The Sacul and Kirvin soils are similar in many respects. Sacul soils are mottled with gray higher in the subsoil than the Kirvin soils.

These soils are medium acid or strongly acid in the surface and subsurface layers and strongly acid to extremely acid below. They are low in natural fertility. Permeability is slow in the Sacul soils and moderately slow in the Kirvin soils. Available water capacity is moderate to high. Runoff is medium to rapid, and the erosion hazard is severe to very severe.

All areas are used for shortleaf and loblolly pines or mixed pine and hardwood forest. Sacul soils are in capability unit IVe–2, woodland group 3c2; Kirvin soils are in capability unit IIIe–2, woodland group 3o1.

Saffell Series

The Saffell series consists of nearly level to moderately sloping, moderately permeable, well-drained soils. In a representative profile the surface layer is dark grayish-brown gravelly sandy loam about 3 inches thick. The subsurface layer is brown gravelly sandy loam about 5 inches thick. The subsoil is yellowish red to reddish brown and extends to a depth of 47 inches below the surface. The upper part is gravelly sandy loam about 6 inches thick, and the lower part is gravelly sandy clay loam. Below the subsoil is light yellowish-brown gravelly loamy sand.

Representative profile of Saffell gravelly sandy loam, 3 to 10 percent slopes, in a moist wooded area in the SW¼SE¼NE¼ sec. 25, T. 11 S., R. 16 W.:

A1—0 to 3 inches, dark grayish-brown (10YR 4/2) gravelly sandy loam; weak, fine, granular structure; very friable; about 20 percent of volume is rounded gravel; strongly acid; clear, smooth boundary.

A2—3 to 8 inches, brown (10YR 5/3) gravelly sandy loam; weak, fine, granular structure; very friable; about 20 percent of volume is rounded gravel; strongly acid; clear, smooth boundary.

B1—8 to 14 inches, yellowish-red (5YR 5/6) gravelly sandy loam; weak, fine, subangular blocky structure; friable; about 35 percent of volume is rounded gravel; clay bridging between sand grains; strongly acid; gradual, smooth boundary.

B21t—14 to 30 inches, yellowish-red (5YR 4/6) gravelly sandy clay loam; moderate, fine, subangular blocky structure; firm; about 50 percent of volume is rounded gravel; thin, patchy clay films on peds; strongly acid; gradual, smooth boundary.

B22t—30 to 47 inches, reddish-brown (5YR 4/4) gravelly sandy loam; moderate, fine, subangular blocky structure; firm; about 60 percent of volume is rounded gravel; thin, patchy clay films on peds; strongly acid; clear, smooth boundary.

C—47 to 72 inches, light yellowish-brown (10YR 6/4) gravelly loamy sand; massive; very friable to loose; about 75 percent of volume is rounded gravel; strongly acid.

The A1 or Ap horizon is dark grayish brown or dark brown. The A2 horizon is yellowish brown to brown. Gravel content of the A horizon ranges from 15 to 25 percent. The B horizon is yellowish red to reddish brown. Content of gravel in the B1 horizon ranges from 25 to 40 percent, and from 35 to 70 percent in the B2t horizon. The C horizon is yellowish-brown to light yellowish brown gravelly loamy sand or gravelly sandy loam. Its gravel content ranges from 50 to 85 percent. Reaction is medium acid or strongly acid in the A horizon and strongly acid or very strongly acid in the B and C horizons.

The Saffell soils are associated with the Cahaba and Norfolk soils. Saffell soils are redder in the B horizon than the Norfolk soils. They have a high content of gravel which the Cahaba and Norfolk soils lack.

Saffell gravelly sandy loam, 1 to 3 percent slopes (SIB).—This soil has a surface layer of dark grayish-brown or dark-brown gravelly sandy loam 2 to 4 inches thick. The subsurface layer is yellowish-brown or brown gravelly sandy loam 5 to 8 inches thick. The subsoil is 4 to 9 inches of gravelly sandy loam over 20 to 30 inches of gravelly sandy clay loam. This material is yellowish red to reddish brown. Beneath it is yellowish-brown to light yellowish-brown gravelly sandy loam or gravelly loamy sand. A few spots of Cahaba and Norfolk soils were included with this soil in mapping.

This soil is medium acid or strongly acid in the surface layer and strongly acid or very strongly acid below. It is low in natural fertility. Permeability is moderate. The available water capacity is low. Runoff is slow to medium, and the hazard of erosion is moderate. This soil is somewhat droughty and is difficult to till because of its high gravel content. Response to fertilizer and lime is poor to moderate.

Most of the acreage is used for shortleaf and loblolly pine or mixed pine and hardwood forest. A few areas are used for cotton, soybeans, small grain, and pasture. Some areas have been mined for gravel and road fill. Capability unit IIe–2; woodland group 4f2.

Saffell gravelly sandy loam, 3 to 10 percent slopes (SlC).—This soil has the profile described as representative for the series. The surface layer is dark grayish-brown or dark-brown gravelly sandy loam 2 to 4 inches thick. The subsurface layer is 3 to 8 inches of yellowish-brown or brown gravelly sandy loam. The subsoil is 4 to 9 inches of gravelly sandy loam over 20 to 30 inches of gravelly sandy clay loam. Its color is yellowish red to reddish brown. Below the subsoil is yellowish-brown to light yellowish-brown gravelly sandy loam or gravelly loamy sand. A few spots of Cahaba and Norfolk soils were included with this soil in mapping.

This soil is medium acid or strongly acid in the surface layer and strongly acid or very strongly acid below. It is low in natural fertility. Permeability is moderate. The available water capacity is low. Runoff is medium to rapid, and the hazard of erosion is severe. This soil is somewhat droughty and is difficult to till because of its gravel content. Response to fertilizer and lime is poor to moderate.

Most of the acreage is used for shortleaf and loblolly pine or mixed pine and hardwood forest. Many small areas have been mined for gravel and road fill (fig. 9) Gravel pits are scattered over the northeastern part of the county. They range from 1 to 50 acres in size and are 5 to 15 feet deep. A few areas of this soil having more gentle slopes are used for cotton, soybeans, small grain, and pasture. Capability unit IIIe-3; woodland group 4f2.

Smithton Series

The Smithton series consists of level, poorly drained soils on broad upland flats. Permeability is moderately slow. In a representative profile the surface layer is dark grayish-brown fine sandy loam. The subsurface layer is grayish-brown fine sandy loam. Their combined thickness is about 10 inches. The subsoil extends more than 72 inches below the surface. It is light brownish-gray fine sandy loam mottled with yellowish brown.

Representative profile of Smithton fine sandy loam in a moist wooded area in the NW¼NE¼SW¼ sec. 6, T. 11 S., R. 15 W.:

O1—¾ to ¼ inch, loose pine needles and hardwood leaves.

O2—¼ inch to 0, partially decayed organic debris.

A1—0 to 1 inch, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine, granular structure; friable; many roots; few, small, black concretions; very strongly acid; abrupt, wavy boundary.

A2—1 to 10 inches, grayish-brown (10YR 5/2) fine sandy loam; weak, fine, subangular blocky structure; fria-

Figure 9.—**Sidewall of a gravel pit in Saffell gravelly sandy loam, 3 to 10 percent slopes.**

ble; many roots; few, small, black concretions; few fine pebbles; very strongly acid; clear, wavy boundary.

B11g—10 to 24 inches, light brownish-gray (10YR 6/2) fine sandy loam; many, medium, distinct, yellowish-brown (10YR 5/4) mottles; weak, medium, subangular blocky structure; friable; few roots; few, small, black concretions; some sand grains coated and bridged with clay; very strongly acid; gradual, smooth boundary.

B21tg—24 to 38 inches, light brownish-gray (10YR 6/2) fine sandy loam; many, medium, distinct, yellowish-brown (10YR 5/4) mottles; weak, medium, subangular blocky structure; friable; few roots; few, small, black concretions; most sand grains coated and bridged with clay; very strongly acid; gradual, smooth boundary.

B22tg—38 to 51 inches, mottled light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/4) fine sandy loam; weak, medium, subangular blocky structure; friable; sand grains coated and bridged with clay; few, small, black concretions; few fine pebbles; strongly acid; gradual, smooth boundary.

B23tg—51 to 72 inches, light brownish-gray (10YR 6/2) fine sandy loam; many, medium, distinct, yellowish-brown (10YR 5/4) mottles; weak, medium, subangular blocky structure; friable; few, small, black concretions; few fine pebbles; strongly acid.

The A1 horizon ranges from very dark grayish brown to grayish brown. The A2 horizon is grayish brown or light brownish gray with common, medium, distinct, yellowish-brown mottles in some places. Texture of the B horizon is fine sandy loam or loam. The B21tg and B22tg horizons have common to many, medium and coarse mottles. The B23tg horizon is gray or light brownish gray mottled yellowish brown or brown. Reaction is strongly acid or very strongly acid throughout the profile.

Some included soils have colors less gray than the range of the Smithton series. This characteristic does not alter their usefulness or behavior.

The Smithton soils are associated with the Amy, Goldsboro, and Mashulaville soils. Smithton soils contain more sand and less clay in the B horizon than the Amy soils. They lack the fragipan of the Mashulaville soils. Smithton soils are grayer and contain less clay in the B horizon than the Goldsboro soils.

Smithton fine sandy loam (Sm).—This is the only Smithton soil mapped in the county. This level soil has a surface layer of very dark grayish-brown to grayish-brown fine sandy loam 1 to 5 inches thick. The subsurface layer is 7 to 15 inches of grayish-brown or light brownish-gray fine sandy loam. The subsoil extends more than 72 inches below the surface. The upper part of the subsoil is light brownish-gray fine sandy loam or loam mottled with yellowish brown. At a depth below about 57 inches, it is gray or light brownish-gray fine sandy loam or loam mottled with yellowish brown or brown. A few spots of Amy, Goldsboro, and Mashulaville soils were included with this soil in mapping.

This soil is strongly acid or very strongly acid throughout. It is low in natural fertility. Permeability is moderately slow. The available water capacity is moderate. Runoff is very slow to ponded, and wetness is a severe hazard. The water table is at or near the surface in winter and early in spring. Response to fertilizer and lime is moderate.

Most of the acreage is used for shortleaf and loblolly pines or mixed pine and hardwood forest. Some small areas are used for pasture. Capability unit IIIw-1; woodland group 2w9a.

Use and Management of the Soils

This section explains the system of capability grouping used by the Soil Conservation Service and discusses the management of the soil in Ouachita County for crops and pasture. A table showing estimated yields under improved management is provided. Also discussed in this section is the suitability of soils for woodland, wildlife, and engineering uses, and for use in town and country planning.

Use of the Soils for Crops and Pasture [2]

Most of the cleared areas in the county are used for pasture. Some are used for crops such as soybeans, small grains, and cotton. Some are idle.

In general, the soils in this county are low in nitrogen, potassium, phosphorus, calcium, and organic material. Many of those suitable for cultivation are erodible. Poor surface or internal drainage and the susceptibility to flooding are limitations on some soils. Contour cultivation, terraces, and vegetated waterways are needed on sloping soils that are used for clean-tilled crops, and row arrangement and suitable drainage are needed for dependable growth on wet areas.

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

The amount of fertilizer to be applied generally is determined by soil tests, the kinds of crops to be grown, and past experiences with fertilization and crops. Periodic applications of agricultural limestone according to soil tests are beneficial to most crops and generally is needed for satisfactory production of such crops as alfalfa and white clover.

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 to break up plowpans.

If left bare many soils tend to crust and pack during periods of heavy rainfall. Growing cover crops and managing crop residue help preserve 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. Johnsongrass is also suited to many of the soils in the county. Tall fescue, the chief winter perennial grass now grown in the county, grows well only on soils that have a favorable soil-moisture rela-

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

tionship. All of these grasses respond well to fertilizers 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, for stand survival, and for erosion control. Also important are brush and weed control, fertilization, and renovation of the pasture.

Capability grouping

Capability grouping shows, in a general way. the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when 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, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for forest trees or engineering.

In the capability system, all kinds of soils are grouped at three levels, the capability class, subclass, and unit. These are discussed 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. (None in this county.)
- Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.
- Class III soils have severe limitations that reduce the choice of plants, 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 largely to pasture, range, woodland, or wildlife.
- Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife.
- Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.
- Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes.

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 can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

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 and other responses to management. 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-1 or IIIs-1. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

In the following pages the capability units in Ouachita County are described and suggestions for the use and management of the soils are given.

CAPABILITY UNIT IIe-1

This unit consists of moderately well drained and well drained, nearly level soils. The surface and subsurface layer are fine sandy loam or silt loam, and their combined thickness ranges from about 6 to 27 inches. The subsoil is friable to firm sandy clay loam, loam, or silt loam.

Natural fertility is low, and response to lime and fertilizer is moderate. The reaction ranges from medium acid to very strongly acid in the surface and subsurface layers, and strongly acid or very strongly acid below. Permeability is moderate to moderately slow, and the available water capacity is moderate to high.

Cotton, soybeans, winter small grains, grain sorghum, corn, and truck crops such as tomatoes, okra, beans, and melons are suitable crops. Crimson clover, white clover, bermudagrass, Pensacola bahiagrass, tall fescue, annual lespedeza, and sericea lespedeza are suitable forage plants.

Runoff is slow to medium, and the erosion hazard is moderate. If proper tillage, terracing, contour cultivation, and adequate fertilization are used, row crops that leave large amounts of residue can be grown year after year. No special management is needed if crops that leave large amounts of residue are grown year after year. Soil-improving grasses, legumes, or cover crops must be included if the cropping system consists mainly of low-residue crops.

CAPABILITY UNIT IIe-2

The one soil in this unit, Saffell gravelly sandy loam, 1 to 3 percent slopes, is well drained and nearly level. The surface and subsurface layers are gravelly sandy loam, and their combined thickness ranges from about 7 to 12 inches. The subsoil is friable gravelly sandy loam over firm gravelly sandy clay loam.

Natural fertility is low, and response to lime and fertilizer is poor to moderate. The reaction is medium acid or strongly acid in the surface and subsurface layers and is strongly acid or very strongly acid below. Permeability is moderate. The available water capacity is low because of the high content of gravel, and the soil is somewhat droughty.

Winter small grains is a suitable crop. Row crops such as cotton, corn, and soybeans can be grown. Vetch, crimson clover, ball clover, sericea lespedeza, bermudagrass, Pensacola bahiagrass, and weeping lovegrass are suitable forage plants.

Runoff is slow to medium, and the erosion hazard is moderate. If proper tillage, terracing, contour cultivation, and adequate fertilization are practiced, row crops that leave large amounts of residue can be grown year after year. No special management is needed if sown crops that leave large amounts of residue are grown year after year. Soil-improvement grasses, legumes, or cover crops must be included if the cropping system consists mainly of low-residue crops.

CAPABILITY UNIT IIIe-1

This unit consists of well-drained, gently sloping and undulating soils. The surface and subsurface layers of these soils are fine sandy loam, and their combined thickness ranges from about 5 to 22 inches. The subsoil is friable to firm sandy clay loam to fine sandy loam.

Natural fertility is low, and response to lime and fertilizer is moderate. The reaction ranges from medium acid to very strongly acid in the surface and subsurface layers and strongly acid or very strongly acid below. Permeability is moderate, and the available water capacity is moderate.

Cotton, soybeans, grain sorghum, winter small grains, and corn are suitable crops. Bermudagrass, Pensacola bahiagrass, crimson clover, and lespedeza are suitable forage plants.

Runoff is medium to rapid and the erosion hazard is severe. If proper tillage, terracing, contour farming, and adequate fertilization are practiced, clean-tilled crops that leave large amounts of residue can be grown year after year on the lower slope gradients. Conservation treatment measures need to be intensified as the gradient and length of slope increase. Soil-improving grasses, legumes, or cover crops must be included if the cropping system consists chiefly of low-residue crops.

CAPABILITY UNIT IIIe-2

This unit consists of moderately well drained to well drained, nearly level to gently sloping and undulating soils. The surface and subsurface layers of these soils are fine sandy loam, and their combined thickness ranges from about 5 to 16 inches. The subsoil is firm clay or silty clay.

Natural fertility is low, and response to lime and fertilizer is moderate. The reaction is medium acid in the surface and subsurface and is strongly acid to extremely acid below. Permeability is moderately slow to slow, and the available water capacity is moderate to high.

Winter small grains are suitable crops. Row crops such as cotton, soybeans, and corn can be grown. Bermudagrass, Pensacola bahiagrass, lespedeza, ball clover, and crimson clover are suitable forage plants.

Runoff is rapid and the erosion hazard is severe. If proper tillage, terracing, contour farming, and adequate fertilization are practiced, clean-tilled crops that leave large amounts of residue can be grown year after year on the lower slope gradients. Conservation treatment measures need to be intensified as the gradient and length of slope increase. Soil-improving grasses, legumes, or cover crops must be included if the cropping system consists chiefly of low-residue crops.

CAPABILITY UNIT IIIe-3

The one soil in this unit, Saffell gravelly sandy loam, 3 to 10 percent slopes, is well drained and gently sloping to moderately sloping. The surface and subsurface layers are gravelly sandy loam, and their combined thickness ranges from about 5 to 12 inches. The subsoil is friable gravelly sandy loam over firm gravelly sandy clay loam.

Natural fertility is low, and response to lime and fertilizer is poor to moderate. The reaction is medium acid or strongly acid in the surface and subsurface layers, and strongly acid to very strongly acid below. Permeability is moderate. The available water capacity is low because of the high content of gravel, and the soil is somewhat droughty.

Winter small grains are suitable crops, but most row crops are poorly suited. Vetch, ball clover, crimson clover, sericea lespedeza, bermudagrass, weeping lovegrass, and Pensacola bahiagrass are suitable forage plants.

Runoff is medium to rapid, and the erosion hazard is severe. If proper tillage, terracing, contour farming, and adequate fertilization are practiced, clean-tilled crops that leave large amounts of residue can be grown year after year on the lower slope gradients. Conservation treatment measures need to be intensified as the gradient and length of slope increase. Soil-improving grasses, legumes, or cover crops should be included if the cropping system consists mainly of low-residue crops.

CAPABILITY UNIT IIIw-1

This unit consists of poorly drained and somewhat poorly drained, level and nearly level soils. The surface and subsurface layers are silt loam or fine sandy loam and their combined thickness ranges from about 8 to 20 inches. The subsoil is friable to firm silty clay loam, silt loam, fine sandy loam, or loam.

Natural fertility is low, and response to lime and fertilizer is moderate. The reaction ranges from medium acid to very strongly acid in the surface and subsurface layers and strongly acid or very strongly acid below. Permeability is slow to moderately slow, and the available water capacity is moderate to high.

Grain sorghum and soybeans are suitable crops. Cotton, corn, and winter small grains can be grown. Bermudagrass, tall fescue, Pensacola bahiagrass, annual lespedeza, singletary peas, and white clover are suitable forage plants (fig. 10).

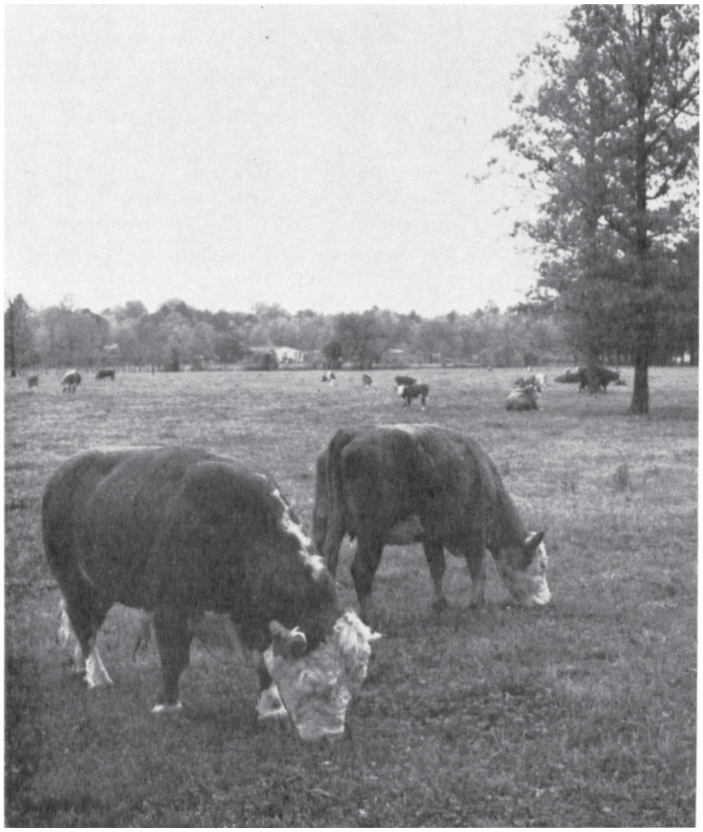

Figure 10.—**Cattle grazing in pasture of bermudagrass and white clover on Amy silt loam. This soil is in capability unit IIIw–1.**

Runoff is slow to ponded, and wetness is a severe hazard. Farming is commonly delayed several days after a rain unless drainage is provided. If proper tillage, adequate fertilization, and adequate drainage, including row arrangement, are practiced, crops that leave large amounts of residue can be grown year after year. Soil-improving grasses, legumes, or cover crops must be included if the cropping system consists chiefly of low-residue crops.

CAPABILITY UNIT IIIs–1

The one soil in this unit, Lucy loamy fine sand, 3 to 8 percent slopes, is well drained and gently sloping. The surface and subsurface layers are loamy fine sand, and their combined thickness ranges from about 21 to 39 inches. The subsoil is friable sandy clay loam to sandy loam.

Natural fertility is low, and response to lime and fertilizer is moderate. The reaction is medium acid or strongly acid in the surface and subsurface layers and strongly acid or very strongly acid below. Permeability is moderate. The available water capacity is low in the surface and subsurface layers and moderate below.

Watermelons, cantaloupes, and winter small grains are suitable crops. Coastal bermudagrass and weeping lovegrass are suitable forage plants.

Runoff is slow, because water moves rapidly into the surface layer. Erosion is a slight to moderate hazard. The major limitation of this soil is droughtiness. If proper tillage and adequate fertilization are practiced, sown crops that leave large amounts of residue can be grown year after year, as can intertilled crops when they follow annual cover crops. Soil-improving grasses, legumes, or cover crops must be included if the cropping system consists mainly of low-residue crops.

CAPABILITY UNIT IVe–1

The one soil in this unit, Cahaba fine sandy loam, 8 to 12 percent slopes, is well-drained and moderately sloping. The surface and subsurface layers are fine sandy loam and their combined thickness ranges from 5 to 15 inches. The subsoil is friable sandy clay loam to fine sandy loam.

Natural fertility is low, and response to lime and fertilizer is moderate. The reaction is medium acid or strongly acid in the surface and subsurface layers and strongly acid or very strongly acid below. Permeability is moderate, and the available water capacity is moderate.

These soils have very limited suitability for crops. The most suitable crop is winter small grains. Bermudagrass, Pensacola bahiagrass, weeping lovegrass, crimson clover, and lespedeza are suitable forage plants.

Runoff is rapid, and the erosion hazard is very severe. Row crops can be grown occasionally if stripcropping is practiced and the cropping system consists chiefly of grasses and legumes. Sown crops can be grown if contour tillage is practiced and the cropping system consists mainly of grasses or legumes.

CAPABILITY UNIT IVe–2

This unit consists of moderately well drained, gently sloping and undulating soils. The surface layer is fine sandy loam and ranges from 5 to 14 inches in thickness. The subsoil is firm clay or silty clay.

Natural fertility is low, and response to lime and fertilizer is moderate. The reaction is medium acid or strongly acid in the surface layer and strongly acid to extremely acid below. Permeability is slow, and the available water capacity is moderate to high.

These soils have very limited suitability for crops. Winter small grains is the most suitable crop. Bermudagrass, Pensacola bahiagrass, dallisgrass, weeping lovegrass, and lespedeza are suitable forage plants.

Runoff is rapid, and the erosion hazard is very severe. Row crops can be grown occasionally if stripcropping is practiced and the cropping system consists chiefly of grasses and legumes. Sown crops can be grown if contour tillage is practiced and the cropping system consists mainly of grasses and legumes.

CAPABILITY UNIT IVw–1

This unit consists of poorly drained, level or nearly level soils. The surface and subsurface layers are silt loam and their combined thickness ranges from about 6 to 9 inches. The subsoil is firm silt loam to silty clay or clay in the upper part and silty clay loam to silty clay or clay in the lower part.

Natural fertility is low, and response to lime and fertilizer is moderate. The reaction ranges from medium acid to very strongly acid below. Permeability is slow to very slow, and the available water capacity is moderate to high.

These soils have very limited suitability for crops. Grain sorghum and soybeans are the most suitable of the common crops. Bermudagrass, Pensacola bahiagrass, tall fescue, dallisgrass, white clover, vetch, and lespedeza are suitable forage plants.

Runoff is slow to ponded. Wetness is a very severe hazard, and farming is commonly delayed several days after a rain. The erosion hazard is slight to moderate in the nearly level areas. If proper tillage, drainage, and adequate fertilizer are used, these soils can be used for cultivated crops, but soil-improving grasses and legumes must be included regularly in the cropping system.

CAPABILITY UNIT IVw-2

This unit consists of somewhat poorly drained to well-drained, level to nearly level soils on frequently flooded bottom lands. The surface layer is silty clay loam, silt loam, or fine sandy loam and ranges from about 6 to 21 inches in thickness. The subsoil is friable to firm sandy clay loam, silty clay loam, silt loam, clay loam, or fine sandy loam.

Natural fertility is moderate, and response to lime and fertilizer is moderate. The reaction ranges from medium acid to very strongly acid in the surface layer and is strongly acid or very strongly acid, and, in places, extremely acid below. Permeability is moderate to moderately slow, and the available water capacity is moderate to high.

These soils are well suited to forest, and most of the acreage is presently used to grow hardwoods and loblolly pine. Soybeans and grain sorghum are fairly well suited row crops. Suitable forage plants are dallisgrass, bermudagrass, carpetgrass, bahiagrass, and johnsongrass.

These soils are subject to frequent flooding, mainly during winter and spring. Floods recede by June in most years. Most areas are not subject to scouring by rapidly flowing floodwater, and the soils can be used for pasture and for crops that require only a short growing season. With proper fertilization and tillage methods, tilled areas can be used year after year for crops that leave large amounts of residue.

CAPABILITY UNIT IVs-1

This unit consists of somewhat excessively drained, nearly level to gently sloping and undulating soils. The surface layer is loamy sand about 7 inches thick. Below is loose loamy sand or sand.

Natural fertility is very low, and response to lime and fertilizer is poor. The reaction is medium acid or strongly acid in the surface layer and medium acid to very strongly acid below. Permeability is rapid. The available water capacity is low, and the soils are droughty.

Watermelons, cantaloupes, and winter small grains are suitable crops. Coastal bermudagrass and weeping lovegrass are better suited than other grasses.

Runoff is slow, because water moves rapidly into these soils. Erosion is a moderate hazard. With proper fertilization and tillage methods and contour farming, sown crops that leave large amounts of residue can be grown year after year. Soil-improving grasses, legumes, or cover crops must be included regularly if the cropping system consists mainly of intertilled or low-residue crops.

CAPABILITY UNIT Vw-1

This unit consists of poorly drained, level soils on frequently flooded bottom lands. The surface and subsurface layers are silt loam, silty clay loam, or fine sandy loam and their combined thickness ranges from about 6 to 18 inches. Below this is friable to firm silt loam, fine sandy loam, silty clay loam, silty clay, or clay.

Natural fertility is low. The reaction is medium acid to very strongly acid in the surface layer and strongly acid to extremely acid below. Permeability is very slow to moderate, and the available water capacity is moderate to high.

These soils are subject to frequent flooding (fig. 11). Most of the areas are used for hardwood forest, and they are well suited for this use. A small acreage is cleared and used for pasture. Bermudagrass, johnsongrass, and annual lespedeza are better suited than other pasture plants.

CAPABILITY UNIT VIe-1

This unit consists of moderately well drained to well drained, moderately sloping to moderately steep and rolling soils. The surface and subsurface layers are fine sandy loam and their combined thickness ranges from about 3 to 16 inches. The subsoil is firm clay or silty clay.

Natural fertility is low, and response to lime and fertilizer is moderate. The reaction is medium acid or strongly acid in the surface and subsurface layers and strongly acid to extremely acid below. Permeability is moderately slow to slow, and the available water capacity is moderate to high.

Runoff is very rapid, and the erosion hazard is severe. These soils are not suitable for cultivation. They are well suited to pasture and woodland. Bermudagrass, Pensacola bahiagrass, weeping lovegrass, lespedeza, crimson clover, and vetch are better suited than other pasture plants.

CAPABILITY UNIT VIs-1

This unit consists of somewhat excessively drained, moderately sloping to moderately steep and rolling soils. The surface layer is loamy sand about 7 inches thick. Below is loose loamy sand or sand.

Natural fertility is very low, and response to lime and fertilizer is poor. The reaction is medium acid or strongly acid in the surface layer and medium acid to very strongly acid below. Permeability is rapid. The available water capacity is low, and the soils are droughty.

Runoff is medium, and water moves rapidly into the soil. Erosion is a severe hazard.

These soils are not suitable for cultivation. They are well suited to woodland. Coastal bermudagrass and weeping lovegrass can be grown for forage.

CAPABILITY UNIT VIIe-1

The one soil in this unit, Kirvin-Sacul association, hilly, is moderately well drained to well drained. The surface and subsurface layers are fine sandy loam and their combined thickness ranges from about 4 to 12 inches. The subsoil is clay or silty clay.

Natural fertility is low. The reaction is medium acid to strongly acid in the surface and subsurface layers and strongly acid to extremely acid below. Permeability is moderately slow to slow, and the available water capacity is moderate to high.

Runoff is very rapid, and the erosion hazard is very severe. These soils are not suitable for cultivation. They are well suited to woodland. Bermudagrass, Pensacola bahiagrass, weeping lovegrass, and sericea lespedeza can be grown for forage.

Figure 11.—**Backwater flooding of a pasture on an area of Amy association, frequently flooded.**

CAPABILITY UNIT VIIIs-1

This unit consists of Oil-waste land. This is land that has been severely polluted with crude oil and salt water from oil fields. Most areas are in level creek bottoms where the oil and salt water have spread out after rainfall. They are denuded of vegetation and the soil material is highly dispersed. During dry periods the oil and salt form a crust on the land, and during wet periods the material is soft and mushy.

This land type is not suited for any farm use without major and intensive treatment to reclaim it.

Estimated yields

The estimated yields of the principal crops shown in Table 2 are based mainly on data supplied by farmers and other agricultural workers in Ouachita County. The level of improved management at which yields are obtained includes (a) preparing a good seedbed; (b) planting or seeding at recommended rates and at the proper time; (c) fertilizing according to needs determined by soil tests and on the basis of experience; (d) choosing well-suited, high-yielding varieties; (e) inoculating legumes; (f) controlling weeds, insects, and diseases; (g) cultivating at a shallow depth; (h) providing adequate drainage on wet soils; and (i) controlling grazing.

Use of the Soils for Woodland [3]

Virgin forests covered all of Ouachita County. Principal species on the flood plains and at the lower elevations or flatwoods were oaks, sweetgum, baldcypress, cottonwood, sycamore, ash, and pecan. On the uplands were oaks, pines, and hickories.

Woodland now covers about 84 percent of the total land area of the county, or about 396,800 acres. The State owns about 3 percent of the woodland, and the rest is privately owned.

A suitable secondary use for many areas of woodland is grazing. The grasses, legumes, forbs, and many of the woody plants in the understory of woodland stands can be utilized for forage. Grazing must be controlled so that desirable tree seedlings are not damaged and the forage plants are not overgrazed.

This section gives information about both the production of wood crops and the production of forage in woodland.

Production of wood crops

Table 3 gives information that will help owners and operators of woodland to establish, manage, and harvest tree crops. The information is based on detailed plot studies, measurements of different trees on different soils, published and unpublished records, and the experience and judgment of technicians who work with tree crops in this area.

Management of woodland can be planned more effectively if soils are grouped according to those characteristics that affect growth of trees and management of the stands. The soils of Ouachita County have been assigned to 14 woodland suitability groups. These groups are listed in table 3. To find the woodland group to which a specified soil has been assigned, refer to the "Guide to Mapping Units" at the back of this survey. Each group consists of soils that are about the same in suitability for wood crops, potential productivity, and management requirements. These factors depend on such soil characteristics as depth; arrangement of layers in the profile; texture, drainage, color, reaction, and consistence of each layer; content of humus and minerals; degree of erosion; and slope.

Each group has been assigned a symbol which basically consists of three elements. The first element in the symbol is an Arabic numeral. It indicates the relative potential of the soils in the group for growing wood crops. It expresses the site quality based on the site index of one or more forest types or species. Number 1 indicates very high site index or potential productivity, followed by 2, 3, 4, and 5, the lowest potential productivity.

The second element in the symbol is a small letter. It indicates the soil or physiologic characteristic that is the primary cause of the limitation. The letter *w* indicates wetness; *t* indicates toxic substances within the rooting zone; *c* indicates a limitation due to the kind or amount of clay in the upper part of the soil profile; *s* indicates sandy soils with low available water capacity; *f* indicates large amounts of coarse fragments in the soil; *r* indicates steep slopes; and the letter *o* indicates soils with no significant limitations.

The third element, an Arabic numeral, indicates degree of limitation, and the suitability of the soils for different kinds of trees. The numeral 1 indicates soils with no

[3] JAMES T. BEENE, woodland conservationist, Soil Conservation Service, and IVAN R. PORTER, range conservationist, Soil Conservation Service, assisted in the preparation of this section.

to slight management problems, and they are best suited to needleleaf trees. The numeral 2 indicates soils with one or more moderate management problems, and they are best suited to needleleaf trees. The numeral 3 indicates soils with one or more severe management problems, and they are best suited to needleleaf trees. The numeral 7 indicates soils with no to slight management problems, but they are suited to either needleleaf or broadleaf trees. The numeral 8 indicates soils with one or more moderate management problems, and they are suited to either needleleaf or broadleaf trees. The numeral 9 indicates soils with one or more severe management problems, and they are suited to either needleleaf or broadleaf trees. The numeral 0 indicates the soils are not suited to trees which can be used for any major commercial wood product.

One group has a fourth element, *a*, which indicates a subdivision of the basic group which is due to a difference in species of suited trees.

The column headings in table 3 are explained in the following paragraphs. Major hazards and limitations indicates the nature and degree of soil-related limitations that present problems in the management of woodland.

Equipment limitations refers to soil characteristics and topographic features that restrict or prohibit the use of conventional equipment for planting, road construction, control of unwanted vegetation, harvesting tree crops, and fire control. The limitations in Ouachita County are caused mainly by wetness. Other limiting factors are texture of the surface soil, frequency and duration of overflow, and slopes. The limitation is *slight* if the slope is less than 20 percent, if the soils are loamy and at least moderately well drained and are not subject to overflow or excessive surface water, and if the use of equipment is restricted for only a short period after a heavy rain. The limitation is *moderate* if the slope is within the range of 20 to 40 percent, if the soils are not subject to periodic overflow or excessive surface water for extended periods, if the soils are sandy, and if equipment can be used from March to December. The limitation is *severe* if the use of equipment is limited to the driest months or to short periods between extended overflows.

TABLE 2.—*Estimated yields per acre for principal crops under an improved level of management*

[Absence of figure indicates the crop is not suited or not commonly grown on the soil specified, or the soil is not arable]

Soil	Corn	Cotton (lint)	Soybeans	Bahiagrass	Common bermudagrass	Tall fescue
	Bu.	*Lbs.*	*Bu.*	*A.U.M.*[1]	*A.U.M.*[1]	*A.U.M.*[1]
Alaga loamy sand, 1 to 8 percent slopes				4.0		
Alaga loamy sand, 8 to 20 percent slopes						
Alaga association, undulating				3.0		
Alaga association, rolling						
Amy silt loam		450	25	7.5	6.0	6.0
Amy association, frequently flooded				7.5	6.0	
Bibb soils				7.5	6.0	
Cahaba fine sandy loam, 1 to 3 percent slopes	60	600	30	8.0	7.0	6.0
Cahaba fine sandy loam, 3 to 8 percent slopes	50	500	25	8.0	7.0	6.0
Cahaba fine sandy loam, 8 to 12 percent slopes				7.5	6.5	
Cahaba-Norfolk association, undulating						
Ennis silty clay loam			35	8.0	7.5	
Goldsboro fine sandy loam, 1 to 3 percent slopes	60	600	30	8.0	7.0	6.0
Kirvin fine sandy loam, 3 to 8 percent slopes	40	400	25	7.0	6.5	
Kirvin fine sandy loam, 8 to 20 percent slopes				5.5	5.0	
Kirvin-Norfolk association, undulating						
Kirvin-Sacul association, rolling						
Kirvin-Sacul association, hilly						
Leadvale silt loam, 1 to 3 percent slopes	50	500	25	8.0	7.0	6.0
Leaf silt loam				6.0	5.0	
Lobelville fine sandy loam			35	8.0	7.0	6.0
Lucy loamy fine sand, 3 to 8 percent slopes	40	375	20	8.0	7.0	
Mashulaville silt loam		375	25	8.0	7.0	6.0
Norfolk fine sandy loam, 1 to 3 percent slopes	60	600	30	8.0	7.0	6.0
Norfolk fine sandy loam, 3 to 8 percent slopes	50	500	25	8.0	7.0	
Oil-waste land						
Ouachita silt loam			35	8.0	7.5	
Ouachita association, frequently flooded						
Pheba silt loam, 1 to 3 percent slopes	50	500	25	8.0	7.0	6.0
Sacul fine sandy loam, 1 to 3 percent slopes	35	400	25	6.5	5.5	5.0
Sacul fine sandy loam, 3 to 8 percent slopes				6.5	5.5	
Sacul fine sandy loam, 8 to 16 percent slopes				5.5	4.5	
Sacul-Kirvin association, undulating						
Saffell gravelly sandy loam, 1 to 3 percent slopes		400	20	5.0	4.0	
Saffell gravelly sandy loam, 3 to 10 percent slopes		350	20	5.0	4.0	
Smithton fine sandy loam		450	25	7.5	6.0	6.0

[1] Animal-unit-months. The figure represents the number of months that 1 acre will provide grazing for one animal unit (one cow, steer, or horse, five hogs, or seven sheep) without injury to the pasture.

TABLE 3.—*Woodland groups, wood*

Suitability group, mapping unit symbol, and descriptions of soils	Major hazards and limitations	Potential productivity	
		Important wood crops	Estimated site index range [1]
Group 1w8: Level to nearly level loamy soils on flood plains; very high potential productivity; well suited to hardwoods and pines. En, Lo, Ot, OU.	Moderate equipment limitations and seedling mortality mainly because of floodwater.	Sweetgum Nuttall oak Water oaks Cottonwood Lobolly pine	96+ 96+ 96+ 106+ 96+
Group 2o7: Nearly level loamy soils with high potential productivity; suited to hardwoods and pines. The only soil in this group is Goldsboro fine sandy loam, 1 to 3 percent slopes. GoB.	No serious management problems.	Loblolly pine Sweetgum	86–95 86–95
Group 2w8: Nearly level, moderately wet loamy soils with fragipans; high potential productivity; suited to hardwoods and pines. The only soil in this group is Pheba silt loam, 1 to 3 percent slopes. PhB.	Moderate equipment limitations mainly because of excess wetness.	Loblolly pine Shortleaf pine Sweetgum	86–95 76–85 86–95
Group 2w9: Level, wet loamy soils on flood plains; high potential productivity; suited to hardwoods and pines. AS, BB.	Severe equipment limitations and moderate to severe seedling mortality, mainly because of excess wetness.	Loblolly pine Sweetgum Water oaks	86–95 86–95 86–95
Group 2w9a: Level and nearly level, wet loamy soils on low terraces; high potential productivity; suitable for hardwoods and pines. Am, Lf, Sm.	Severe equipment limitations and severe seedling mortality mainly because of excess wetness.	Loblolly pine Shortleaf pine Sweetgum	86–95 76–85 86–95
Group 3o1: Nearly level to moderately steep loamy soils on uplands; moderately high potential productivity; best suited to pines. CaB, CaC, CaD, CNB, KfC, KfE, KNB, KSC, NoB, NoC (For the Sacul part of KSC, refer to Group 3c2).	No serious management problems.	Loblolly pine Shortleaf pine	76–85 70–80
Group 3o7: Nearly level, loamy soils with fragipans on uplands; moderately high potential productivity; suitable for hardwoods and pines. The only soil in this group is Leadvale silt loam, 1 to 3 percent slopes. LeB.	No serious management problems.	Loblolly pine Shortleaf pine Sweetgum	76–85 66–75 76–85
Group 3c2: Nearly level to steep soils with clayey subsoils on uplands; moderately high potential productivity; well suited to pines. SaB, SaC, SaE, SKB. (For the Kirvin part of SKB, refer to Group 3o1).	Slight to moderate equipment limitations. Slight to moderate seedling mortality. Moderate erosion hazard because of thin surface layer and slopes.	Loblolly pine Shortleaf pine	76–85 66–75
Group 3r2: Steep loamy soils with clayey subsoils on uplands; moderately high potential productivity; well suited to pines. The only soil in this group is Kirvin-Sacul association, hilly. KSD (For Sacul part of KSD, refer to Group 3c2).	Moderate equipment limitations and erosion hazard because of slopes.	Loblolly pine Shortleaf pine	76–85 66–75
Group 3s2: Gently sloping sandy soils on uplands; moderately high potential productivity; well suited to pines and redcedar. The only soil in this group is Lucy loamy fine sand, 3 to 8 percent slopes. LuC.	Moderate equipment limitations and seedling mortality because of droughty, loose, sandy surface layer.	Loblolly pine Shortleaf pine	80–90 70–80

See footnote at end of table.

crops, and woodland forage

Preferred species—		Understory vegetation utilized as forage	
In existing stands	For planting	Principal plants (excellent condition)	Estimated yields by canopy class
			Lb. air-dry forage/acre
Sweetgum, cherrybark oak, Shumard oak, Nuttall oak, southern red oak, cow oak, water oaks, green ash, black cherry, sycamore, cottonwood, loblolly pine, silver maple.	Cherrybark oak, Shumard oak, cottonwood, sycamore, sweetgum, loblolly pine, green ash, cow oak, silver maple.	Switchgrass, eastern gamagrass, Virginia wildrye, switchcane, big bluestem, little bluestem, meadow dropseed, low panicums, sedges.	Open canopy 4,000–7,500; sparse 3,000–5,000; medium 1,500–3,500; dense 100–2,000.
Loblolly pine, sweetgum, shortleaf pine, cherrybark oak, Shumard oak, black walnut, black cherry, southern red oak, white oak, water oaks.	Loblolly pine, shortleaf pine, sweetgum, cherrybark oak, Shumard oak, black walnut.	Little bluestem, big bluestem, plumegrasses, indiangrass, beaked panicum, switchgrass, low panicums.	Open canopy 2,500–4,000; sparse 1,500–3,000; medium 800–2,000; dense 0–1,000.
Loblolly pine, shortleaf pine, water oaks, sweetgum, southern red oak, cherrybark oak, white oak, Shumard oak.	Loblolly pine, sweetgum	Plumegrasses, beaked panicum, longleaf uniola, spike uniola, little bluestem, big bluestem, switchgrass, low panicums.	Open canopy 3,000–5,000; sparse 1,500–3,000; medium 1,000–2,000; dense 400–1,200.
Loblolly pine, shortleaf pine, sweetgum, water oaks, cottonwood, cherrybark oak, Shumard oak, cow oak, Nuttall oak, sycamore.	Loblolly pine, Nuttall oak, sweetgum, cottonwood, sycamore, cow oak, green ash.	Switchgrass, velvetgrass, beaked panicum bluestems, low panicums, longleaf uniola, spike uniola, sedges, flat sedges.	Open canopy 3,000–4,000; sparse 1,500–3,000; medium 1,000–2,000; dense 200–1,500.
Loblolly pine, shortleaf pine, sweetgum, water oaks, cherrybark oak, southern red oak.	Loblolly pine, sweetgum	Switchgrass, velvetgrass, beaked panicum, bluestems, low panicums, longleaf uniola, spike uniola, sedges and flat sedges.	Open canopy 3,000–4,000; sparse 1,500–3,000; medium 1,000–2,000; dense 200–1,500.
Loblolly pine, shortleaf pine	Loblolly pine, shortleaf pine	Bluestems, indiangrass, plumegrasses, longleaf uniola, spike uniola, beaked panicum, low panicums.	Open canopy 4,500–6,000; sparse 2,000–5,000; medium 1,000–2,500; dense 100–1,500.
Loblolly pine, shortleaf pine sweetgum, red oaks, white oaks.	Loblolly pine, sweetgum	Bluestems, indiangrass, beaked panicum, longleaf uniola, plumegrasses, low panicums.	Open canopy 4,500–6,000; sparse 2,000–5,000; medium 1,000–2,500; dense 200–1,500.
Loblolly pine, shortleaf pine	Loblolly pine, shortleaf pine	Beaked panicum, bluestems, indiangrass, longleaf uniola, plumegrasses, low panicums.	Open canopy 4,000–5,000; sparse 2,000–4,000; medium 1,000–2,500; dense 200–1,200.
Loblolly pine, shortleaf pine	Loblolly pine, shortleaf pine	Bluestems, indiangrass, plumegrasses, longleaf uniola, spike uniola, beaked panicum, low panicums.	Open canopy 4,000–6,000; sparse 2,000–5,000; medium 1,000–2,000; dense 200–1,500.
Loblolly pine, shortleaf pine, redcedar.	Loblolly pine, shortleaf pine, redcedar.	Little bluestem, big bluestem, perennial three-awns, indiangrass, skeletongrass, longleaf uniola, plumegrasses, low panicums.	Open canopy 3,000–4,000; sparse 2,000–3,500; medium 1,000–2,500; dense 200–1,500.

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TABLE 3.—*Woodland groups, wood*

Suitability group, mapping unit symbol, and descriptions of soils	Major hazards and limitations	Potential productivity	
		Important wood crops	Estimated site index range [1]
Group 3s3: Nearly level to moderately steep sandy soils on uplands; moderately high potential productivity; well suited to pines and redcedar. AgC, AgE, ALB, ALC.	Moderate equipment limitations and severe seedling mortality because of droughty, loose, sandy soil.	Loblolly pine Shortleaf pine	76–85 66–75
Group 3w9: Level, wet loamy soils with fragipans; moderately high potential productivity; suited to hardwoods and pines. The only soil in this group is Mashulaville silt loam. Ma.	Severe equipment limitations and moderate to severe seedling mortality.	Loblolly pine Sweetgum Water oaks	76–85 76–85 76–85
Group 4f2: Nearly level to gently sloping gravelly soils on uplands; moderate potential productivity; well suited to pines and redcedar. SIB, SIC.	Moderate seedling, mortality because of droughtiness and coarse fragments.	Loblolly pine Shortleaf pine	66–75 56–65
Group 5t0: Land so polluted with crude oil and salt water as to be unsuitable for woodland use without major reclamation. The only land in this unit is Oil-waste land. Os.			

[1] Site class ratings adapted from data gathered in soil-site studies by the Soil Conservation Service and the Forest Service (*12, 13,*

Seedling mortality refers to the expected loss of seedlings during the first growing seasons after planting. Loss of seedlings in this county is caused mainly by either excess water or droughtiness. Soil is a major factor. Mortality is *slight* if less than 25 percent of planted seedlings die and adequate natural regeneration ordinarily occurs. Mortality is *moderate* if between 25 and 50 percent of planted seedlings die, natural regeneration cannot be relied on without site preparation, and replanting is necessary. Mortality is *severe* if more than 50 percent of the planted seedlings die, natural regeneration cannot be relied on, and special site preparation and replanting are necessary.

Erosion hazard depends on the steepness of the slope and the erodibility of the soil.

Potential productivity.—The important wood crops for the soils of each group are listed under this heading. Each kind of tree is rated according to its estimated site index range. Site index range is the average height of the dominant trees in a stand, at age 30 for cottonwood, at age 35 for sycamore, and at age 50 for other species. The higher the site index range, the higher the potential productivity of the soil for wood crops.

Preferred species.—Under this heading are listed the kinds of trees to be favored for management in existing stands and the kinds to be chosen for planting in establishing or reinforcing a stand. Species were selected on the basis of their growth and the quality, value, and marketability of the products obtained from each.

Production of forage

The amount of forage produced in a woodland area varies with the age of the trees, the density of the canopy, and the condition of the understory vegetation.

The principal forage plants listed in table 3 are those that produce most of the forage when the vegetation is in excellent condition and the canopy is less than 45 percent. As the canopy closes, these plants are replaced by more shade-tolerant grasses, forbs, and woody plants, and forage yields become progressively lower.

Forage condition is the present state of the understory vegetation as compared with the potential for a particular site. Four classes of forage condition are recognized. They provide a measure of any deterioration that has taken place and a basis for predicting the degree of improvement that can be brought about by management. Excellent forage condition indicates that the present forage is more than 75 percent of its potential; good condition, between 50 and 75 percent; fair condition, between 26 and 50 percent; and poor condition, less than 25 percent. All woodland groups of Ouachita County are in the excellent condition class for forage.

For the purpose of this survey, four canopy classes are recognized. An open canopy shades up to 20 percent of the ground at midday; a sparse canopy 21 to 35 percent; a medium canopy 36 to 55 percent; and a dense canopy, 56 to 70 percent. The potential yields of forage, by canopy classes, for each woodland group are shown in table 3. If the canopy shades more than 70 percent of the ground at midday, little or no forage is produced.

Use of the Soils for Wildlife [4]

Wildlife and fish respond to the basic characteristics of soils. This response is affected by fertility, slope, restrictive layers, structure, wetness, erosion, and other factors.

Soils are related to the kinds and abundance of wild-

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

crops, and woodland forage—Continued

Preferred species—		Understory vegetation utilized as forage	
In existing stands	For planting	Principal plants (excellent condition)	Estimated yields by canopy class
			Lb. air-dry forage/acre
Loblolly pine, shortleaf pine, redcedar.	Loblolly pine, shortleaf pine, redcedar.	Little bluestem, indiangrass, perennial three-awns, longleaf uniola, blackseed needlegrass, low panicums.	Open canopy 2,500–3,500; sparse 1,500–3,000; medium 1,000–2,000; dense 100–1,500.
Loblolly pine, sweetgum, water oaks, red oaks.	Loblolly pine, sweetgum	Switchgrass, redtop panicum, Virginia wildrye, beaked panicum, velvetgrass, eastern gamagrass, sedges and flat sedges.	Open canopy 3,000–6,000; sparse 2,500–5,000; medium 1,500–3,000; dense 400–2,000.
Loblolly pine, shortleaf pine, redcedar.	Loblolly pine, shortleaf pine, redcedar.	Big bluestem, little bluestem, indiangrass, Virginia wildrye, skeletongrass, low panicums.	Open canopy 2,500–4,000; sparse 1,500–3,000; medium 800–2,000; dense 500–1,000.

15, 16).

life through the vegetation they support and the habitat the vegetation provides. The kind of wildlife habitat depends on vegetation and the food it produces, and on water. The kind and amount of vegetation are closely related to soil characteristics and present land use. Extensive forested areas, such as those in Ouachita County, provide excellent habitat for deer, wild turkey, bear, squirrel, waterfowl, and many songbirds because of suitable food, water, and cover. These areas are sparsely populated by humans, and wildlife is not unduly disturbed. Water-holding characteristics of soils determine whether they are suitable for ponds and reservoirs. The fertility of impounded water is directly related to the fertility of the soil.

Wildlife habitats can be managed by planting choice food plants, by managing existing vegetation, and by locating water developments where water is scarce. Information about the soils is useful for these purposes and provides a basis for planning multiple-use management. Present vegetation reflects past land use and may be a false criterion in judging potential for development for wildlife food and habitat. Information about soils helps determine specific sites for development, protection, and enhancement of habitat elements.

In table 4 the soils of Ouachita County are rated according to their relative suitability for the establishment, improvement, or maintenance of seven fish and wildlife elements and three classes of wildlife. These ratings refer only to the suitability of the soil. They do not take into account the present use of the soil or the distribution of wildlife and human population. The suitability of individual sites must be determined by onsite inspection or intimate knowledge of the area.

In table 4 a rating of *well suited* indicates that the habitats generally are easily created, improved, or maintained; the soil has few or no limitations that affect management, and satisfactory results can be expected. *Suited* indicates that habitats can be created, improved, or maintained in most places; the soil has moderate limitations that affect management, and moderate intensity of management may be required for satisfactory results. *Poorly suited* indicates that habitats can be created, improved, or maintained in most places; the soil has severe limitations; habitat management is difficult and expensive, and results are not always satisfactory. *Unsuited* indicates that it is impractical or impossible to create or maintain habitats, and unsatisfactory results are probable.

Habitat elements.—The elements shown in table 4 are defined in the following paragraphs.

Grain and seed crops.—Agricultural grains or seed-producing annuals planted to produce food for wildlife. Examples are wheat, corn, sorghums, oats, cowpeas, and soybeans.

Grasses and legumes.—Domestic grasses and legumes established by planting to produce food and cover for wildlife. Examples are bermudagrass, tall fescue, bahiagrass, ryegrass, clovers, annual lespedezas, and bush lespedezas.

Wild herbaceous plants.—Native or introduced perennials that provide food and cover for wildlife. Examples are tickclovers, perennial lespedezas, wild beans, pokeberry, panicgrasses, croton (goat weed), and partridge peas.

Hardwood woody plants.—Trees, shrubs, and woody vines that produce fruit, nuts, seeds, buds, and twigs and foliage (browse) used by wildlife. Examples are oaks, cherries, mulberries, dogwoods, viburnums, maples, blueberries, honeysuckle, hickories, greenbriers, roses, and wild grape.

TABLE 4.—*Suitability of the soils for elements*

[Soils are rated on the basis of 4 classes of limitations: Well suited—relatively free of limitations or limitations that are easily overcome; to make use questionable and results are not always satisfactory;

Soil	Wildlife habitat elements—			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood woody plants
Alaga loamy sand, 1 to 8 percent slopes	Poorly suited	Suited	Suited	Poorly suited
Alaga loamy sand, 8 to 20 percent slopes	Poorly suited	Suited	Suited	Poorly suited
Alaga association, undulating	Poorly suited	Suited	Suited	Poorly suited
Alaga association, rolling	Poorly suited	Suited	Suited	Poorly suited
Amy silt loam	Poorly suited	Suited	Suited	Well suited
Amy association, frequently flooded	Poorly suited	Suited	Suited	Well suited
Bibb soils	Poorly suited	Suited	Suited	Well suited
Cahaba fine sandy loam, 1 to 3 percent slopes	Well suited	Well suited	Well suited	Well suited
Cahaba fine sandy loam, 3 to 8 percent slopes	Suited	Well suited	Well suited	Well suited
Cahaba fine sandy loam, 8 to 12 percent slopes	Suited	Well suited	Well suited	Well suited
Cahaba-Norfolk association, undulating	Suited	Well suited	Well suited	Well suited
Ennis silty clay loam	Suited	Suited	Suited	Well suited
Goldsboro fine sandy loam, 1 to 3 percent slopes	Well suited	Well suited	Well suited	Well suited
Kirvin fine sandy loam, 3 to 8 percent slopes	Suited	Well suited	Well suited	Well suited
Kirvin fine sandy loam, 8 to 20 percent slopes	Poorly suited	Suited	Well suited	Well suited
Kirvin-Norfolk association, undulating	Suited	Well suited	Well suited	Well suited
Kirvin-Sacul association, rolling	Unsuited	Suited	Well suited	Well suited
Kirvin-Sacul association, hilly	Unsuited	Poorly suited	Well suited	Well suited
Leadvale silt loam, 1 to 3 percent slopes	Suited	Well suited	Well suited	Well suited
Leaf silt loam	Poorly suited	Suited	Suited	Well suited
Lobelville fine sandy loam	Suited	Suited	Suited	Well suited
Lucy loamy fine sand, 3 to 8 percent slopes	Suited	Suited	Well suited	Well suited
Mashulaville silt loam	Poorly suited	Suited	Suited	Well suited
Norfolk fine sandy loam, 1 to 3 percent slopes	Well suited	Well suited	Well suited	Well suited
Norfolk fine sandy loam, 3 to 8 percent slopes	Suited	Well suited	Well suited	Well suited
Oil-waste land	Unsuited	Unsuited	Unsuited	Unsuited
Ouachita silt loam	Suited	Suited	Suited	Well suited
Ouachita association, frequently flooded	Suited	Suited	Suited	Well suited
Pheba silt loam, 1 to 3 percent slopes	Suited	Suited	Well suited	Well suited
Sacul fine sandy loam, 1 to 3 percent slopes	Suited	Well suited	Well suited	Well suited
Sacul fine sandy loam, 3 to 8 percent slopes	Suited	Well suited	Well suited	Well suited
Sacul fine sandy loam, 8 to 16 percent slopes	Poorly suited	Well suited	Well suited	Well suited
Sacul-Kirvin association, undulating	Suited	Well suited	Well suited	Well suited
Saffell gravelly sandy loam, 1 to 3 percent slopes	Suited	Suited	Suited	Well suited
Saffell gravelly sandy loam, 3 to 10 percent slopes	Suited	Suited	Suited	Well suited
Smithton fine sandy loam	Poorly suited	Suited	Suited	Well suited

Wetland food and cover plants.—Plants that provide food and cover for wetland forms of wildlife. Examples are smartweed, wild millet, spikerush, sedges, cattails, and rice cutgrass.

Shallow-water developments.—Impoundments, excavations, or other water-control structures, generally not exceeding six feet in depth, to create habitat principally for waterfowl. They may be designed to be drained and planted to crops or they may be permanent impoundments.

Ponds and reservoirs.—Impounded or dug-out areas that have water of suitable depth, quantity, and quality to produce fish and wildlife.

Classes of wildlife.—The three classes of wildlife listed in table 4 are defined in the following paragraphs.

Openland wildlife.—Quail, doves, cottontail rabbit, fox, meadowlark, field sparrow, and other birds and mammals that normally live on cropland, pasture, meadow, lawn, and in other openland areas where grasses, herbs, and shrubby plants grow.

Woodland wildlife.—Woodcock, thrush, vireo, deer, turkey, squirrel, raccoon, and other birds and mammals that normally live in wooded areas where trees and shrubs are dominant.

Wetland wildlife.—Ducks, geese, rail, herons, shore birds, otter, mink, muskrat, beaver, and other birds and *of wildlife habitat and kinds of wildlife*

Suited—moderate limitations that can be overcome with good management or careful design; Poorly suited—limitations are severe enough
Unsuited—limitations are very severe and unsatisfactory results are probable]

Wildlife habitat elements—Continued			Classes of wildlife—		
Wetland food and cover plants	Shallow-water developments	Ponds and reservoirs	Openland	Woodland	Wetland
Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Well suited	Well suited	Well suited	Suited	Well suited	Well suited.
Well suited	Poorly suited	Suited	Poorly suited	Well suited	Well suited.
Well suited	Poorly suited	Suited	Poorly suited	Well suited	Well suited.
Unsuited	Poorly suited	Suited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Suited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Poorly suited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Suited	Well suited	Well suited	Unsuited.
Poorly suited	Poorly suited	Poorly suited	Suited	Well suited	Poorly suited.
Poorly suited	Poorly suited	Suited	Well suited	Well suited	Poorly suited.
Unsuited	Unsuited	Well suited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Suited	Suited	Well suited	Unsuited.
Unsuited	Unsuited	Well suited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Suited	Suited	Well suited	Unsuited.
Unsuited	Unsuited	Poorly suited	Poorly suited	Well suited	Unsuited.
Poorly suited	Poorly suited	Well suited	Well suited	Well suited	Poorly suited.
Well suited	Suited	Well suited	Suited	Well suited	Well suited.
Suited	Poorly suited	Suited	Suited	Well suited	Suited.
Unsuited	Unsuited	Poorly suited	Suited	Well suited	Unsuited.
Well suited	Well suited	Well suited	Suited	Well suited	Well suited.
Unsuited	Poorly suited	Suited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Suited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Unsuited	Unsuited	Unsuited	Unsuited.
Poorly suited	Poorly suited	Suited	Suited	Well suited	Poorly suited.
Poorly suited	Poorly suited	Suited	Suited	Well suited	Poorly suited.
Suited	Suited	Well suited	Suited	Well suited	Suited.
Unsuited	Poorly suited	Well suited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Well suited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Suited	Suited	Well suited	Unsuited.
Unsuited	Unsuited	Well suited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Poorly suited	Suited	Well suited	Unsuited.
Unsuited	Unsuited	Poorly suited	Suited	Well suited	Unsuited.
Well suited	Well suited	Suited	Suited	Well suited	Well suited.

mammals that normally live in wet areas, marshes and swamps.

Engineering Uses of the Soils [5]

This section provides information of special interest to engineers, contractors, farmers, and others who use soil as structural material or as foundation material upon which structures are built. Considered in this section are those properties of the soils that affect construction and maintenance of roads and airports, pipelines, buildings, water storage facilities, erosion-control structures, drainage systems, and sewage disposal systems. Among the soil properties most important in engineering are permeability, shear strength, density, shrink-swell potential, available water capacity, grain-size distribution, plasticity, and reaction.

Information concerning these and related soil properties is given in tables 5, 6, and 7. The estimates and interpretations of soil properties in these tables can be used in:

1. Planning and designing of agricultural drainage systems, farm ponds, irrigation systems, diversion terraces, and other structures for controlling water and conserving soil.

[5] GEORGE C. BYRD, JR., agricultural engineer, Soil Conservation Service, and DOUGLAS E. HAWKINS, civil engineer, Soil Conservation Service, helped prepare this section.

TABLE 5.—*Estimated soil properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in for referring to other series that appear in the first column of this table. Absence of

Soil series and map symbols	Depth to seasonal high water table	Depth from surface of typical profile	Classification— USDA texture	Unified	AASHO
	In.	*In.*			
Alaga: AgC, AgE, ALB, ALC	>120	0–58	Loamy sand and sand.	SP–SM or SM	A–2
		58–80	Sand	SP or SP–SM	A–1–b or A–3
*Amy:[1] Am, AS For Leaf part of AS, see Leaf series.	0–15	0–18	Silt loam	ML	A–4
		18–41	Silt loam	ML or CL	A–4 or A–6
		41–52	Silty clay loam	CL	A–6
		52–68	Silt loam	ML or CL	A–4 or A–6
Bibb:[1] BB	0–15	0–65	Fine sandy loam	SM or ML	A–4
*Cahaba: CaB, CaC, CaD, CNB For Norfolk part of CNB, see Norf k series.	60–120	0–12	Fine sandy loam	SM or ML	A–4
		12–48	Sandy clay loam	CL or ML	A–6
		48–72	Fine sandy loam	ML	A–4
Ennis:[1] En	60–120	0–6	Silty clay loam	CL	A–6
		6–29	Sandy clay loam	SC or CL	A–4 or A–6
		29–72	Fine sandy loam	SM or ML	A–4
Goldsboro: GoB	15–30	0–12	Fine sandy loam	SM	A–2
		12–72	Sandy clay loam	SC or SM	A–2 or A–4
*Kirvin: KfC, KfE, KNB, KSC, KSD For Norfolk part of KNB, see Norfolk series; for Sacul part of KSC and KSD, see Sacul series.	30–60	0–9	Fine sandy loam	SM	A–2 or A–4
		9–55	Clay	MH or CH	A–7
		55–73	Silty clay loam	ML or CL	A–4 or A–6
Leadvale: LeB	15–30	0–8	Silt loam	ML	A–4
		8–23	Silt loam	ML	A–4
		23–63	Silt loam (fragipan).	ML	A–4
Leaf: Lf	0–15	0–6	Silt loam	ML or CL	A–4 or A–6
		6–65	Silty clay	MH or CH	A–7
Lobelville:[1] Lo	15–30	0–16	Fine sandy loam	SM or ML	A–4
		16–72	Silty clay loam	CL	A–6
Lucy: LuC	>120	0–30	Loamy fine sand	SM	A–2
		30–64	Sandy clay loam	SC	A–2 or A–4
		64–72	Loam	SM or ML	A–4
Mashulaville: Ma	0–15	0–9	Silt loam	ML	A–4
		9–25	Silt loam	ML	A–4
		25–46	Silt loam (fragipan).	ML	A–4
		46–60	Silty clay	MH or CH	A–7
Norfolk: NoB, NoC	60–120	0–21	Fine sandy loam	SM	A–2
		21–63	Sandy clay loam	SC or SM–SC	A–2 or A–4
		63–72	Sandy loam	SM	A–2
Oil-waste land. Os. Too variable to be rated.					
*Ouachita:[1] Ot, OU For Amy part of OU, see Amy series.	24–60	0–19	Silt loam	ML or CL	A–4 or A–6
		19–69	Silty clay loam	CL or ML–CL	A–4 or A–6
		69–77	Fine sandy loam	ML	A–4
Pheba: PhB	5–20	0–12	Silt loam	ML	A–4
		12–24	Silt loam	ML or CL	A–4 or A–6
		24–72	Silt loam (fragipan).	ML or CL	A–4 or A–6

See footnotes at end of table.

significant to engineering

such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions entry in a column indicates that properties are not estimated. <less than, >more than]

Percentage passing sieve [2]—				Permeability	Available water capacity	Reaction	Shrink-swell potential
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	*In./hr.*	*In./in. of soil*	*pH*	
95–100	95–100	65–100	5–15	>6.3	0.05–0.10	4.5–6.0	Low.
95–100	95–100	35–60	2–10	>6.3	<0.05	4.5–6.0	Low.
---	100	95–100	75–95	0.63–2.0	0.20–0.22	4.5–6.0	Low.
---	100	95–100	85–95	0.63–2.0	0.20–0.22	4.5–5.5	Low.
100	95–100	95–100	85–95	0.06–0.2	0.19–0.21	4.5–5.5	Low.
100	95–100	95–100	70–90	0.2–0.63	0.20–0.22	4.5–5.5	Low.
100	95–100	95–100	45–65	0.63–2.0	0.14–0.22	4.0–5.5	Low.
95–100	95–100	60–100	45–65	2.0–6.3	0.13–0.16	5.1–6.0	Low.
95–100	95–100	80–100	60–90	0.63–2.0	0.15–0.18	4.5–5.5	Low.
95–100	95–100	60–100	55–80	0.63–2.0	0.13–0.16	4.5–5.5	Low.
100	95–100	80–95	60–70	0.2–0.63	0.19–0.21	5.1–6.0	Low.
100	95–100	80–95	45–65	0.2–0.63	0.15–0.18	4.5–5.5	Low.
100	95–100	70–95	40–60	2.0–6.3	0.13–0.16	4.5–5.5	Low.
95–100	95–100	60–95	20–30	0.63–2.0	0.14–0.16	4.5–6.0	Low.
95–100	95–100	50–95	25–40	0.63–2.0	0.15–0.18	4.5–5.5	Low.
95–100	90–100	60–95	30–40	0.63–2.0	0.13–0.16	5.1–6.0	Low.
95–100	95–100	90–100	75–95	0.2–0.63	0.17–0.20	4.0–5.5	Moderate.
95–100	95–100	85–100	60–75	0.2–0.63	0.16–0.19	4.0–5.5	Low.
100	95–100	90–100	70–90	0.63–2.0	0.20–0.22	5.1–6.0	Low.
100	95–100	95–100	85–95	0.2–0.63	0.20–0.22	4.5–5.5	Low.
100	95–100	95–100	85–95	0.2–0.63	0.14–0.16	4.5–5.5	Low.
---	100	90–100	70–90	0.63–2.0	0.20–0.22	4.5–6.0	Low.
---	100	95–100	80–95	<0.2	0.17–0.20	4.5–5.5	Moderate.
100	95–100	95–100	40–60	0.63–2.0	0.13–0.16	4.5–6.0	Low.
100	100	95–100	60–95	0.63–2.0	0.19–0.21	4.0–5.0	Low.
95–100	95–100	75–90	15–25	>6.3	0.05–0.10	5.1–6.0	Low.
95–100	100	75–95	30–40	0.63–2.0	0.15–0.18	4.5–5.5	Low.
100	100	75–95	40–60	0.63–2.0	0.16–0.19	4.5–5.5	Low.
---	100	95–100	75–95	0.63–2.0	0.20–0.22	5.1–6.0	Low.
---	100	95–100	75–95	0.2–0.63	0.20–0.22	4.5–5.5	Low.
---	100	95–100	75–95	0.06–0.2	0.14–0.16	4.5–5.5	Low.
---	100	95–100	80–95	0.06–0.2	0.17–0.20	4.5–5.5	Moderate.
95–100	95–100	90–100	15–35	2.0–6.3	0.13–0.16	4.5–6.0	Low.
95–100	95–100	95–100	30–50	0.63–2.0	0.15–0.18	4.5–5.5	Low.
95–100	95–100	95–100	20–35	0.63–2.0	0.10–0.15	4.5–5.5	Low.
100	95–100	85–100	75–95	0.63–2.0	0.20–0.22	5.1–6.0	Low.
100	95–100	95–100	85–100	0.2–0.63	0.19–0.21	4.5–5.5	Low.
100	95–100	85–100	50–70	0.63–2.0	0.13–0.16	4.5–5.5	Low.
100	95–100	80–95	75–95	0.63–2.0	0.20–0.22	5.1–6.0	Low.
100	95–100	80–95	75–95	0.2–0.63	0.20–0.22	4.5–5.5	Low.
100	95–100	80–95	75–95	0.2–0.63	0.14–0.16	4.5–5.5	Low.

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface of typical profile	Classification— USDA texture	Unified	AASHO
	In.	*In.*			
*Sacul: SaB, SaC, SaE, SKB. For Kirvin part of SKB, see Kirvin series.	15–30	0–10	Fine sandy loam	SM or ML	A–4
		10–44	Clay and silty clay	MH or CH	A–7
		44–72	Silty clay loam	CL	A–6 or A–7
Saffell: SlB, SlC	>120	0–14	Gravelly sandy loam.	SM or GM	A–2 or A–4
		14–47	Gravelly sandy clay loam.	GC or SC	A–2 or A–4
		47–72	Gravelly loamy sand.	GM or SM	A–2
Smithton: Sm	0–15	0–10	Fine sandy loam	SM or ML	A–4
		10–72	Fine sandy loam	ML	A–4

[1] Subject to flooding.

TABLE 6.—*Engineering*

An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils for referring to other series that appear in the first column of this table. Absence of entry

Soil series and map symbols	Suitability as source of— Topsoil	Road fill	Soil features affecting— Highway location
Alaga: AgC, AgE, ALB, ALC	Poor: low fertility; low available water capacity.	Good	Erodible and excessive cut and fill if slopes are more than 6 percent.
*Amy: Am AS. For Leaf part of AS, see Leaf series.	Poor: poorly drained; low fertility; subject to frequent flooding in places.	Poor: poorly drained; some areas subject to frequent flooding; moderate traffic-supporting capacity.	Poorly drained; frequent flooding; moderate traffic-supporting capacity.
Bibb: BB	Poor: poorly drained; subject to frequent flooding.	Poor: subject to frequent flooding; poorly drained; moderate traffic-supporting capacity.	Poorly drained; subject to frequent flooding; moderate traffic-supporting capacity.
*Cahaba: CaB, CaC, CaD, CNB. For Norfolk part of CNB, see Norfolk series.	Good to fair: low fertility.	Fair: moderate traffic-supporting capacity.	Erodible and excessive cut and fill if slopes are steeper than 6 percent; moderate traffic-supporting capacity.
Ennis: En	Fair: somewhat poor workability; subject to frequent flooding.	Fair: moderate traffic-supporting capacity; subject to frequent flooding.	Moderate traffic-supporting capacity; subject to frequent flooding.

significant to engineering—Continued

Percentage passing sieve [2]— No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Permeability	Available water capacity	Reaction	Shrink-swell potential
				In./hr.	*In./in. of soil*	*pH*	
95–100	90–100	80–100	40–65	0. 63–2. 0	0. 10–0. 15	5. 1–6. 0	Low.
95–100	95–100	95–100	80–95	0. 06–0. 2	0. 17–0. 20	4. 0–5. 5	Moderate.
95–100	95–100	95–100	85–100	0. 2–0. 63	0. 19–0. 21	4. 0–5. 5	Low.
75–90	70–85	40–50	20–45	2. 0–6. 3	0. 08–0. 12	5. 1–6. 0	Low.
40–65	40–60	40–55	25–45	0. 63–2. 0	0. 10–0. 15	4. 5–5. 5	Low.
35–60	20–55	20–50	15–30	>6. 3	0. 04–0. 08	4. 5–5. 5	Low.
95–100	95–100	85–95	40–65	0. 63–2. 0	0. 13–0. 16	4. 5–5. 5	Low.
95–100	95–100	85–95	55–80	0. 2–0. 63	0. 13–0. 16	4. 5–5. 5	Low.

[2] 100 percent of the material is smaller than 3 inches.

interpretations

in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions in a column indicates that characteristics are too variable for the material to be classified]

Soil features affecting—Continued: Winter grading	Farm ponds: Reservoir area	Farm ponds: Embankment	Terraces and diversions	Grassed waterways
Soil features favorable	High seepage rate	High seepage after compaction; subject to piping and erosion.	Material erodible and unstable in low embankments; rapid intake rate.	Low fertility; low available water capacity; difficult to maintain vegetation.
Seasonal high water table; poorly drained; subject to frequent flooding in winter.	Moderately slow seepage rate.	Fair stability; medium compressibility; subject to piping and erosion.	Level surface; some areas subject to frequent flooding.	Level surface; some areas subject to frequent flooding.
Subject to frequent flooding in winter; seasonal high water table; poorly drained.	Moderate seepage rate.	Fair slope stability; medium compressibility; subject to piping and erosion.	Level surface; subject to frequent flooding.	Level surface; subject to frequent flooding on bottom lands.
Soil features favorable	Moderate seepage rate	Fair to good slope stability; medium compressibility; subject to piping and erosion.	Susceptible to erosion; some slopes exceed 8 percent.	Soil features generally favorable; slopes excessive in some areas.
Subject to frequent flooding in winter.	Moderate to moderately slow seepage rate.	Fair to good slope stability; slight to medium compressibility; subject to piping and erosion.	Level surface; subject to frequent flooding.	Level surface; subject to frequent flooding on bottom lands.

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TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting—
	Topsoil	Road fill	Highway location
Goldsboro: GoB	Fair to good: moderately well drained.	Fair: moderately well drained.	Moderately well drained.
*Kirvin: KfC, KfE, KNB, KSC, KSD. For Norfolk part of KNB, see Norfolk series; for Sacul part of KSC and KSD, see Sacul series.	Fair to poor: thin surface layer over clayey material; low fertility.	Poor: low traffic-supporting capacity.	Low traffic-supporting capacity; moderate shrink-swell potential; excessive cut and fill if slopes are steeper than 6 percent.
Leadvale: LeB	Fair to good: low fertility; moderately well drained.	Fair: moderate traffic-supporting capacity; moderately well drained.	Moderate traffic-supporting capacity; moderately well drained.
Leaf: Lf	Poor: mainly clayey material; low fertility; poorly drained; subject to frequent flooding in places.	Poor: poorly drained; low traffic-supporting capacity; subject to frequent flooding in places.	Poorly drained; low traffic-supporting capacity; moderate shrink-swell potential; subject to frequent flooding in places.
Lobelville: Lo	Fair: subject to frequent flooding; moderately well drained; somewhat poor workability at depth below 16 inches.	Fair: subject to frequent flooding; moderately well drained; moderate traffic-supporting capacity.	Subject to frequent flooding; moderately well drained; moderate traffic-supporting capacity.
Lucy: LuC	Poor in upper 21 to 39 inches; low available water capacity; low fertility; fair to good at depths of more than 39 inches.	Good	Excessive cut and fill if slopes are more than 6 percent.
Mashulaville: Ma	Poor: poorly drained; low fertility; clayey at depths of more than 46 inches.	Poor: poorly drained; moderate to low traffic-supporting capacity.	Poorly drained; moderate to low traffic-supporting capacity.
Norfolk: NoB, NoC	Good to fair: low fertility.	Fair: moderate traffic-supporting capacity.	Moderate traffic-supporting capacity; excessive cut and fill if slopes are more than 6 percent.
Oil-waste land: Os	Poor: polluted with oil-field waste.	Poor: variable, dispersed material.	Variable, dispersed material.
*Ouachita: Ot, OU. For Amy part of OU, see Amy series.	Good to fair: subject to frequent flooding; somewhat poor workability at depths of more than 19 inches.	Fair: moderate traffic-supporting capacity; subject to frequent flooding.	Subject to frequent flooding; moderate traffic-supporting capacity.

interpretations—Continued

Soil features affecting—Continued				
Winter grading	Farm ponds		Terraces and diversions	Grassed waterways
	Reservoir area	Embankment		
Seasonal high water table.	Moderate seepage rate	Fair to good slope stability; slight to medium compressibility; subject to piping and erosion.	Susceptible to erosion	Soil features favorable.
Plastic, clayey subsoil, difficult to work when wet.	Excessive slope in some areas.	Fair slope stability; high compressibility.	Moderately slow permeability; clayey subsoil makes construction difficult; some slopes exceed 8 percent.	Moderately slow permeability; clayey subsoil.
Seasonal high water table; moderately well drained.	Moderately slow seepage rate.	Fair slope stability; medium compressibility; subject to piping and erosion.	Susceptible to erosion on long slopes.	Soil features favorable.
Plastic, clayey subsoil, difficult to work when wet; subject to frequent flooding in winter; seasonal high water table; poorly drained.	Soil features favorable	Fair slope stability; high compressibility.	Level and nearly level soils; subject to frequent flooding in places.	Level and nearly level soils; subject to frequent flooding in places.
Subject to frequent flooding in winter; seasonal high water table.	Moderate seepage rate	Fair slope stability; medium compressibility; subject to piping and erosion.	Subject to frequent flooding on bottom land.	Subject to frequent flooding on bottom land.
Soil features favorable	Moderate to high seepage rate.	Fair to good slope stability; medium to low seepage; subject to piping and erosion.	Susceptible to erosion; unstable in low embankments.	Difficult to maintain vegetation; low available water capacity; low fertility.
Seasonal high water table; poorly drained; lower subsoil is plastic, clayey material.	Soil features favorable	Fair slope stability; medium to high compressibility; subject to piping and erosion.	Level surface	Level surface.
Soil features favorable	Moderate seepage rate	Fair to good slope stability; medium compressibility; subject to piping and erosion.	Susceptible to erosion	Soil features favorable.
Variable, dispersed material; generally wet in winter.	Variable, polluted material.	Variable material	Variable material; mainly level areas.	Variable material; difficult to establish vegetation.
Subject to frequent flooding in winter.	Moderately slow seepage rate.	Fair to good slope stability; medium compressibility; subject to piping and erosion.	Level surface, subject to frequent flooding.	Level surface, subject to frequent flooding.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of— Topsoil	Road fill	Soil features affecting— Highway location
Pheba: PhB	Fair: low fertility; somewhat poorly drained.	Fair: moderate traffic-supporting capacity; somewhat poorly drained.	Moderate traffic-supporting capacity; somewhat poorly drained.
*Sacul: SaB, SaC, SaE, SKB. For Kirvin part of SKB, see Kirvin series.	Fair to poor: thin surface layer over clayey material; low fertility.	Poor: low traffic-supporting capacity.	Moderate shrink-swell potential; low traffic-supporting capacity; excessive cut and fill on slopes steeper than 6 percent.
Saffell: SlB, SlC	Poor: high gravel content; low fertility; low available water capacity.	Good	Excessive cut and fill where slopes are steeper than 6 percent.
Smithton: Sm	Poor: poorly drained; low fertility.	Poor: moderate traffic-supporting capacity; poorly drained.	Poorly drained; moderate traffic-supporting capacity.

TABLE 7.—*Engineering*

[Tests performed by Arkansas State Highway

Soil name and location	Parent material	Arkansas SCS report number S-67-Ark-52	Depth from surface
			In.
Alaga loamy sand: SW¼NE¼SE¼, sec. 30, T. 12 S., R. 19 W.	Unconsolidated sandy fluvial or marine sediment on Coastal Plain uplands.	2-2	7-24
		2-3	24-46
Amy silt loam: SE¼SE¼NW¼, sec. 2, T. 12 S., R. 16 W.	Unconsolidated loamy fluvial or marine sediment on Coastal Plain uplands and terraces.	1-2	4-18
		1-3	18-41
		1-4	41-52
Kirvin fine sandy loam: SE¼NW¼SE¼, sec. 30, T. 11 S., R. 19 W.	Unconsolidated, stratified loamy and clayey fluvial or marine sediment on Coastal Plain uplands.	4-3	9-24
		4-4	24-38
		4-5	38-55
Norfolk fine sandy loam: NW¼NW¼NE¼, sec. 12, T. 14 S., R. 18 W.	Unconsolidated, stratified loamy fluvial or marine sediment on Coastal Plain uplands.	5-2	7-21
		5-3	21-36
		5-5	49-63
Ouachita silt loam: SW¼SW¼NE¼, sec. 10, T. 13 S., R. 17 W.	Loamy sediment on flood plains and natural levees along drainageways in the Coastal Plain.	6-3	19-34
		6-5	42-69

[1] Based on AASHO Designation T-99, Method A (*2*).

[2] Mechanical analyses according to the AASHO Designation T-88-57 (*2*). Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data used in this table are not suitable for naming textural classes for soils.

interpretations—Continued

Soil features affecting—Continued				
Winter grading	Farm ponds: Reservoir area	Farm ponds: Embankment	Terraces and diversions	Grassed waterways
Seasonal high water table; somewhat poorly drained.	Moderately slow seepage rate.	Fair slope stability; medium compressibility; subject to piping and erosion.	Susceptible to erosion if slopes are long.	Soil features favorable.
Moderate shrink-swell potential; plastic, clayey subsoil, difficult to work when wet.	Excessive slopes in some areas.	Fair slope stability; high compressibility.	Clayey subsoil makes construction difficult; slopes over 5 percent are excessive.	Clayey subsoil; low fertility; many areas have excessive slopes.
Soil features favorable.	Moderate to high seepage rate.	Fair to good slope stability; medium to low seepage; subject to piping and erosion.	High gravel content; low fertility; erodible; poor stability in low embankments; some slopes exceed 8 percent.	High gravel content; low fertility; low available water capacity.
Seasonal high water table; poorly drained.	Moderately slow seepage rate.	Fair slope stability; medium compressibility; subject to piping and erosion.	Level surface.	Level surface.

test data

Department, Division of Materials and Tests]

Moisture density-data [1]		Mechanical analysis [2]			Liquid limit	Plasticity index	Classification	
Maximum dry density	Optimum moisture	Percentage passing sieve— No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)			AASHO [3]	Unified [4]
Lb./cu. ft.	*Pct.*				*Pct.*			
111	12	100	97	14		[5] NP	A-2-4(0)	SM
112	12	100	97	13		NP	A-2-4(0)	SM
108	15		100	88		NP	A-4(8)	ML
109	17		100	92	29	12	A-6(9)	CL
105	20	[6] 99	97	87	33	15	A-6(11)	CL
87	32	[6] 98	97	81	62	25	A-7-5(20)	MH
84	34	[6] 99	98	84	61	18	A-7-5(17)	MH
86	32	100	99	80	53	18	A-7-5(15)	MH
113	11	[6] 99	99	31		NP	A-2-4(0)	SM
120	12	[6] 99	99	42	21	4	A-4(2)	SM-SC
114	15	[6] 99	97	43	28	10	A-4(2)	SC
104	20		100	97	33	10	A-4(8)	ML-CL
102	21		100	97	35	11	A-6(9)	ML-CL

[3] Based on AASHO Designation M 145-66 I (*2*).
[4] Based on the Unified Soil Classification System, Tech. Memo. No. 3-357, v. 1 (*17*).
[5] NP=nonplastic.
[6] 100 percent passed the No. 4 sieve.

2. Selecting potential locations for highways, airports, pipelines, and underground cables.
3. Locating probable sources of sand or gravel suitable for use as construction material.
4. Selecting potential industrial, commercial, residential, and recreational areas.

The engineering interpretations reported here do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and where the excavations are deeper than the depths of layers here reported. Even in these situations, however, the soil map is useful in planning more detailed field investigations and for indicating the kinds of problems that may be expected.

Some terms used by soil scientists may be unfamiliar to engineers, and some words, for example, gravel, sand, silt, clay, loam, surface soil, subsoil, and horizon, have different meanings in soil science than they have in engineering. These and other terms are defined in the Glossary.

Engineering classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system (*17*) used by the SCS engineers, Department of Defense, and others, and the AASHO system (*2*) adopted by the American Association of State Highway Officials.

In the Unified system, soils are classified according to particle-size distribution, plasticity, liquid limit, and organic matter. Soils are grouped in 15 classes. There are 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 are designated by symbols for both classes; for example, ML-CL.

The AASHO system is used to classify soils according to those properties that affect their use in highway construction and maintenance. In this system, a soil is placed in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A-1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation). At the other extreme, in group A-7, are clay soils that have low strength when wet and that are the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A-1, A-2, and A-7 groups are divided 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 engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest.

USDA texture is determined by the relative proportions of sand, silt, and clay in soil material that is less than 2.0 millimeters in diameter. "Sand," "silt," "clay," and some of the other terms used in the USDA textural classification are defined in the Glossary.

Table 5 shows the estimated classification of all the soils in the county according to all three systems of classification.

Estimated soil properties significant to engineering

Estimates of soil properties significant to engineering are listed in table 5. The estimates are based on field classification and descriptions, physical and chemical tests of selected representative samples, test data from comparable soils in adjacent areas, and from detailed experience in working with the individual kind of soil in the survey area. The depth to bedrock is not given in table 5, because bedrock is very deep and is not a factor in construction work.

Permeability as used in this table relates only to movement of water downward through undisturbed and uncompacted soil. It does not include lateral seepage. The estimates are based on structure and porosity of the soil. Plowpans, surface crusts, and other properties resulting from use of the soils are not considered.

Available water capacity is that amount of capillary water in the soil available for plant growth after all free water has drained away.

Reaction is the degree of acidity or alkalinity of a soil, expressed as a pH value. The pH value and relative terms used to describe soil reaction are explained in the Glossary.

Shrink-swell potential is an indication of the volume change to be expected of the soil material as a result of changes in moisture content. Shrinking and swelling of soils cause much damage to building foundations, roads, and other structures. A high shrink-swell potential indicates hazards to the maintenance of structures constructed in, on, or with such materials.

Engineering interpretations

Selected information useful to engineers and others who plan to use soil material in construction of highways, farm facilities, buildings, and structures for controlling water and conserving soil are given in table 6. Detrimental or undesirable features are emphasized; but very important desirable features also may be listed. The ratings and other interpretations in this table are based on estimated engineering properties of the soil in table 5, on available test data, including those in table 7, and on field experience. The information applies only to soil depths indicated in table 5, but it is reasonably reliable to depths of about 6 feet for most soils. Specific values should not be assigned to estimates of bearing strength given in table 6.

Topsoil is a term used to designate a fertile soil or soil material, ordinarily rich in organic matter, and used as topdressing for lawns, gardens, roadbanks, and the like. The ratings indicate suitability for such use.

Road fill is material used to build embankments. The ratings indicate performance of soil material moved from borrow areas for these purposes.

Highway location is influenced by features of the undisturbed soil that affect construction and maintenance of highways. The soil features, favorable as well as unfavorable, are the principal ones that affect geographic location of highways.

The Alaga soils are a fair to good source of sand, and the Lucy soils are a fair source in the upper 21 to 39 inches. Sand from most of these areas needs washing to remove silt, clay and organic matter, and it needs screening before it is used for building aggregate.

The Saffell soils have a variable but high content of waterworn gravel that is fairly well graded. Size ranges from about one-fourth inch to about 3 inches in diameter. The very gravelly layers vary in thickness from about 4 feet to more than 10 feet. Many of these areas have been surface-mined for road fill and road surfacing material. Few, if any, of the gravel deposits are clean enough or properly graded for use for building aggregate without washing and screening.

All other soils in the county are poor or unsuitable as a source of sand and gravel.

Most of the soils of Ouachita County have some limitations as construction foundation materials. Many of these limitations, however, can be overcome with appropriate treatment.

Winter grading is affected chiefly by soil features, especially unfavorable ones, that are relevant to moving, mixing, and compacting soil in roadbuilding when temperatures are below freezing, or when the soil material is wet.

Farm pond reservoir areas are affected mainly by loss of water through seepage, and the soil features are those that influence seepage.

Farm pond embankments serve as dams. The soil features of both subsoil and substratum are important to the use of soils for constructing embankments.

Terraces and diversions are affected by soil features and qualities that affect stability or hinder layout and construction. Erodibility, hazards of sedimentation in channels, and the difficulty of establishing and maintaining cover are important considerations for diversions.

Grassed waterways are affected by soil features that affect the establishment, growth, and maintenance of plants, and factors that hinder layout and construction.

Engineering test data

Table 7 contains the results of engineering tests performed by the Arkansas State Highway Department on 5 soil series in Ouachita County. The table shows the specific location where samples were taken, the depth to which sampling was done, and the results to determine particle-size distribution and other properties significant in soil engineering.

Maximum dry density is the maximum unit dry weight of the soil when it has been compacted with optimum moisture by the prescribed method of compaction. The moisture content which gives the highest dry weight unit is called the optimum moisture content for the specific method of compaction.

Mechanical analyses show the percentages, by weight, of soil particles that would pass sieves of specified sizes. Sand and other coarser materials do not pass through the No. 200 sieve. Silt and clay pass through the No. 200 sieve. Silt is that material larger than 0.002 millimeter in diameter that passes through the No. 200 sieve, and clay is that fraction passing through the No. 200 sieve that is smaller than 0.002 millimeter in diameter.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a solid to a plastic state. If the moisture is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from solid to plastic. The liquid limit is the moisture content at which the material changes from plastic to liquid. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic.

Use of Soils for Town and Country Planning

Table 8 gives the degree and kind of limitations of the soils of Ouachita County for selected uses of soils in town and country planning. The degree of limitation reflects all the features of the given soil, to a depth of 6 feet, that affect a particular use. *Slight* indicates that there is no limitation or that the limitation is not serious and is easily overcome; *moderate* indicates that the limitation generally can be corrected by practical means; and *severe*, that the limitation is difficult or impractical to overcome. The limitation is severe for most uses if the site is subject to frequent flooding.

In table 8 the soils are rated according to their suitability for use in six categories—foundations, septic tank filter fields, sewage lagoons, recreation, light industry, and trafficways.

Properties considered for foundation and site requirements for homes of 3 stories or less without basements are natural drainage, depth to the water table, flood hazard, shrink-swell potential, bearing capacity, slope, and suitability for grasses, shrubs, and trees. Ratings of bearing strength are based on estimates of the maximum load that a soil can support when compacted. Specific values should not be applied to the ratings of bearing capacity in this table. Shrink-swell potential refers to expansion and contraction of a soil with changes in moisture content.

Properties considered for septic tank filter fields are permeability, percolation rate, depth to the water table, slopes, and flood hazard. A seasonal water table less than 4 feet below the surface constitutes a moderate to severe limitation for this use. A percolation rate slower than 75 minutes per inch, or permeability slower than 0.63 inch per hour, constitutes a severe limitation; and a percolation rate of between 45 and 75 minutes per inch, or permeability between 0.63 and 1 inch per hour, a moderate limitation. Slopes of 5 to 10 percent constitute a moderate limitation and slopes steeper than 10 percent are a severe limitation.

Properties considered for sewage lagoons are permeability, slope, and the suitability of the reservoir site material for building embankments.

For recreation facilities, trafficability, productivity, natural drainage, flood hazard, permeability, and topography of the landscape are important properties. Trafficability is related to surface soil texture and refers to movement of pedestrian, bicycle, and light vehicular traffic. Trafficability is no more than a slight limitation on loamy soils that are not likely to be flooded and have a water table at a depth of 30 inches or more during the season of heavy use. On sandy soils, trafficability is a moderate to severe limitation.

Soil properties of importance for light industry structures of less than 3 stories are bearing strength, shrink-swell potential, depth to the water table, flood hazard, natural drainage, and topography.

TABLE 8.—*Degree and kind of limitation*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils for referring to other series that appear

Series and map symbols	Foundations of dwellings [1]	Septic tank filter fields	Sewage lagoons
Alaga: AgC, AgE, ALB, ALC	Slight if slopes are less than 6 percent; moderate if slopes are 6 to 15 percent; severe if slopes are more than 15 percent; low available water capacity.	Slight if slopes are less than 5 percent; moderate if slopes are 5 to 10 percent; severe if slopes are more than 10 percent; severe if hazard of ground-water contamination exists.	Severe: high seepage rate, poor embankment material.
*Amy: Am, AS For Leaf part of AS, see Leaf series.	Severe: moderate bearing strength; poorly drained; seasonal high water table; some areas subject to frequent flooding.	Severe: slow percolation; seasonal high water table; some areas subject to frequent flooding.	Moderate: fair embankment material; severe in areas subject to frequent flooding.
Bibb: BB	Severe: moderate bearing strength; poorly drained; seasonal high water table; subject to frequent flooding.	Severe: slow percolation; seasonal high water table; subject to frequent flooding.	Severe: subject to frequent flooding; moderate seepage rate; fair embankment material.
*Cahaba: CaB, CaC, CaD, CNB For Norfolk part of unit CNB; see Norfolk series.	Slight to moderate if slopes are less than 6 percent; high to moderate bearing strength; moderate if slopes are 6 to 12 percent.	Slight if slopes are less than 5 percent; moderate if slopes are 5 to 10 percent; severe if slopes are more than 10 percent.	Moderate if slopes are less than 7 percent; moderate seepage rate; fair embankment material; severe if slopes are more than 7 percent.
Ennis: En	Severe: subject to frequent flooding.	Severe: subject to frequent flooding.	Severe: subject to frequent flooding; fair embankment material.
Goldsboro: GoB	Moderate: seasonal high water table.	Moderate to severe: seasonal high water table.	Moderate: moderate seepage rate; fair embankment material.
*Kirvin: KfC, KfE, KNB, KSC, KSD For Norfolk part of unit KNB, see Norfolk series; for Sacul part of units KSC, KSD, see Sacul series.	Moderate if slopes are less than 15 percent; moderate bearing strength, moderate shrink-swell potential; severe if slopes are more than 15 percent.	Severe: slow percolation.	Moderate if slopes are less than 7 percent, severe if slopes are steeper; fair to good reservoir site material.
Leadvale: LeB	Moderate to severe: seasonal high water table; moderate bearing strength.	Severe: slow percolation; seasonal high water table.	Moderate: fair embankment material; slopes more than 2 percent in places.
Leaf: Lf	Severe: low bearing strength; poorly drained; seasonal high water table; moderate shrink-swell potential; subject to frequent flooding in places.	Severe: slow percolation; seasonal high water table; subject to frequent flooding in places.	Slight to moderate: fair to good embankment material; severe in areas subject to frequent flooding.

See footnote at end of table.

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in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions in the first column of this table]

Recreation			Light industries [1]	Trafficways
Campsites	Picnic areas	Intensive play areas		
Moderate: poor trafficability, low productivity, droughty; severe if slopes are more than 15 percent.	Moderate: poor trafficability, low productivity, droughty; severe if slopes are more than 15 percent.	Moderate if slopes are less than 6 percent; severe if slopes are more than 6 percent; droughty; difficult to maintain vegetative cover.	Slight if slopes are less than 4 percent, moderate if slopes are 4 to 8 percent, severe if slopes are more than 8 percent.	Slight if slopes are less than 6 percent, moderate if slopes are 6 to 15 percent, severe if slopes are more than 15 percent.
Severe: poorly drained; seasonal high water table; some areas subject to frequent flooding.	Severe: poorly drained; seasonal high water table; some areas subject to frequent flooding.	Severe: poorly drained; seasonal high water table; some areas subject to frequent flooding.	Severe: poorly drained; seasonal high water table; some areas subject to frequent flooding.	Severe: moderate traffic-supporting capacity; seasonal high water table; some areas subject to frequent flooding.
Severe: poorly drained; seasonal high water table; subject to frequent flooding.	Severe: poorly drained; seasonal high water table; subject to frequent flooding.	Severe: poorly drained; seasonal high water table; subject to frequent flooding.	Severe: poorly drained; seasonal high water table; subject to frequent flooding.	Severe: moderate traffic-supporting capacity; seasonal high water table; subject to frequent flooding.
Slight if slopes are less than 8 percent; moderate if slopes are steeper.	Slight if slopes are less than 8 percent; moderate if slopes are steeper.	Slight if slopes are less than 2 percent; moderate if slopes are 2 to 6 percent; severe if slopes are steeper.	Slight to moderate if slopes are less than 8 percent; moderate bearing strength; severe if slopes are more than 8 percent.	Moderate: moderate traffic-supporting capacity.
Severe: subject to frequent flooding; fair trafficability.	Moderate: fair trafficability; subject to frequent flooding.	Severe: fair trafficability; subject to frequent flooding.	Severe: subject to frequent flooding.	Severe: moderate traffic-supporting capacity; subject to frequent flooding.
Moderate: moderately well drained.	Moderate: moderately well drained.	Moderate: moderately well drained.	Moderate: seasonal high water table; moderately well drained.	Moderate: seasonal high water table.
Moderate if slopes are less than 15 percent, severe if slopes are steeper.	Slight if slopes are less than 8 percent, moderate if slopes are 8 to 15 percent, severe if slopes are steeper.	Moderate if slopes are less than 6 percent, severe if slopes are steeper.	Moderate if slopes are less than 8 percent; moderate bearing strength; moderate shrink-swell potential; severe if slopes are more than 8 percent.	Severe: low traffic-supporting capacity; moderate shrink-swell potential; slope.
Moderate: moderately well drained; moderately slow permeability.	Moderate: moderately well drained.	Moderate: moderately well drained; moderately slow permeability.	Moderate: seasonal high water table; moderately well drained.	Severe: moderate traffic-supporting capacity.
Severe: fair to poor trafficability; poorly drained; seasonal high water table; subject to frequent flooding in places.	Severe: fair to poor trafficability; poorly drained; seasonal high water table; subject to frequent flooding in places.	Severe: fair to poor trafficability; poorly drained; seasonal high water table; subject to frequent flooding in places.	Severe: moderate bearing strength; poorly drained; seasonal high water table; moderate shrink-swell potential; subject to frequent flooding in places.	Severe: low traffic-supporting capacity; seasonal high water table; moderate shrink-swell potential; subject to frequent flooding in places.

TABLE 8.—*Degree and kind of limitation*

Series and map symbols	Foundations of dwellings [1]	Septic tank filter fields	Sewage lagoons
Lobelville: Lo	Severe: subject to frequent flooding; seasonal high water table.	Severe: seasonal high water table; subject to frequent flooding.	Severe: subject to frequent flooding; fair embankment material; moderate seepage.
Lucy: LuC	Slight if slopes are less than 6 percent, moderate if slopes are steeper.	Slight if slopes are less than 5 percent, moderate if slopes are steeper.	Moderate to severe: moderate seepage; fair to poor embankment material; slopes are more than 2 percent.
Mashulaville: Ma	Severe: moderate bearing strength; poorly drained; seasonal high water table.	Severe: slow percolation; seasonal high water table.	Moderate: fair embankment material.
Norfolk: NoB, NoC	Slight if slopes are less than 6 percent, moderate if slopes are steeper.	Slight if slopes are less than 5 percent, moderate if slopes are steeper.	Moderate if slopes are less than 7 percent, severe if slopes are steeper; moderate seepage; fair to good embankment material.
Oil-waste land: Os	Severe: low bearing strength; poorly drained; oil and salt pollution; high corrosion potential.	Severe: slow percolation; oil and salt pollution; high corrosion potential.	Severe: oil and salt pollution; dispersed and unstable material.
*Ouachita: Ot, OU For Amy part of unit OU see Amy series.	Severe: subject to frequent flooding; moderate bearing strength.	Severe: subject to frequent flooding; slow percolation.	Severe: subject to frequent flooding; fair embankment material.
Pheba: PhB	Severe: moderate bearing strength; somewhat poorly drained; seasonal high water table.	Severe: slow percolation; seasonal high water table.	Moderate: fair embankment material.
*Sacul: SaB, SaC, SaE, SKB For Kirvin part of SKB, see Kirvin series.	Moderate if slopes are less than 15 percent; moderate bearing strength; moderate shrink-swell potential; severe if slopes are more than 15 percent.	Severe: slow percolation.	Moderate if slopes are less than 7 percent, severe if slopes are steeper; fair to good embankment material.
Saffell: SlB, SlC	Slight if slopes are less than 6 percent, moderate if slopes are 6 to 10 percent.	Slight if slopes are less than 5 percent, moderate if slopes are steeper.	Severe: fair to poor embankment material; moderate to high seepage rate; most slopes are more than 2 percent.
Smithton: Sm	Severe: moderate bearing strength; poorly drained; seasonal high water table.	Severe: slow percolation; seasonal high water table.	Moderate: fair embankment material.

[1] Engineers and others should not apply specific values to estimated bearing capacity.

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Recreation			Light industries [1]	Trafficways
Campsites	Picnic areas	Intensive play areas		
Severe: seasonal high water table; subject to frequent flooding.	Moderate: subject to frequent flooding.	Severe: subject to frequent flooding.	Severe: subject to frequent flooding.	Severe: moderate traffic-supporting capacity; seasonal high water table; subject to frequent flooding.
Moderate: poor trafficability.	Moderate: poor trafficability.	Moderate if slopes are less than 6 percent severe if slopes are steeper; poor trafficability.	Slight if slopes are less than 4 percent moderate if slopes are steeper.	Slight if slopes are less than 6 percent moderate if slopes are steeper.
Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table.	Severe: moderate bearing strength; poorly drained; seasonal high water table.	Severe: moderate to low traffic-supporting capacity; seasonal high water table.
Slight	Slight	Slight if slopes are less than 2 percent, moderate if slopes are 2 to 6 percent, severe if slopes are steeper.	Slight to moderate: high to moderate bearing strength.	Moderate: moderate traffic-supporting capacity; slopes.
Severe: poor trafficability; dispersed soil material; poorly drained; oil and salt pollution; low productivity.	Severe: poor trafficability; dispersed soil material; poorly drained; oil and salt pollution; low productivity.	Severe: poor trafficability; dispersed soil material; poorly drained; oil and salt pollution; low productivity.	Severe: low bearing strength; poorly drained; dispersed soil material; oil and salt pollution; high corrosion potential.	Severe: low traffic-supporting capacity; oil and salt pollution; high corrosion potential.
Severe: subject to frequent flooding.	Moderate: subject to frequent flooding.	Severe: subject to frequent flooding.	Severe: subject to frequent flooding.	Severe: subject to frequent flooding; moderate traffic-supporting capacity.
Severe: somewhat poorly drained; seasonal high water table.	Moderate: somewhat poorly drained; seasonal high water table.	Severe: somewhat poorly drained; seasonal high water table.	Severe: moderate bearing strength; somewhat poorly drained; seasonal high water table.	Severe: moderate traffic-supporting capacity; seasonal high water table.
Moderate if slopes are less than 15 percent; slow permeability; severe if slopes are more than 15 percent.	Slight if slopes are less than 8 percent, moderate if slopes are 8 to 15 percent, severe if slopes are steeper.	Moderate if slopes are less than 6 percent, slow permeability; severe if slopes are more than 6 percent.	Moderate if slopes are less than 8 percent; moderate bearing strength; moderate shrink-swell potential; severe if slopes are more than 8 percent.	Severe: low traffic-supporting capacity; moderate shrink-swell potential; slopes.
Slight to moderate: fair to good trafficability; gravelly surface layer; moderate if slopes are more than 8 percent.	Slight to moderate: fair to good trafficability; gravelly surface layer; moderate if slopes are more than 8 percent.	Moderate to severe if slopes are less than 6 percent; fair to good trafficability; gravelly surface layer; severe if slopes are more than 6 percent.	Slight if slopes are less than 4 percent; moderate if slopes are 4 to 8 percent; severe if slopes are steeper.	Slight if slopes are less than 6 percent; moderate if slopes are steeper.
Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table.	Severe: moderate bearing strength; poorly drained; seasonal high water table.	Severe: moderate traffic-supporting capacity; seasonal high water table.

If soils are to be used for trafficways, consideration must be given to traffic-supporting capacity, topography, shrink-swell potential, flood hazard, and the depth to the water table. Traffic-supporting capacity is the ability of the undisturbed soil to support moving loads.

The detailed soil maps and the information in table 8 are guides for evaluating the soils for the specific uses named, but detailed onsite investigations are needed for final evaluation, because as much as 15 percent of an area designated on the map as a specific soil may consist of spots of other soils.

Formation and Classification of the Soils

This section discusses the factors of soil formation, the processes of soil formation, and the classification of the soils in Ouachita County by higher categories. Laboratory data are given for some important soil series.

Formation of the Soils

Soil is formed by the interaction of climate, living organisms, parent material, and relief over a period of time. Each of these factors modifies the effect of the other four. Significant differences in any one of the factors result in differences in soil characteristics.

Climate and plants and animals are the active forces in soil formation. Relief, mainly by its influence on runoff and temperature, modifies the effect of climate and living organisms. The parent material also affects the kind of soil that can be formed, and, in extreme cases, determines it almost entirely. Finally, time is needed for the changing of the parent material into soil.

Climate.—The climate in Ouachita County is characterized by long, hot, humid summers; short, mild winters; and abundant rainfall. It probably has not changed much while the soils have been forming. The climate is relatively uniform throughout the county and consequently does not account for significant differences among the soils.

The warm, moist climate promotes rapid chemical reactions and rapid soil formation. Abundant rainfall makes a large amount of water available for the leaching of soluble and colloidal materials (*10*). Plant remains decompose rapidly, and the organic acids thus produced hasten the development of clay minerals and the removal of carbonates. Because the soil freezes for only short periods of time, soil formation continues almost the year around.

Living organisms.—Among the plants and animals important in the formation of soils in Ouachita County are bacteria, fungi, insects, and the more highly developed flora and fauna. The organisms help to increase the content of organic matter, to increase the supply of nitrogen, to decrease or increase the supply of other plant nutrients, and to change the structure and porosity of the soils.

Before settlement of the county, native vegetation had more influence on soil development than did animal activity. The native vegetation of the county was dominantly pine and hardwood trees. On the poorly drained to well-drained flood plains and low terraces where Ouachita, Amy, Leaf, Ennis, Lobelville, and Bibb soils formed, the trees were chiefly oaks, baldcypress, sycamore, pecan, sweetgum, and ash. On the poorly drained to excessively drained uplands where Alaga, Amy, Cahaba, Goldsboro, Kirvin, Leadvale, Leaf, Lucy, Mashulaville, Norfolk, Pheba, Sacul, Saffell, and Smithton soils formed, the trees were chiefly shortleaf and loblolly pines, oaks, and hickory.

With the development of agriculture in the county, man is influencing the formation of the soils. By clearing forests and tilling the soil, by introducing new plants, by fertilizing and improving drainage, man is changing the direction of soil formation. Changes in structure, color, organic matter and nutrient content, and thickness of the surface horizon, or plow layer, are a few results of these activities that can be seen now. Many of the results of man's activities will probably not be evident for several centuries.

Parent material.—Most or all of the soils of Ouachita County are formed in a regolith of Pleistocene and Recent sediment.

Pleistocene terrace deposits of unconsolidated loamy and gravelly sediment occupy much of the interstream surface area (*4*, *18*). Recent thin alluvial deposits of sand, silt, and clay form the flood plains of all major streams and many minor ones. Eocene beds, principally the Sparta Sand, Cane River Formation, and the Carrizo Sand, outcrop in north-central and northwestern Ouachita County (*1*). These are the same general areas where large areas of Alaga and Lucy soils have formed.

On the flood plains of Freeo Creek, Two Bayou, and Smackover Creek, the parent material consists of alluvium derived from the local uplands and adjacent terraces. Flood plain sediment along the Ouachita and Little Missouri Rivers are derived from more variable materials. Those streams rise in the Ouachita Mountains, west and north of Ouachita County. Erosion of these mountains has contributed a large amount of sediment to the soils of the county.

Relief.—The northeastern part of the county, generally east of the Ouachita River, is characterized by wide flats with slopes less than 1 percent, broken by low, nearly level and gently sloping ridges that rise about 5 to 10 feet above the flats.

The stream flood plains are long and narrow, level and nearly level areas of loamy soils. The slope dominantly is less than 1 percent and rarely exceeds 2 percent. Most of these areas are subject to annual or more frequent overflow.

The uplands in the part of the county west of the Ouachita River are characterized by nearly level to hilly relief. The hilly areas mainly are in a strip 1 to 4 miles wide along the western side of the Ouachita River flood plain. Slopes range from 1 to 40 percent but generally are less than 20 percent.

The recorded elevations above sea level range from about 78 feet along the Ouachita River to about 400 feet on the highest points in the county. Typically the Ouachita River flood plain elevation ranges from about 85 to about 105 feet and its terraces from about 105 to 130 feet. Elevation in the upland part of the county ranges from about 130 feet to about 400 feet, but typically is between 200 and 250 feet.

Time.—The length of time required for the formation of soil depends largely upon the other factors of soil formation. Less time generally is required if the climate is warm and humid, the vegetation luxuriant, and the parent material is loamy. Older soils generally show a greater degree of differentiation between horizons.

The soils of the uplands generally have the most strongly developed argillic horizons and are the most mature soils in Ouachita County. However, some of the upland soils, such as the Alaga soils, contain so little clay and silt that it is unlikely that they will develop mature profiles.

The soils of the flood plains such as the Ouachita, Ennis, and Lobelville soils are of younger sediment and are much less mature than most of the soils on uplands. They have cambic horizons rather than argillic horizons. In many places on first bottoms along present streams, the soil material is little more than raw alluvium. The parent materials have been in place too short a time for soils to form, and only a low content of organic matter has accumulated in the upper few inches. Such areas receive fresh sediment with each overflow. Bibb soils are an example of the young soils in these areas.

Processes of Soil Formation

The soils in Ouachita County have horizons that developed through one or more of the following processes: (1) the accumulation of organic matter, (2) the leaching of bases, (3) the reduction and transfer of iron, and (4) the translocation of silicate clay minerals. In most of the soils, more than one of these processes was involved.

Accumulation of organic matter in the surface layer of soils has been an important process in horizon development. The A1 horizon is darker colored because organic matter has been added, and the A2 horizon is lighter colored because organic matter as well as clay minerals and iron oxides have been removed. The content of organic matter ranges from very low to moderate.

All of the soils of the county have been leached of carbonates. Generally, the leaching of bases precedes the translocation of silicate clay minerals.

Reduction and transfer of iron are evident in all of the somewhat poorly drained and poorly drained soils. The processes have been important in the formation of Amy, Bibb, Leaf, Lobelville, Mashulaville, Pheba, and Smithton soils. Gray colors are evidence of the reduction of iron. Mottles of red, brown, and yellow in some horizons and concretions in others indicate the segregation of iron. The concretions are made up of segregated iron compounds in complex with organic matter and manganese or other oxides.

Translocation, or downward movement, of clay minerals has contributed to horizon development in most of the soils in the county. The eluviated A2 horizon contains less clay and generally is lighter colored than the B horizon. Clay has accumulated in the B horizons in the form of clay films in pores and on ped surfaces. The C horizon contains less clay than the B horizons.

The distribution of clay in typical profiles of Cahaba and Smithton soils is compared in figure 12. These soils are about the same age.

The shape of the curves suggests that the translocation of clay is more advanced in Smithton soils than in the

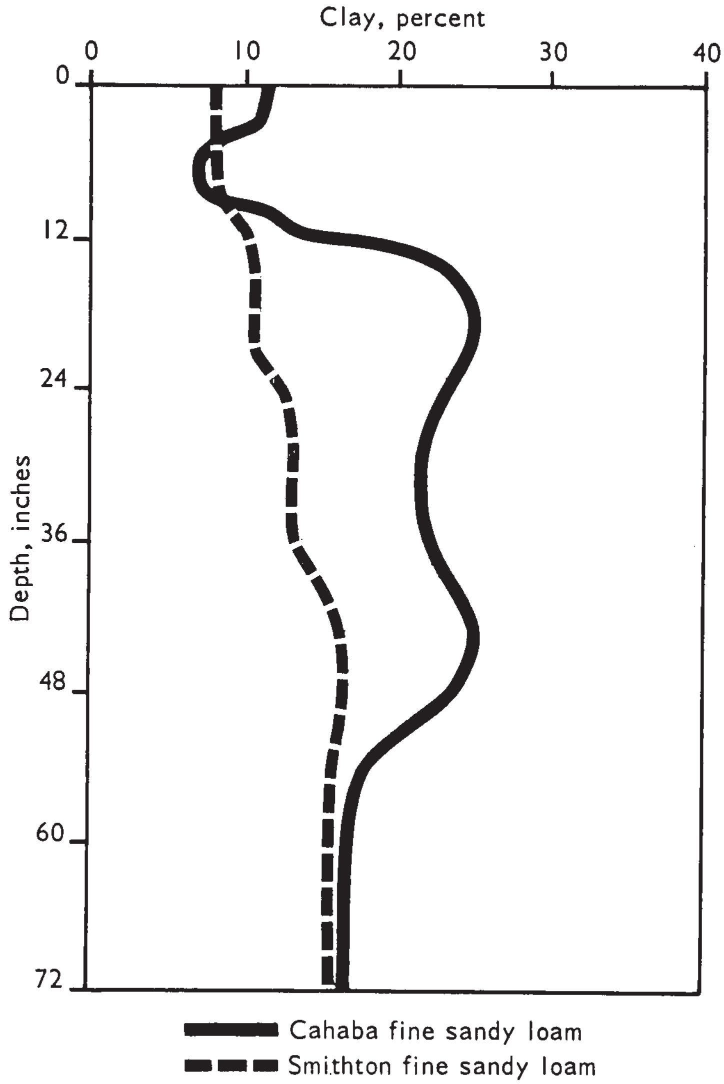

***Figure 12.*—Distribution of clay in profiles of Cahaba fine sandy loam and Smithton fine sandy loam. Both soils formed in alluvium and are about the same age.**

Cahaba soils. Both soils formed in alluvium but are in different topographic positions. Smithton soils are in level areas where runoff is slow. A large amount of water percolating through the soil has carried much of the clay downward and deposited it in the lower horizons. Cahaba soils are in more sloping areas. Runoff is greater and less water has percolated through the profile, so less clay has been carried downward.

The distribution of clay in the profiles of Amy silt loam and Lobelville fine sandy loam is shown in figure 13. Both soils formed in alluvium.

The Lobelville soil is formed in younger sediment. In the Amy soil there is evidence of translocation of clay in the form of clay films on peds and in pores. This is suggested by the smooth bulge of the clay curve. In the younger Lobelville soil there is no visible evidence of clay films, and the clay distribution curve has an irregular shape.

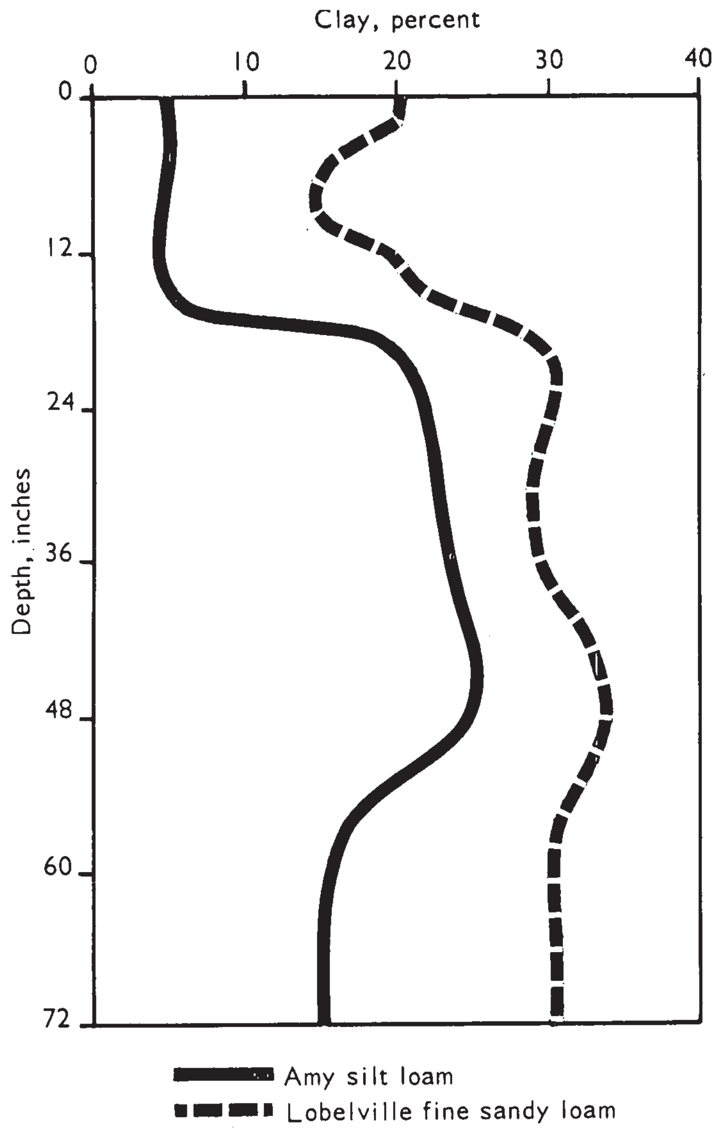

Figure 13.—**Distribution of clay in profiles of Amy silt loam and Lobelville fine sandy loam. Both soils formed in alluvium, but the Lobelville soil is younger.**

Classification of the Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

Thus in classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and used in managing farms, fields, and woodland; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*3*) and later revised (*9*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965. It is under continual study (*8*, *14*). Therefore, readers interested in developments of the current system should search the latest literature available.

The soil series of Ouachita County are placed in some categories of the current system in table 9.

Order: Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties that differentiate these soil orders are those that give broad climatic groupings of soils. Two exceptions, the Entisols and Histosols, occur in many different kinds of climate. Three of the soil orders are recognized in Ouachita County. They are Entisols, Inceptisols, and Ultisols.

Entisols are young mineral soils that do not have genetic horizons or have only the beginning of such horizons.

Inceptisols are mineral soils in which horizons have definitely started to develop. They generally are on young, but not recent, land surfaces.

Ultisols are mineral soils that have a horizon of clay accumulation and a base saturation lower than 35 percent.

Suborder: Each order is divided into suborders, primarily on the basis of soil characteristics that indicate genetic similarity. The suborders have a narrower climatic range than the order. The criteria for suborders reflect either the presence or absence of waterlogging, or soil differences resulting from climate or vegetation.

Great Group: Each suborder is divided into great groups on the basis of uniformity in the kind and sequence of genetic horizons.

Subgroup: Each great group is divided into subgroups, one representing the central (typic) concept of the group, and other subgroups, called intergrades, made up of soils that have mostly the properties of one great group but also one or more properties of another great group.

Families: Families are established within subgroups, primarily on the basis of properties important to plant growth. Some of these properties are texture, mineralogy, reaction, soil temperature, permeability, consistence, and thickness of horizons.

Mechanical and Chemical Analyses

Mechanical 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, base-exchange capacity, mineralogical composition, organic-matter content, and other 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 impor-

TABLE 9.—*Soil series classified by higher categories*

Series	Family	Subgroup	Order
Alaga	Siliceous, thermic, coated	Typic Quartzipsamments	Entisols.
Amy	Fine-silty, siliceous, thermic	Typic Ochraquults	Ultisols.
Bibb	Coarse-loamy, siliceous, acid, thermic	Typic Haplaquents	Entisols.
Cahaba [1]	Fine-loamy, siliceous, thermic	Typic Hapludults	Ultisols.
Ennis [2]	Fine-loamy, siliceous, thermic	Fluventic Dystrochrepts	Inceptisols.
Goldsboro	Fine-loamy, siliceous, thermic	Aquic Paleudults	Ultisols.
Kirvin [3]	Clayey, mixed, thermic	Typic Hapludults	Ultisols.
Leadvale	Fine-silty, siliceous, thermic	Typic Fragiudults	Ultisols.
Leaf	Clayey, mixed, thermic	Typic Albaquults	Ultisols.
Lobelville [4]	Fine-loamy, siliceous, thermic	Aquic Fluventic Dystrochrepts	Inceptisols.
Lucy	Loamy, siliceous, thermic	Arenic Paleudults	Ultisols.
Mashulaville	Coarse-loamy, siliceous, thermic	Typic Fragiaquults	Ultisols.
Norfolk	Fine-loamy, siliceous, thermic	Typic Paleudults	Ultisols.
Ouachita	Fine-silty, siliceous, thermic	Fluventic Dystrochrepts	Inceptisols.
Pheba	Coarse-silty, siliceous, thermic	Aqueptic Fragiudults	Ultisols.
Sacul	Clayey, mixed, thermic	Aquic Hapludults	Ultisols.
Saffell	Loamy-skeletal, siliceous, thermic	Typic Hapludults	Ultisols.
Smithton [5]	Coarse-loamy, siliceous, thermic	Typic Paleaquults	Ultisols.

[1] Some of the Cahaba soils in this survey are taxadjuncts to the series and have sola more than 44 inches thick. They are outside the defined range of the series in that respect.
[2] Ennis soils in this survey are taxadjuncts to the series and lack chert fragments in the control section. They are outside the defined range of the series in that respect.
[3] Some of the Kirvin soils in this survey are taxadjuncts to the series and have sola less than 40 inches thick. They are outside the range of the series in that respect.
[4] Lobelville soils in this survey are taxadjuncts to the series and lack chert fragments and are outside the defined range of the series in that respect.
[5] Some of the Smithton soils in this survey are taxadjuncts to the series and have colors less gray than the defined range for the series.

tant in the survey area are considered first. A review of available laboratory data is made to determine the need for additional information about these particular soils. Priority generally is given to soils for which little or no laboratory data are available.

In Ouachita County soils representing 13 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. Table 10 shows the results. Soil textures reported in table 10 are not necessarily the same as those stated in the section "Descriptions of the Soils," which are field estimates.

Particle-size distribution was determined by the hydrometer method (*6*). Organic carbon content was determined by the Walkley-Black method of digestion with potassium dichromate-sulfuric acid (*7*). Percentage of organic matter was then calculated using the equation, percent organic carbon$\times$1.72=percent organic matter.

Soil pH was determined using a Beckman pH meter on mixtures of soil and water at a ratio of 1:1. Available phosphorus was extracted by the Bray No. 1 solution (0.03N NH_4F in 0.025 N HCL) and determined colorimetrically.

The bases were extracted with pH7 1N ammonium acetate. Magnesium was determined colorimetrically (*7*). The other bases were determined by flamephotometry. The extractable acidity was determined by the barium chloride triethanolamine method (*5*).

The total of extractable calcium, potassium, magnesium, sodium, and hydrogen is an approximation of the cation exchange capacity of the soil. Base saturation percent was determined by dividing this total into the sum of calcium, potassium, magnesium, and sodium and multiplying by 100.

General Nature of the County

This section gives information about farming and physiography, relief, and drainage of Ouachita County. It also gives facts about the water supply and the climate.

Farming

The early economy of Ouachita County was based on logging and general farming. The cash crops were cotton, corn, and livestock. In the 1930's reforestation began and now nearly all of the county is wooded and is managed for the production of pulpwood, poles and sawlogs. The main openland crops produced in the county are soybeans, cotton, small grain, pasture, and hay.

According to the 1964 Census of Agriculture, the total land area of Ouachita County is 472,320 acres. This includes streams less than one-eighth mile wide and lakes and ponds of 40 surface acres or less. About 84 percent of the county is wooded and the rest is mainly pasture, cropland, and idle land. Some woodland has been cleared in the Ouachita River bottoms. Most of the newly cleared areas are used for soybeans.

The 1964 Census of Agriculture shows that between 1959 and 1964 the number of farms in the county decreased from 712 to 689. The total acreage in farms decreased from 121,916 to 86,869. This is the land that was being used principally for crops and pasture or grazing. The average size of farms decreased from 171 to 126 acres. Most classes of farms smaller than 500 acres decreased in number. Farms larger than 500 acres increased from 24 in 1959 to 31 in 1964. Of the farm operators, 496 were full owners, 109 were part owners, 3 were managers and 81 were tenants. Most farms are small enough that the operator's family, with occasional outside help, can

TABLE 10.—*Mechanical and chemical*

[Analysis made by the University of Arkansas, Fayetteville. Absence of data

Soil name and sample number	Depth from surface	Partical-size distribution— Very coarse and coarse sand (2.0 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to to 0.1 mm.)	Very fine sand (0.1 to 0.05 mm.)	Total sand	Silt (0.05 to 0.002 mm.)	Clay (less than 0.002 mm.)	USDA textures [1]
	In.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	
Alaga loamy sand: S-67-Ark-52-2	0-7	8	62	17	3	90	9	1	Sand
	7-24	11	45	29	2	87	12	1	Sand
	24-46	7	37	39	3	86	13	1	Sand
	46-58	17	43	28	2	90	9	1	Sand
	58-80	52	41	4	1	98	1	1	Coarse sand
Amy silt loam: S-67-Ark-52-1	0-4		1	10	11	22	73	5	Silt loam
	4-18		1	8	10	19	77	4	Silt loam
	18-41		1	7	7	15	62	23	Silt loam
	41-52		1	4	8	13	61	26	Silt loam
	52-68		1	14	15	30	54	16	Silt loam
Bibb fine sandy loam: S-68-Ark-52-10	1-7	3	1	38	14	56	40	4	Fine sandy loam
	7-26		1	34	23	58	36	6	Fine sandy loam
	26-45		1	33	21	55	38	7	Fine sandy loam
	45-65		1	33	22	56	35	9	Fine sandy loam
Cahaba fine sandy loam: S-68-Ark-52-3	0-3	1	1	26	41	69	21	10	Very fine sandy loam.
	3-9		1	29	23	53	41	6	Fine sandy loam
	9-12			21	27	48	40	12	Loam
	12-24		1	18	18	37	38	25	Loam
	24-39			16	24	40	39	21	Loam
	39-48			6	19	25	49	26	Loam to silt loam.
	48-72			9	31	40	44	16	Loam
Ennis silty clay loam: S-67-Ark-52-9	0-3	1	13	19	3	36	38	26	Loam
	3-6	6	16	15	2	39	31	30	Clay loam
	6-17	3	13	20	4	40	40	20	Loam
	17-29	4	14	27	10	55	24	21	Fine sandy loam to sandy clay loam.
	29-48	4	14	30	9	57	25	18	Fine sandy loam.
	48-72	5	14	28	7	54	28	18	Fine sandy loam
Goldsboro fine sandy loam: S-68-Ark-52-13	0-3	6	28	39	5	78	20	2	Loamy sand
	3-12	6	24	42	7	79	19	2	Loamy sand
	12-18	3	22	37	4	66	16	18	Fine sandy loam
	18-24		22	39	4	65	16	19	Fine sandy loam to sandy clay loam.
	24-39	12	21	28	3	64	17	19	Sandy loam to sandy clay loam.
	39-55	27	15	22	3	67	12	21	Sandy clay loam
	55-72	48	9	14	2	73	8	19	Coarse sandy loam to sandy clay loam.
Lobelville fine sandy loam: S-68-Ark-52-6	0-4	1	1	28	16	46	34	20	Loam
	4-11		1	46	17	64	22	14	Fine sandy loam
	11-16		2	32	16	50	30	20	Loam
	16-24		2	23	12	37	32	31	Clay loam
	24-40		3	26	15	44	27	29	Clay loam
	40-56		2	28	10	40	27	33	Clay loam
	56-72		5	28	12	45	26	29	Clay loam to sandy clay loam.

See footnote at end of table.

analyses of selected soils

indicates analysis was not made or data resulting from the analysis were insignificant]

Extractable bases				Extractable acidity	Base saturation	Reaction (soil-water ratio of 1:1)	Organic-matter content	Available phosphorus
Calcium	Magnesium	Sodium	Potassium					
Meq./100 gm. of soil	*Meq./100 gm. of soil*	*Meq./100 gm. of soil*	*Meq./100 gm. of soil*	*Meq./100 gm. of soil*	*Pct.*	*pH*	*Pct.*	*p.p.m.*
0.7	0.2	0.2	0.3	2.1	40	5.9	0.9	7
.1	.1	.1	.1	2.8	13	5.6	.6	7
.1	.1	.1	.0	2.0	13	5.3	.4	12
.1	.1	.1	.0	1.7	15	5.4	.4	11
.0	.1	.2	.1	1.0	29	5.4	.3	5
.1	.1	.1	.0	6.7	4	4.6	1.3	10
.0	.1	.2	.0	5.1	6	4.7	.8	5
.0	.2	.9	.1	13.9	8	5.2	.5	3
.1	.5	1.9	.1	15.4	14	4.8	.4	2
.4	.5	1.4	.1	8.1	23	5.0	.4	2
.6	.2	.1	.1	5.4	16	4.6	2.3	4
.4	.2	.1	.4	3.2	26	4.6	1.1	3
.3	.2	.1	.1	3.2	18	4.4	.5	3
.3	.2	.1	.1	3.8	16	4.4	.4	3
1.7	.4	.3	.2	2.5	51	5.8	.9	6
1.2	.4	.2	.1	2.1	48	5.9	.5	6
1.7	.7	.2	.2	3.2	47	5.5	.5	4
1.1	1.4	.3	.2	5.7	34	5.3	.3	4
.7	1.3	.2	.2	4.4	35	5.3	.2	4
.7	2.4	.3	.3	6.7	36	5.5	.2	3
.4	1.5	.3	.2	8.2	23	5.5	.1	3
7.6	1.2	.3	.3	22.2	30	5.4	2.9	6
5.6	.9	.2	.2	13.9	33	5.3	2.8	5
2.6	.5	.2	.1	12.8	21	5.2	1.1	7
1.0	.2	.2	.1	8.8	15	5.1	.4	9
.5	.2	.2	.2	9.2	11	4.9	.3	5
.3	.2	.3	.1	9.8	8	4.8	.8	6
.4	.3	.1	.1	2.4	27	5.0	.9	4
.6	.2	.1	.1	2.1	32	5.0	.3	3
1.4	1.2	.2	.2	3.0	50	5.0	.3	2
1.4	1.2	.2	.2	4.8	38	5.0	.3	3
.6	.9	.2	.2	8.2	19	4.8	.2	3
.3	1.0	.1	.2	8.5	16	4.7	.2	4
.2	.9	.1	.2	8.0	15	4.5	.2	5
1.4	.8	.2	.2	9.7	21	4.7	2.4	7
.6	.4	.1	.1	5.2	19	4.8	.6	6
.3	.3	.2	.1	8.2	10	4.6	.8	6
.5	.6	.4	.2	11.9	13	4.6	.6	8
.5	.4	.5	.2	9.0	15	4.4	.4	15
.5	.4	.5	.2	12.6	11	4.3	.4	9
.5	.4	.6	.2	12.8	12	4.4	.4	3

TABLE 10.—*Mechanical and chemical*

Soil name and sample number	Depth from surface	Partical-size distribution— Very coarse and coarse sand (2.0 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to to 0.1 mm.)	Very fine sand (0.1 to 0.05 mm.)	Total sand	Silt (0.05 to 0.002 mm.)	Clay (less than 0.002 mm.)	USDA textures [1]
	In.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	
Lucy loamy fine sand: S-67-Ark-52-7	1-15	6	10	58	4	78	15	7	Loamy fine sand.
	15-30	1	30	47	4	82	12	6	Loamy sand.
	30-46	22	3	36	3	64	12	24	Sandy clay loam.
	46-64	10	28	26	2	66	8	26	Sandy clay loam.
	64-72	22	3	24	2	51	36	13	Loam to sandy loam.
Norfolk fine sandy loam: S-67-Ark-52-5	0-7	1	3	61	12	77	19	4	Loamy fine sandy.
	7-21		1	59	13	73	22	5	Fine sandy loam.
	21-36		10	33	17	60	23	17	Fine sandy loam.
	36-49		1	48	9	58	17	25	Sandy clay loam.
	49-63	1	3	51	9	64	14	22	Sandy clay loam.
	63-72		1	68	7	76	6	18	Fine sandy loam.
Ouachita silt loam: S-67-Ark-52-6	0-5			7	17	24	60	16	Silt loam.
	5-19			1	12	13	69	18	Silt loam.
	19-34			3	6	9	69	22	Silt loam.
	34-42				6	6	63	31	Silty clay loam.
	42-69			1	2	3	63	34	Silty clay loam.
	69-77			22	24	46	37	17	Loam.
Pheba silt loam: S-67-Ark-52-13	0-3	2	1	11	8	22	67	11	Silt loam.
	3-12	1		7	13	21	68	11	Silt loam.
	12-24	5	1	8	5	19	68	13	Silt loam.
	24-42	3		5	8	16	71	13	Silt loam.
	42-54	5	1	6	4	16	56	28	Silty clay loam to silt loam.
	54-72	6		6	7	19	49	32	Silty clay loam to clay loam.
Sacul fine sandy loam: S-68-Ark-52-2	2-10	1	1	24	28	54	40	6	Very fine sandy loam.
	10-25			2	17	19	22	59	Clay.
	25-31			1	14	15	32	53	Clay.
	31-44				6	6	43	51	Silty clay.
	44-56				5	5	57	38	Silty clay loam.
	56-72				21	21	42	37	Clay loam.
Smithton fine sandy loam: S-67-Ark-52-10	1-10	12	3	19	9	43	49	8	Loam.
	10-24	10	2	18	9	39	51	10	Silt loam to loam.
	24-38	9	3	18	8	38	49	13	Loam to silt loam.
	38-51	10	1	15	7	33	51	16	Silt loam to loam.
	51-72	6	4	16	7	33	52	15	Silt loam.

[1] Textures do not necessarily agree with those stated in the section "Descriptions of the Soils," which are field determinations.

analyses of selected soils—Continued

Extractable bases				Extractable acidity	Base saturation	Reaction (soil-water ratio of 1:1)	Organic-matter content	Available phosphorus
Calcium	Magnesium	Sodium	Potassium					
Meq./100 gm. of soil	*Meq./100 gm. of soil*	*Meq./100 gm. of soil*	*Meq./100 gm. of soil*	*Meq./100 gm. of soil*	*Pct.*	*pH*	*Pct.*	*p.p.m.*
0. 6	0. 2	0. 2	0	1. 5	40	5. 6	0. 7	5
. 3	. 2	. 2	0	1. 4	33	5. 6	. 7	5
. 3	. 6	. 2	. 2	7. 4	15	5. 2	. 7	3
. 1	. 5	. 2	. 2	7. 0	13	5. 1	. 6	3
. 1	. 3	. 2	. 1	4. 7	13	5. 2	. 6	3
. 1	. 1	. 1	0	4. 3	7	5. 0	. 9	5
. 3	. 1	. 1	. 1	1. 8	25	5. 7	. 3	6
1. 9	. 9	. 1	. 2	2. 9	52	5. 5	. 3	3
2. 1	1. 2	. 2	. 2	4. 6	45	5. 5	. 2	3
1. 8	1. 4	. 2	. 2	5. 1	41	5. 5	. 1	2
. 5	1. 0	. 1	. 1	5. 7	23	5. 2	. 1	3
3. 6	. 6	. 2	. 1	5. 1	47	5. 9	1. 2	7
3. 3	. 4	. 2	. 1	7. 3	35	5. 1	. 6	4
1. 7	. 3	. 2	. 1	10. 9	17	5. 0	. 7	5
2. 0	. 5	. 2	. 1	14. 2	16	5. 1	. 9	7
1. 8	. 5	. 2	. 1	12. 1	18	5. 1	. 7	7
. 6	. 2	. 1	. 1	7. 3	12	4. 9	. 4	8
4. 6	1. 0	. 2	. 3	9. 0	40	5. 9	3. 0	12
2. 1	. 4	. 2	. 1	5. 7	33	5. 9	1. 4	6
1. 6	. 7	. 3	. 1	5. 2	34	5. 5	. 2	5
. 9	. 5	. 2	. 1	6. 5	21	5. 3	. 1	5
. 6	1. 7	. 6	. 2	14. 2	18	5. 2	. 2	2
. 6	1. 6	. 5	. 2	14. 2	17	5. 4	. 2	3
. 6	. 5	. 2	. 1	3. 8	27	5. 5	1. 1	4
1. 4	4. 8	. 2	. 6	20. 5	25	4. 9	. 6	3
3. 7	3. 7	. 2	. 5	16. 5	33	4. 6	. 7	3
. 2	3. 1	. 4	. 4	33. 1	11	4. 2	. 3	3
. 1	3. 9	. 4	. 4	31. 4	13	4. 2	. 8	2
. 1	1. 6	. 2	. 3	25. 3	8	4. 6	. 6	3
. 3	. 1	. 2	0	6. 2	9	4. 6	1. 5	4
. 2	. 1	. 2	0	4. 9	9	4. 6	1. 0	4
. 2	. 1	. 2	0	12. 4	4	4. 9	. 9	3
. 2	. 1	. 5	. 1	8. 4	10	5. 5	. 6	3
. 2	. 1	. 6	. 1	10. 3	9	5. 5	. 1	3

do the work. The larger farms are operated by tenants or day laborers under the supervision of the owner or manager. Some tenants pay a fixed rent, but most pay a share of the crops.

Most of the farms are general farms. Pasture, hay, cotton, and corn are the major crops. Small acreages are used to grow vegetables and fruit. According to the U.S. Census of Agriculture, the acreage of principal crops and pasture in 1964 were as follows:

Crop:	*Acres in 1964*
Pasture and cropland pastured	23, 718
Hay	3, 302
Cotton	1, 432
Corn	1, 168
Sorghums	256
Soybeans (for beans)	191

There has been a significant increase in the acreage of soybeans since 1964. In 1969 about 4,500 acres of soybeans were planted.

The number of cattle and calves in the county in 1964 was 10,300, and the number of hogs and pigs was 2,688. The number of chickens sold, nearly all broilers, was 1,448,986, and the number of turkeys raised was 94.

In Ouachita County nearly all of the farms are mechanized to some extent. Equipment reported on the farms in 1964 was as follows:

Equipment:	*Number in 1964*
Automobiles	535
Motor trucks (including pickups)	616
Tractors (other than graden tractors)	333
Grain and bean combines	1

About half of the farms use fertilizer, and a few use chemicals for weed control. In 1964, 358 farms had 1,016 tons of fertilizer applied on 7,280 acres. Fifty farms had 2,314 tons of lime applied on 1,231 acres. Nitrogen is the most needed fertilizer for locally grown crops, although a complete fertilizer is needed for most crops.

Among the industrial enterprises related to agriculture are paper making, fence post treating, furniture making, and lumber milling.

Physiography, Relief, and Drainage

All of Ouachita County is in the Southern Coastal Plain. For the most part the county slopes toward the center and southward. The Ouachita River enters the north-central part of the county and leaves at the southeastern corner, and it forms part of the eastern boundary. Two Bayou forms the boundary along the upper part of the eastern side, and the Little Missouri River forms part of the northern boundary. Smackover Creek forms part of the southern boundary of the county.

The three main topographic divisions of the county are: the nearly level to hilly uplands; the stream terraces; and the flood plains. The uplands make up most of the western part of the county. The terraces are predominantly in the northeastern part of the county and in strips along the major streams. They range from moderately sloping to level. Most of the level areas are poorly drained and are known locally as flatwoods. The flood plains range from one-fourth to several miles wide. They are poorly drained to well drained, and most lie along sluggish, meandering streams. The best drained areas are near the larger streams. Several shallow natural lakes have formed in old channels of the Ouachita River.

Water Supply

There is a good supply of surface water in most parts of the county. Among the principal streams are the Ouachita River, Little Missouri River, Freeo Creek, Two Bayou, Gum Creek, and Smackover Creek. Among the major lakes are White Oak Lake, Bragg Lake, Mustin Lake, Woodward Lake, Ben Davis Lake, and Little Johnson Lake.

Many farmers have constructed ponds that range from one-half acre to 10 acres in size. More ponds are being constructed each year.

The supply of ground water generally is abundant in shallow aquifers throughout the county. Wells of adequate yield for household use have been developed in most parts of the county. Most are dug or bored to depths of less than 50 feet. They generally are pumped at rates of less than 25 gallons per minute, but the potential yield is greater. Wells to depths of 200 to 400 feet over most of the county will yield from 100 to 1,000 gallons per minute, but deep wells are likely to yield salt water (*1*).

Climate [6]

Ouachita County has long, hot, humid summers, mild winters, and generally adequate rainfall. Table 11 shows data on precipitation and temperature from the U.S. National Weather Service station in Camden. These data are representative of Ouachita County.

Summer is characterized by bright sunshine, high temperatures, and high humidity, broken by short periods of scattered showers and thunderstorms, mainly in the afternoon or evening.

In fall, days are warm and the nights are cool. This normally is the driest season, and commonly the most pleasant.

About 50 percent of the winter nights have temperatures of 32 degrees or lower. Daytime temperatures in the winter generally are mild, in the 50 to 60 degree range, but warm periods are common, with temperatures of 70 degrees or higher. Temperatures below freezing occur only for brief periods and temperatures below 10 degrees are rare. Snowfall is negligible and generally melts within a few hours. Sleet or freezing rain and drizzle occur occasionally, but freezing rain and hailstorms have caused severe damage to timber stands, particularly the pines.

Precipitation normally is adequate for the needs of a general farming area. It averages about 51 inches a year. Winter and spring are the wet seasons. Roughly 60 percent of the annual precipitation falls during this part of the year. Frontal weather systems in winter and in spring may produce 24-hour rains of 3 to 5 inches. Table 11 shows that there is a 10 percent chance of more than 8 inches of precipitation per month from November through April. March consistently is the wettest month, with average rainfall of more than 5 inches and a 90 percent chance of more than 2.5 inches. Most rainfall in summer occurs as scattered showers and thunderstorms of brief duration. They are erratic and unpredictable, but cumulatively are fairly well distributed over the county.

Short periods of drought affecting parts of the county

[6] ROBERT O. REINHOLD, meteorologist for Arkansas, National Weather Service, U.S. Department of Commerce.

TABLE 11.—*Temperature and precipitation*

[All data from Camden for the period 1921 through 1960]

Month	Temperature				Precipitation		
	Average daily maximum	Average daily minimum	Two years in 10 will have at least four days with—		Average total	One year in 10 will have—	
			Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—
	° F.	° F.	° F.	° F.	Inches	Inches	Inches
January	56. 2	33. 2	81	10	4. 93	1. 76	8. 78
February	60. 2	35. 6	81	16	4. 58	1. 68	8. 57
March	68. 0	40. 9	87	21	5. 19	2. 54	8. 04
April	76. 6	51. 2	92	31	5. 10	1. 82	10. 11
May	84. 1	59. 1	95	43	4. 46	1. 58	7. 78
June	91. 6	67. 1	102	51	3. 36	. 72	6. 74
July	94. 5	70. 3	105	57	4. 36	1. 01	8. 26
August	95. 0	68. 8	107	54	2. 73	. 14	4. 97
September	89. 8	61. 2	103	41	3. 12	. 85	7. 97
October	80. 0	49. 7	95	29	3. 09	. 72	6. 04
November	66. 3	38. 8	87	19	5. 13	1. 67	9. 28
December	58. 5	33. 5	80	12	5. 14	1. 80	9. 55
Year	76. 7	50. 8	[1] 104	[2] 13	51. 19	-----------	-----------

[1] Average annual maximum.
[2] Average annual minimum.

are frequent. In some years droughts 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 June through September. Such droughts damage but do not kill crops. Extended droughts of a month or more during the growing season have occurred. These have caused severe crop damage and high mortality of newly planted tree seedlings, particularly on soils such as Alaga, Lucy, and Saffell, which have low or very low available water capacity.

During the hottest part of the summer, evaporation of moisture from the soil averages a third of an inch a day. Drought days, days on which soils have little or no available water in the upper 12 inches, are most common in August, September and October. Some can be expected in July. Dry years, with less than 36 inches of precipitation, average about one in 10 years.

Thunderstorms are fairly common, but are not ordinarily accompanied by damaging winds. Severe local storms are infrequent. In Ouachita County and the six adjoining counties, the frequency of damaging hailstorms, windstorms, and tornadoes is less than one of each per year.

In spring, wetness is common, and in low-lying areas crop planting may have to be delayed from one to several weeks. Occasionally late frost will damage early planted crops, and they may have to be replanted. The normally dry weather late in summer and in fall is favorable for harvesting but not for fall seeding or for the growth of pasture plants. Rarely do frosts come early enough in the fall to damage the quality or reduce the yield of crops. Fall-sown small grain remains vigorous enough for grazing throughout the winter.

The growing season is normally from 220 to 230 days. The average date of the last freezing temperature (32°) in spring is March 24, and the first in fall is November 2. The latest that a temperature of 32° has been recorded is April 22 (in 1931) and the earliest is October 7 (in 1932). The average date of the last 28° reading in spring is March 7, and that of the first in fall is November 14. The latest that a temperature of 28° has been recorded is March 28 (in 1937) and the earliest is October 17 (in 1952). Temperatures of 16° have been recorded as late as March 11 and as early as November 18, but on the average occur during a 30-day period between December 22 and January 21.

Literature Cited

(1) ALBIN, DONALD R.
1962. RESUME OF THE GROUND-WATER RESOURCES OF BRADLEY, CALHOUN, AND OUACHITA COUNTIES, ARKANSAS. Water Resources Summary Number 1. Ark. Geol. and Cons. Comm., Little Rock, Arkansas. illus.

(2) AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS.
1961. STANDARD SPECIFICATIONS FOR HIGHWAY MATERIALS AND METHODS OF SAMPLING AND TESTING. Ed. 8, 2 v., illus.

(3) BALDWIN, MARK, KELLOGG, CHARLES E., and THORP, JAMES.
1938. SOIL CLASSIFICATION. U.S. Dept. Agr. Ybk., pp. 979–1001, illus.

(4) BRANNER, GEORGE C., and others.
1929. GEOLOGIC MAP OF ARKANSAS. U.S. Geo. Surv.

(5) CHAPMAN, HOMER D., and PRATT, PARKER F.
1961. METHODS OF ANALYSIS FOR SOILS, PLANTS, AND WATERS. Div. Agr. Sci., Univ. Calif., 309 pp., illus.

(6) DAY, PAUL R.
1956. REPORT OF THE COMMITTEE ON PHYSICAL ANALYSES, 1954–55. Soil Sci. Soc. Amer. Proc. 20: 167–169.

(7) JACKSON, M. L.
1958. SOIL CHEMICAL ANALYSIS. Prentice-Hall Inc., 498 pp., illus.

(8) SIMONSON, ROY W.
1962. SOIL CLASSIFICATION IN THE UNITED STATES. Sci. 137: 1027–34, illus.

(9) THORP, JAMES, and SMITH, GUY D.
1949. HIGHER CATEGORIES OF SOIL CLASSIFICATION: ORDER, SUBORDER, AND GREAT SOIL GROUPS. Soil Sci. 67: 117–126.

(10) UNITED STATES DEPARTMENT OF AGRICULTURE.
1938. SOILS AND MEN. U.S. Dept. Agr. Ybk., 1232 pp., illus.

(11) ———
1951. SOIL SURVEY MANUAL. U.S. Dept. of Agr. Handbook No. 18, 503 pp., illus. [with 1962 supplement]

(12) ———
1959. GUIDE FOR EVALUATING SWEETGUM SITES. U.S. Forest Serv., Occasional Paper 176, 8 pp., illus.

(13) ———
1960. FIELD GUIDE FOR EVALUATING COTTONWOOD SITES. U.S. Forest Serv., Occasional Paper 178, 6 pp., illus.

(14) ———
1960. SOIL CLASSIFICATION, A COMPREHENSIVE SYSTEM, 7TH APPROXIMATION. 265 pp., illus. (Supplements issued in March 1967 and in September 1968)

(15) ———
1961. GUIDE FOR EVALUATING CHERRYBARK OAK SITES. U.S. Forest Serv., Occasional Paper 190, 8 pp., illus.

(16) ———
1963. GUIDE FOR EVALUATING WATER OAK SITES. U.S. Forest Serv. Res. Paper So-1, 8 pp., illus.

(17) UNITED STATES DEPARTMENT OF DEFENSE.
1968. UNIFIED SOIL CLASSIFICATION FOR ROADS, AIRFIELDS, EMBANKMENTS AND FOUNDATIONS. MIL–STD–619B, 30 pp., illus.

(18) VESTAL, JACK H.
1950. PETROLEUM GEOLOGY OF THE SMACKOVER FORMATION OF SOUTHERN ARKANSAS. Information circular 14, Ark. Geological Comm., Little Rock, Ark., 19 pp., illus.

Glossary

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity (also termed 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 capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Base saturation. The degree to which material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

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.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found 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 and brittle; little affected by moistening.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic matter and clay but is rich in silt or very fine sand. The layer is seemingly cemented. When dry, it is hard or very hard and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon. 15 to 40 inches below the surface.

Gleyed soil. A soil in which waterlogging and lack of oxygen have caused the material in one or more horizons to be neutral gray in color. The term "gleyed" is applied to soil horizons with yellow and gray mottling caused by intermittent waterlogging.

Gravel. Rounded or angular rock fragments that are not prominently flattened and are up to 3 inches in diameter.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

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 some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of 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 these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Natural soil drainage. Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, 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 different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and commonly have mottlings below 6 to 16 inches, in the lower A horizon and in the B and C horizons.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Parent material. Disintegrated and partly weathered rock from which soil has formed.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Pedon. The smallest volume that can be called "a soil." It is three dimensional and large enough to permit study of all horizons. Its area ranges from 1 to 10 square meters.

Permeability. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Profile, soil. A vertical section of the soil through all its horizons and extending 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 precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Runoff. Rainfall that flows over the surface of the soil without sinking in.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Slope, soil. The amount of rise or fall in feet for each 100 feet of horizontal distance expressed as follows:

	Percent
Level	0–1
Nearly level	1–3
Gently sloping	3–8
Moderately sloping	8–16
Undulating	1–8
Rolling	8–20
Hilly	20–40

Soil. 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.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes 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.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. 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 (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Taxadjunct. Soils that are unclassified at the series level but allowed to go under the name of a defined series. They are so like the soils of the defined series in morphology, composition, and behavior that little or nothing is gained by adding a new series.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Water table. The highest part of the soil or underlying rock mamaterial that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. In referring to a capability unit or a woodland group, read the introduction to the section it is in for general information about its management. The mapping units identified by map symbols made up entirely of capital letters are of more varied composition than the others, but the composition of these units was controlled well enough that interpretations for expected uses can be made. Other information is given in tables as follows:

Acreage and extent, table 1, page 6.
Estimated yields, table 2, page 29.
Woodland groups, table 3, page 30.

Engineering uses of the soils, tables 5, 6, and 7, pages 36 through 43.

Map symbol	Mapping units	Described on page	Capability unit Symbol	Capability unit Page	Woodland group Symbol
AgC	Alaga loamy sand, 1 to 8 percent slopes	6	IVs-1	27	3s3
AgE	Alaga loamy sand, 8 to 20 percent slopes	6	VIs-1	27	3s3
ALB	Alaga association, undulating	7	IVs-1	27	3s3
ALC	Alaga association, rolling	7	VIs-1	27	3s3
Am	Amy silt loam	8	IIIw-1	25	2w9a
AS	Amy association, frequently flooded	8	Vw-1	27	2w9
BB	Bibb soils	9	Vw-1	27	2w9
CaB	Cahaba fine sandy loam, 1 to 3 percent slopes	9	IIe-1	24	3o1
CaC	Cahaba fine sandy loam, 3 to 8 percent slopes	10	IIIe-1	25	3o1
CaD	Cahaba fine sandy loam, 8 to 12 percent slopes	10	IVe-1	26	3o1
CNB	Cahaba-Norfolk association, undulating	10	IIIe-1	25	3o1
En	Ennis silty clay loam	11	IVw-2	27	1w8
GoB	Goldsboro fine sandy loam, 1 to 3 percent slopes	11	IIe-1	24	2o7
KfC	Kirvin fine sandy loam, 3 to 8 percent slopes	12	IIIe-2	25	3o1
KfE	Kirvin fine sandy loam, 8 to 20 percent slopes	12	VIe-1	27	3o1
KNB	Kirvin-Norfolk association, undulating	12			
	Kirvin	--	IIIe-2	25	3o1
	Norfolk	--	IIIe-1	25	3o1
KSC	Kirvin-Sacul association, rolling	13			
	Kirvin	--	VIe-1	27	3o1
	Sacul	--	VIe-1	27	3c2
KSD	Kirvin-Sacul association, hilly	13			
	Kirvin	--	VIIe-1	27	3r2
	Sacul	--	VIIe-1	27	3c2
LeB	Leadvale silt loam, 1 to 3 percent slopes	14	IIe-1	24	3o7
Lf	Leaf silt loam	14	IVw-1	26	2w9a
Lo	Lobelville fine sandy loam	15	IVw-2	27	1w8
LuC	Lucy loamy fine sand, 3 to 8 percent slopes	15	IIIs-1	26	3s2
Ma	Mashulaville silt loam	16	IVw-1	26	3w9
NoB	Norfolk fine sandy loam, 1 to 3 percent slopes	17	IIe-1	24	3o1
NoC	Norfolk fine sandy loam, 3 to 8 percent slopes	17	IIIe-1	25	3o1
Os	Oil-waste land	17	VIIIs-1	28	5t0
Ot	Ouachita silt loam	18	IVw-2	27	1w8
OU	Ouachita association, frequently flooded	19	IVw-2	27	1w8
PhB	Pheba silt loam, 1 to 3 percent slopes	19	IIIw-1	25	2w8
SaB	Sacul fine sandy loam, 1 to 3 percent slopes	20	IIIe-2	25	3c2
SaC	Sacul fine sandy loam, 3 to 8 percent slopes	20	IVe-2	26	3c2
SaE	Sacul fine sandy loam, 8 to 16 percent slopes	20	VIe-1	27	3c2
SKB	Sacul-Kirvin association, undulating	21			
	Sacul	--	IVe-2	26	3c2
	Kirvin	--	IIIe-2	25	3o1
S1B	Saffell gravelly sandy loam, 1 to 3 percent slopes	21	IIe-2	25	4f2
S1C	Saffell gravelly sandy loam, 3 to 10 percent slopes	22	IIIe-3	25	4f2
Sm	Smithton fine sandy loam	23	IIIw-1	25	2w9a

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