Issued August 1968

SOIL SURVEY

Recent investigations indicate that some soils between Crowley's Ridge and the Miss. River are not as wet as previously thought and as used for interpretations in this soil survey. Additional investigations are being planned to collect data that is needed to update this soil survey.

Cross County, Arkansas

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
ARKANSAS AGRICULTURAL EXPERIMENT STATION

Major fieldwork for this soil survey was done in the period 1958–63. Soil names and descriptions were approved in 1966. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1963. 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 Cross County Soil and Water Conservation District.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, or other structures; and in appraising the value of tracts of land for agriculture, industry, or recreation.

Locating Soils

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

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. 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 in the survey. This guide lists all of the soils of the county in alphabetic order by map symbol. It shows the page where each kind of soil is described and also the page for the capability unit, woodland group, and wildlife group.

Individual colored maps showing the relative suitability or limitation of soils for many specific purposes other than cultivated crops, woodland, and wildlife can be developed by using the soil map and 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 in the soil descriptions and in the section "Management by Capability Units."

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 and sportsmen can find information of interest in the section "Wildlife."

Community planners and others concerned with suburban development can read about soil properties that affect the choice of homesites, industrial sites, schools, and parks in the section "Use of Soils for Building Sites, Recreational Facilities, and Trafficways."

Engineers and builders can find under "Engineering Uses of the Soils" tables that give engineering descriptions of the soils in the county and that name soil features that affect engineering practices and structures.

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

Newcomers in Cross 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 picture: Rice growing on Crowley and Hillemann silt loams, 0 to 1 percent slopes.

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Issued August 1968

SOIL SURVEY OF CROSS COUNTY, ARKANSAS

BY JAMES L. GRAY AND VERNON R. CATLETT, SOIL CONSERVATION SERVICE

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

CROSS COUNTY is in east-central Arkansas (fig. 1). It is about 20 miles long and 30 miles wide and has a land area of 400,640 acres.

The soils of the county formed in alluvium and loess. Those in the eastern half of the county are nearly level soils that formed in alluvium and have been flooded by backwater from the Mississippi River and its tributary, the St. Francis. The soils in the rest of the county formed in loess.

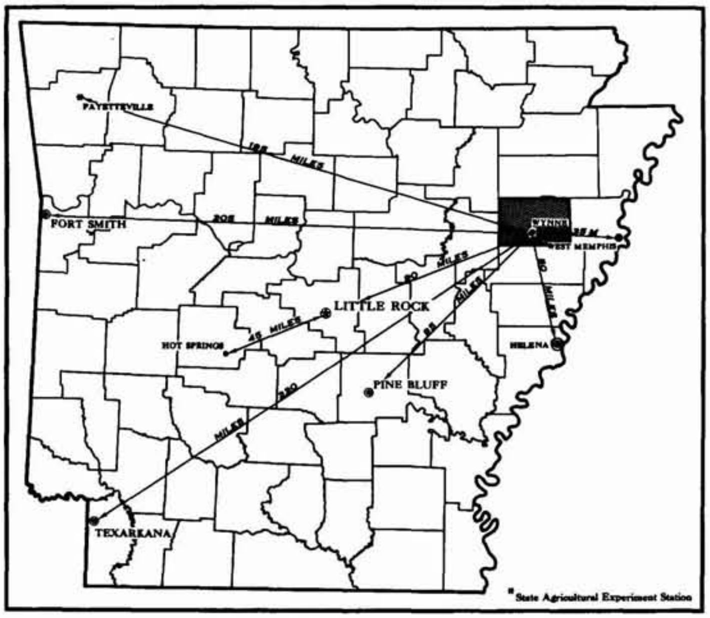

Figure 1.—**Location of Cross County in Arkansas.**

Most of the soils contain moderate to large amounts of plant nutrients, and there is an abundant supply of ground water for agriculture and industry. Large deposits of sand and gravel underlie most of the soils on Crowley Ridge.

The total rainfall is sufficient for most crops, but the distribution of rainfall through the year is not favorable. In summer the rainfall is generally limited, and most crops benefit from irrigation. In winter and spring, many soils need drainage.

Cotton, soybeans, and rice are the principal crops. A small acreage is in permanent pasture, and a small acreage is in peach orchards. Acreage controls on cotton and rice and the shortage of labor have encouraged the trend toward growing more soybeans. Mechanization and chemical weed control have partly offset the shortage of labor caused by migration of laborers from farm to industry.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Cross County, where they are located, and how they can be used.

They 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 steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants.

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. To use this publication efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, the major horizons of all the soils of one series 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. Dundee and Loring, 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 natural, undisturbed landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in the texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Dundee fine sandy loam and Dundee silt loam are two soil types in the Dundee series. The difference in texture of their surface layers is apparent from their names.

Some types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Dundee fine sandy loam, 0 to 1 percent slopes, is one of two phases of Dundee fine sandy loam, a soil type that has a slope range of 0 to 3 percent.

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 aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. 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 type or soil phase.

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed or occur in such small individual tracts that it is not practical to show them separately on the map. They show such a mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a complex is named for the major kinds of soil in it, for example, the Alligator complex. Another kind of mapping unit is the undifferentiated group, which consists of two or more soils that may occur together without regularity in pattern or relative proportion. The individual tracts of the component soils could be shown separately on the map, but the differences between the soils are so slight that the separation is not important for the objectives of the soil survey. An example of an undifferentiated group is Loring and Memphis silt loams, 12 to 20 percent slopes.

Also, most surveys include areas so rocky, so shallow, or so frequently worked by wind and water that they cannot be classified by soil series. These areas are shown on the soil map like other mapping units, but they are given descriptive names, such as Gullied land or Rough broken land, and are called land types.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are 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 soils. 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 that it is readily useful to different groups of readers, among them farmers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in soil surveys. On the basis of the yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others and then 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 soil survey shows, in color, the soil associations in Cross 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 farming, or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, texture, drainage, and other characteristics that affect management.

The 10 soil associations in Cross County are described in this section. More detailed information about the individual soils in each association can be obtained by studying the detailed map and by reading the section "Descriptions of the Soils."

1. Crowley-Hillemann-Henry association

Somewhat poorly drained and poorly drained, level or nearly level soils

This association consists of broad flats drained by slow-flowing intermittent streams and of long, narrow ridges that are 1 to 3 feet higher than the flats. Crowley and Hillemann soils are on both the flats and the ridges, and Henry soils are on the lower part of the flats. This association is in the western part of the county and makes up about 11 percent of the total area.

Crowley and Hillemann soils, together, make up about 60 percent of the association; Henry soils about 20 percent; and Calloway, Loring, Lexington, and Providence soils the remaining 20 percent.

Crowley soils have a surface layer of light brownish-gray to dark grayish-brown silt loam. The subsoil is light-gray, mottled silty clay or silty clay loam in the upper part and brown to light brownish-gray, mottled silty clay loam or silt loam in the lower part.

Hillemann soils have a surface layer of dark grayish-brown to light brownish-gray silt loam and a subsoil of mottled silty clay loam or silt loam that is light brownish gray and yellowish brown in the upper part and brown to light brownish gray in the lower part. The lower part of the subsoil has a moderately high concentration of sodium and magnesium.

Henry soils have a surface layer of gray, mottled silt loam and a subsoil of gray, mottled silty clay loam over grayish-brown, mottled silty clay loam. In the lower part of the subsoil is a compact, brittle fragipan.

This association is within the major rice-producing area of the county. The soils are suited to farming. Most of the acreage is cultivated, and much of it is irrigated. There are some moderate-sized areas of hardwood forest on Henry soils and patches of hardwood forest along streams on Crowley and Hillemann soils. Farms average 500 acres in size, and most are highly mechanized. They are owner operated, except for a few that are operated under rental agreements. Farming is diversified. Rice is the main crop, but cotton, soybeans, corn, grain sorghum, small grain, and lespedeza are also grown. Most farms have a few beef cattle.

2. *Calloway-Henry-Loring association*

Moderately well drained to poorly drained, level to gently sloping soils that have a compact, brittle subsoil (fragipan)

This association consists of broad flats drained by slow-flowing intermittent streams and long, narrow ridges that are 3 to 8 feet higher than the flats. Calloway soils are on the flats, Henry soils on the lower part of the flats, and Loring soils on the ridges. This association is west of Crowley Ridge (fig. 2) and makes up about 11 percent of the county.

Calloway soils make up about 55 percent of the association; Henry soils 15 percent; Loring soils 10 percent; and Calhoun, Grenada, and Zachary soils the rest.

Calloway soils have a dark-brown to brown surface layer. The subsoil is light brownish-gray silt loam. Henry soils have a gray surface layer. The subsoil is gray, mottled silty clay loam over grayish-brown, mottled silty clay loam. Loring soils have a grayish-brown, dark grayish-brown, or dark yellowish-brown surface layer and a subsoil of brown silt loam over yellowish-brown silty clay loam.

These soils are well suited to farming. About 85 percent of the acreage is cultivated, but there are some areas of hardwood forest. Farms average 160 acres in size. Most are owner operated, but a few are operated under rental agreements. Cotton, soybeans, and rice are the main crops. Most farms have a few beef cattle.

3. *Henry-Calloway association*

Poorly drained and somewhat poorly drained, level or nearly level soils that have a compact, brittle subsoil (fragipan)

This association consists of broad flats drained by shallow, slow-flowing, intermittent streams and of long narrow ridges that are 1 to 3 feet higher than the flats. Henry soils are on the lower part of the flats, and Calloway soils are on the flats and ridges. This association is in the western part of the county and makes up about 11 percent of the county.

Henry soils make up about 75 percent of the association; Calloway soils 15 percent; and Zachary, Crowley, and Hillemann soils the remaining 10 percent.

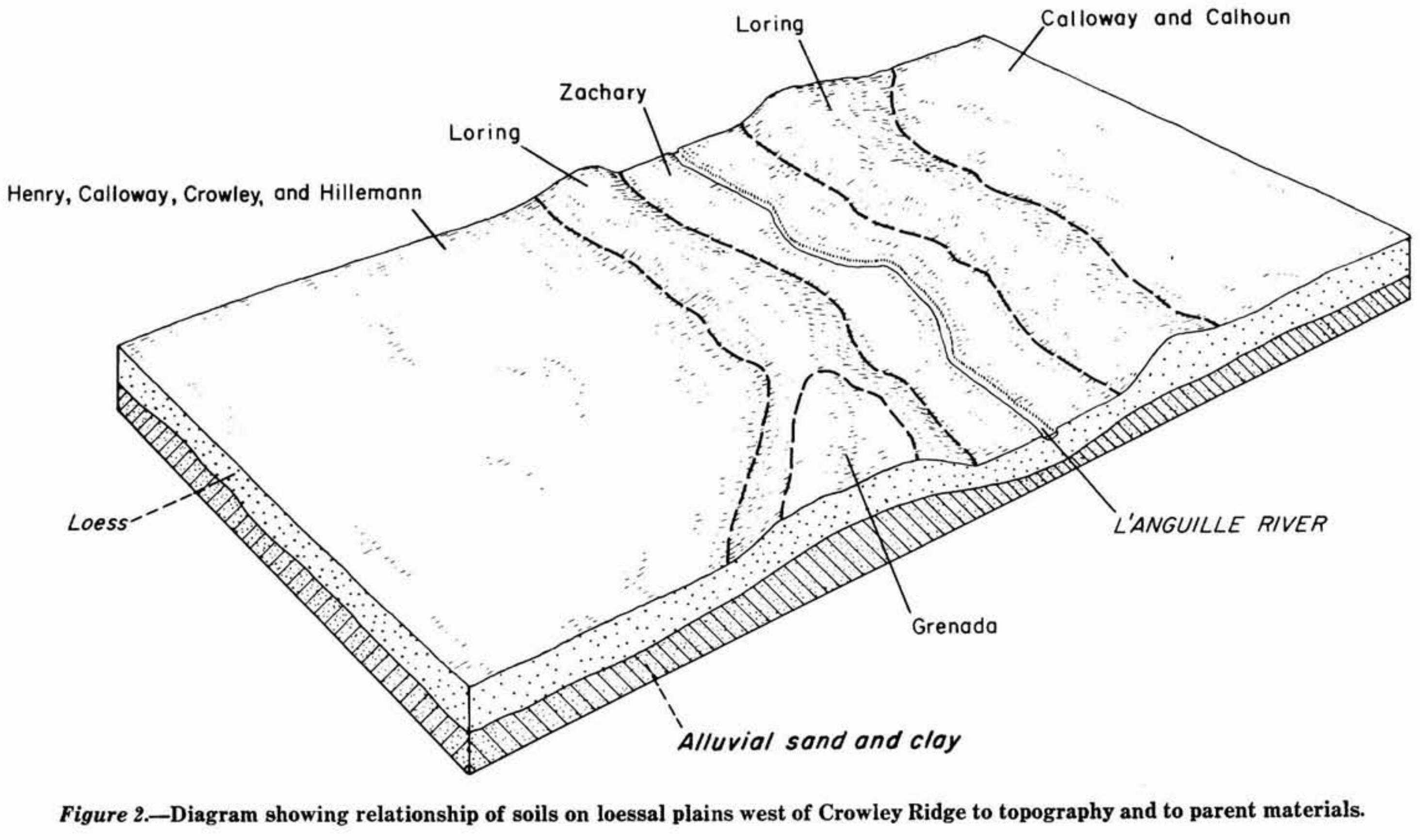

Figure 2.—**Diagram showing relationship of soils on loessal plains west of Crowley Ridge to topography and to parent materials.**

Henry soils have a surface layer of gray, mottled silt loam and a subsoil of gray, mottled silty clay loam over grayish-brown, mottled silty clay loam. In the lower part of the subsoil is a compact, brittle fragipan.

Calloway soils have a surface layer of dark-brown to brown silt loam and a subsoil of light brownish-gray, mottled silt loam. In the subsoil is a compact, brittle layer.

This association is within the major rice-producing area of the county. The soils are well suited to farming if they are drained. About 60 percent of the acreage is cultivated, and the rest is in cutover stands of hardwoods. The trend is toward clearing large tracts of woodland for the cultivation of rice and soybeans. Much of the acreage is irrigated. Farms average about 500 acres in size and are generally highly mechanized. Most are owner operated, but a few are operated under rental agreements. Rice, soybeans, and cotton are the main crops, but grain sorghum, corn, small grain, and annual lespedeza are also grown. Most farms have some beef cattle.

4. Loring-Memphis association

Moderately well drained and well drained, nearly level to steep soils

This association consists of narrow, crooked, nearly level to sloping ridgetops and of irregular, strongly dissected, gently sloping to steep side slopes (fig. 3). Memphis soils occur on the ridgetops and the steeper parts of the side slopes, and Loring soils on the ridgetops and the less steep parts of the side slopes. This association occupies most of Crowley Ridge and makes up about 11 percent of the county.

Loring soils make up about 45 percent of the association, and Memphis soils about 20 percent. The rest is made up of gravelly and sandy outcrops, Gullied land, and small narrow strips of Collins and Arkabutla soils on bottom lands along streams.

Loring soils have a surface layer of grayish-brown, dark grayish-brown, or dark yellowish-brown silt loam and a subsoil of brown silt loam over yellowish-brown silty clay loam. In the lower part of the subsoil is a brittle, mottled fragipan.

Memphis soils have a surface layer of dark-brown to dark grayish-brown silt loam. The subsoil is brown or yellowish-brown silty clay loam.

These soils are well suited to peach orchards and to livestock farming. Most areas are only fairly well suited to intensive farming because of the slopes and the severe hazard of erosion. About 15 percent of the acreage is cultivated or in pasture. Most of the rest is in hardwood forest, and a few steep, severely eroded areas are idle. On some farms erosion control measures have been established. Farms average 100 acres in size. Most are owner operated, but about one-fourth of the farmers are part-time farmers. Farming is diversified. The choice of crops is limited mainly by the hazard of erosion, but cotton, corn, peaches, and annual lespedeza are commonly grown. Most farms have a few beef cattle. Cattle, cotton, and corn are sold.

5. Rough broken land-Gullied land association

Well-drained to excessively drained, nearly level to steep soil material on uplands

This association consists mainly of steep, irregular, strongly dissected ridgetops and side slopes. It is on the eastern side of Crowley Ridge and makes up about 3 percent of the county.

Rough broken land makes up about 60 percent of the association, and Gullied land 25 percent. The rest is made up of Loring and Memphis soils on ridgetops and Ochlockonee soils in narrow stream valleys.

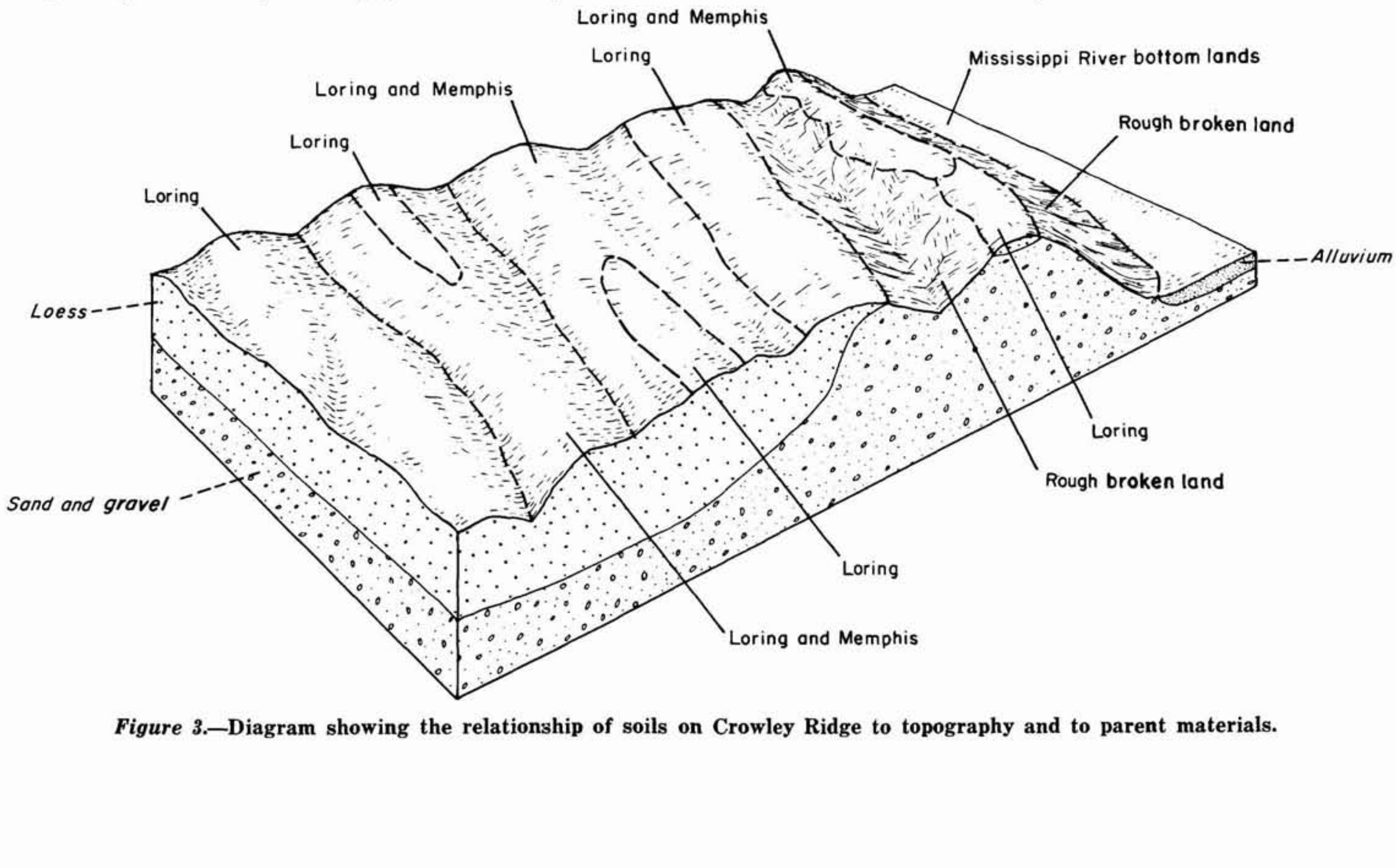

***Figure 3.*—Diagram showing the relationship of soils on Crowley Ridge to topography and to parent materials.**

Rough broken land has material of a silt loam or sandy loam texture in the upper part. Beneath this is a layer of loamy material. In some places this land is gravelly in the upper part and very gravelly in the lower part.

Gullied land is a network of gullies that range from a few feet to many feet in width. Most of the original surface layer has been washed away, and the exposed soil material is silt loam or silty clay loam.

Because of droughtiness and the very high hazard of erosion, most of this association is suitable only for woodland and for upland wildlife habitat. If carefully managed, some areas can be used for pasture. About 85 percent of the acreage is in cutover hardwood and scattered plantings of pine. The rest is idle or in pasture.

6. *Zachary association*

Poorly drained, level soils on bottom lands

This association consists of level bottom lands along streams. The largest areas are along the L'Anguille River, Brushy Creek, First Creek, and Second Creek. Almost all the areas are flooded frequently, and those along the larger streams are flooded for several weeks in winter and spring. The association makes up about 5 percent of the county. It is about 80 percent Zachary soils, and the rest Arkabutla soils.

Zachary soils have a surface layer of dark-gray or grayish-brown, mottled silt loam and a subsoil of light-gray, mottled silt loam over gray silty clay loam or silty clay.

Arkabutla soils have a surface layer of brown to dark grayish-brown silt loam and a subsoil of brown silt loam over light-gray silt loam.

Because of the frequent floods, most of this association is better suited to woodland and wildlife than to crops. About 95 percent of the acreage is in hardwood forest. Soybeans and grain sorghum are the crops most commonly grown. Cotton and rice are grown in a few places.

7. *Arkabutla-Collins association*

Moderately well drained and somewhat poorly drained, level soils on bottom lands

This association consists of broad flats on bottom lands where there are many abandoned stream channels filled with sediment. Some areas are flooded for short periods after heavy rains. This association is west of and parallel to Crowley Ridge and makes up about 7 percent of the county.

Arkabutla soils make up about 75 percent of this association, Collins soils 15 percent, and Zachary soils 10 percent.

Arkabutla soils have a surface layer of brown to dark grayish-brown silt loam about 13 inches thick. The subsoil is brown, mottled silt loam over light-gray silt loam.

Collins soils have a surface layer of dark-brown to grayish-brown silt loam and a subsoil of yellowish-brown silt loam. The subsoil is mottled below a depth of 20 inches.

This is one of the major associations in the county for the production of cotton and soybeans. The soils are well suited to farming. Most of the acreage is cultivated. Farms average 200 acres in size. Most are mechanized. About 80 percent are owner operated, and the rest are operated under rental agreements. Farming is diversified. Cotton, soybeans, and small grain are commonly grown, and most farms have a few cattle.

8. *Mantachie-Iuka-Ochlockonee association*

Well-drained to somewhat poorly drained, level to undulating soils on bottom lands

This association consists of level to undulating bottom lands. The undulating areas are characterized by long, narrow, shallow depressions separated by ridges that are 2 or 3 feet high. Mantachie soils occupy the lowest positions, Ochlockonee soils the highest, and Iuka soils the intermediate positions. This association is east of Crowley Ridge and west of St. Francis Bay Straight Slough. It makes up about 3 percent of the county.

Mantachie soils make up about 40 percent of the association; Iuka soils 15 percent; Ochlockonee soils 10 percent; and Arkabutla, Dundee, and Alligator soils the rest.

Mantachie soils have a surface layer of dark-brown to grayish-brown loam. The subsoil is light-gray, mottled silt loam and very fine sandy loam.

Iuka soils have a surface layer of dark-brown to dark grayish-brown loam over fine sandy loam. The upper part of the subsoil is yellowish-brown fine sandy loam, and the lower part is light-gray, mottled very fine sandy loam.

Ochlockonee soils have a surface layer of dark grayish-brown loam over dark-brown very fine sandy loam. The subsoil is yellowish-brown to brown fine sandy loam.

These soils are well suited to farming. More than 95 percent of the acreage is cultivated. There are small patches of hardwood trees along streams and bayous. Farms average 300 acres in size and are generally mechanized. Most are owner operated, but a few are operated under rental agreements. Farming is diversified. Cotton, soybeans, small grain, and corn are commonly grown.

9. *Dubbs-Dundee association*

Moderately well drained and somewhat poorly drained, level to undulating soils on natural levees

This association consists of old natural levees along bayous, oxbow lakes, and abandoned river channels. It is characterized by long, narrow, shallow depressions separated by ridges 3 to 10 feet high (fig. 4). Dubbs soils are on the crests and side slopes of the levees, and Dundee soils are on the lower parts. This association is in the east-central part of the county and makes up about 3 percent of the total area.

Dubbs soils make up about 40 percent of the association, Dundee soils 40 percent, and Amagon, Bowdre, Earle, and Alligator soils make up the rest.

Dubbs soils have a surface layer of dark-brown to dark grayish-brown fine sandy loam. The subsoil is dark-brown silt loam over dark yellowish-brown, mottled silty clay loam.

Dundee soils have a surface layer of dark-brown to grayish-brown fine sandy loam or silt loam. The subsoil is dark grayish-brown to yellowish-brown, mottled silty clay loam.

This association is one of the major cotton-producing areas of the county. The soils are well suited to farming. Nearly all the acreage is cultivated. Farms average 400 acres in size. Most are highly mechanized. About half are operated under rental agreements. Farming is diversified. Cotton, soybeans, corn, and small grain are commonly grown.

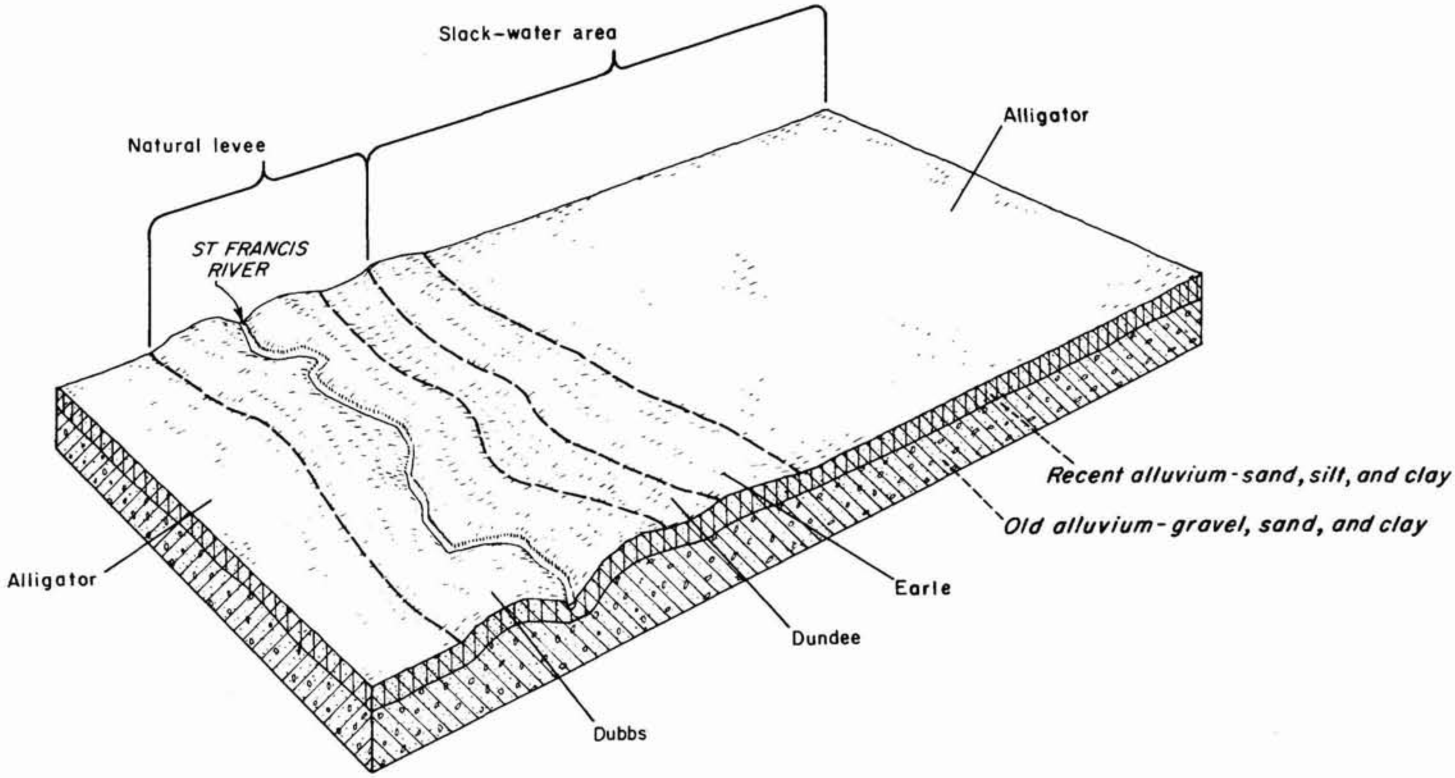

***Figure 4.*—Diagram showing the relationship of soils on bottom lands to topography and to parent materials.**

10. Alligator-Earle association

Poorly drained and somewhat poorly drained, level to undulating soils in slack-water areas

This association consists of wide flats and undulating areas on bottom lands. The undulating areas are characterized by narrow depressions separated by ridges 3 to 8 feet high. This association is east of Crowley Ridge and makes up about 35 percent of the county.

Alligator soils make up about 65 percent of the association, Earle soils 15 percent, and Dubbs, Dundee, Bowdre, Iuka, and Mantachie soils the remaining 20 percent.

Alligator soils have a surface layer of very dark gray to dark grayish-brown clay, silty clay loam, or silt loam. The subsoil is plastic clay. It is gray, light brownish gray, or grayish brown and is mottled.

Earle soils have a surface layer of very dark gray or dark grayish-brown clay. The subsoil is gray or dark-gray, mottled clay underlain at a depth of 20 to 36 inches by coarser textured materials.

Most of the acreage is cultivated, but hardwoods grow in some small patches and in a few tracts of several hundred acres. Farms average 500 acres in size. Most are highly mechanized. About 40 percent are owner operated, and the rest are operated under rental agreements. The main crop is soybeans, but cotton, grain sorghum, and rice are commonly grown.

Descriptions of the Soils

In this section the soils of Cross County are described in detail. The procedure is to describe first the soil series, and then the mapping units in that series. Thus, to get full information on any one mapping unit, it is necessary to read both the description of that unit and the description of the soil series to which the unit belongs.

The description of the soil series includes a description of a profile that is considered representative of all the soils of the series. If the profile of a given mapping unit differs from this typical profile, the differences are stated in the description of the mapping unit, unless they are apparent from its name. The colors described are for moist soil, unless otherwise noted. Many of the more common terms used in describing soil series and mapping units are defined in the Glossary, and some are defined in the section "How This Survey Was Made."

The approximate acreage and proportionate extent of the soils are shown in table 1. At the back of this soil survey is the "Guide to Mapping Units," which lists the mapping units in the county and shows the capability unit, woodland group, and wildlife group each mapping unit is in and the page where each of these groups is described.

Alligator Series

The Alligator series consists of poorly drained, very slowly permeable soils on bottom lands. These soils formed in thick beds of fine-textured, slack-water deposits. They are predominantly level, but some are gently undulating. Typically the surface layer is dark-gray clay, and it overlies several feet of gray clay mottled with yellowish brown.

Alligator soils are adjacent to the somewhat poorly drained Earle soils and the moderately well drained Bowdre soils. They are more poorly drained than Earle and Bowdre soils and formed in thicker beds of clay.

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

Soil	Area	Extent	Soil	Area	Extent
	Acres	*Percent*		*Acres*	*Percent*
Alligator clay, 0 to 1 percent slopes	75, 706	19. 0	Grenada silt loam, 1 to 3 percent slopes, eroded	725	. 2
Alligator clay, gently undulating	11, 367	2. 8	Gullied land	3, 779	. 9
Alligator complex	602	. 1	Henry silt loam	70, 107	17. 5
Alligator silt loam	8, 088	2. 0	Iuka loam, 0 to 1 percent slopes	1, 025	. 3
Alligator silty clay loam	710	. 2	Iuka loam, gently undulating	415	. 1
Amagon silt loam	454	. 1	Iuka soils, local alluvium, 1 to 3 percent slopes	475	. 1
Arkabutla silt loam	34, 030	8. 5	Iuka soils, local alluvium, 3 to 8 percent slopes	1, 219	. 3
Bowdre silty clay loam, 0 to 1 percent slopes	535	. 1	Lexington silt loam, 3 to 8 percent slopes, eroded	251	. 1
Bowdre silty clay loam, gently undulating	1, 884	. 5	Loring silt loam, 1 to 3 percent slopes	1, 001	. 2
Bowdre silty clay loam, undulating	474	. 1	Loring silt loam, 1 to 3 percent slopes, eroded	352	. 1
Calhoun silt loam	1, 271	. 3	Loring silt loam, 3 to 8 percent slopes	3, 929	1. 0
Calloway silt loam, 0 to 1 percent slopes	29, 899	7. 5	Loring silt loam, 3 to 8 percent slopes, eroded	9, 774	2. 4
Calloway silt loam, 1 to 3 percent slopes	10, 839	2. 7	Loring silt loam, 8 to 12 percent slopes, eroded	1, 040	. 3
Calloway silt loam, 1 to 3 percent slopes, eroded	1, 636	. 4	Loring and Memphis silt loams, 12 to 20 percent slopes	8, 982	2. 2
Collins silt loam	6, 200	1. 5	Loring and Memphis silt loams, 12 to 20 percent slopes, eroded	3, 077	. 8
Crowley and Hillemann silt loams, 0 to 1 percent slopes	30, 797	7. 7	Loring and Memphis silt loams, 12 to 20 percent slopes, severely eroded	2, 267	. 6
Crowley and Hillemann silt loams, 1 to 3 percent slopes	2, 185	. 8	Loring and Memphis silt loams, 20 to 45 percent slopes	1, 935	. 5
Dubbs fine sandy loam, gently undulating	3, 262	. 5	Mantachie loam	4, 914	1. 2
Dubbs fine sandy loam, undulating	1, 809	. 5	Ochlockonee loam	1, 106	. 3
Dundee fine sandy loam, 0 to 1 percent slopes	184	(1)	Providence silt loam, 1 to 3 percent slopes	542	. 1
Dundee fine sandy loam, gently undulating	659	. 2	Providence silt loam, 3 to 8 percent slopes, eroded	367	. 1
Dundee silt loam, 0 to 1 percent slopes	1, 555	. 4	Rough broken land	8, 533	2. 1
Dundee silt loam, gently undulating	2, 274	. 6	Zachary silt loam	16, 768	4. 2
Earle clay, 0 to 1 percent slopes	1, 798	. 4	Gravel pits	411	. 1
Earle clay, gently undulating	14, 881	3. 7	Spoil banks	375	. 1
Earle clay, undulating	3, 455	. 9	Water	4, 306	1. 1
Earle silty clay loam, gently undulating	2, 726	. 7			
Foley and Grubbs silt loams, 0 to 2 percent slopes	389	. 1			
Grenada silt loam, 1 to 3 percent slopes	3, 296	. 8	Total	400, 640	100. 0

[1] Less than 0.05 of 1 percent.

Profile of Alligator clay, 0 to 1 percent slopes, in a moist cultivated area in the SE¼SE¼SE¼ sec. 36, T. 8 N., R. 5 E.:

Ap—0 to 4 inches, dark-gray (10YR 4/1) clay; moderate, fine, granular structure; hard when dry, firm when moist, and plastic when wet; roots common; few pores; medium acid; abrupt, smooth boundary.

C1g—4 to 13 inches, dark-gray (10YR 4/1) clay; common, medium, distinct mottles of yellowish-brown; massive; hard when dry, firm when moist, and plastic when wet; few roots; few, small, dark-colored, hard concretions; strongly acid; clear, smooth boundary.

C2g—13 to 23 inches, light brownish-gray (10YR 6/2) clay; common, medium, distinct mottles of strong brown; massive; hard when dry, firm when moist, and plastic when wet; few fine roots; few, small, dark-colored, soft and hard concretions; very strongly acid; diffuse boundary.

C3g—23 to 50 inches +, light-gray (10YR 6/1) clay; common, medium, distinct mottles of yellowish-brown; massive; hard when dry, firm when moist, and plastic when wet; few, small, dark-colored, soft concretions; very strongly acid.

The A horizon is very dark gray (10YR 3/1) to dark grayish-brown (10YR 4/2) clay, silty clay loam, or silt loam. It is 4 to 15 inches thick. The C2g horizon is light brownish gray (10YR 6/2), gray (10YR 6/1 or 5Y 5/1), or grayish brown (2.5Y 5/2). The C3g horizon is light gray (10YR 6/1), light brownish gray (10YR 6/2 or 2.5Y 6/2), grayish brown (2.5Y 5/2), or olive gray (5Y 5/2) in color and is very strongly acid to neutral in reaction.

In some areas where the surface area is silt loam, the C1 horizon is about 4 inches of dark grayish-brown (10YR 4/2) silty clay loam mottled with yellowish red (5YR 5/6), and the C2g horizon, at a depth of 10 to 16 inches, is gray (5Y 5/1) clay mottled with yellowish red (5YR 5/8).

Alligator clay, 0 to 1 percent slopes (AaA).—This soil is poorly drained. It has a surface layer of very dark gray to dark grayish-brown clay 4 to 8 inches thick and a subsoil of gray clay mottled with yellowish brown. A few spots of Earle soils were included in mapping.

When dry this soil contracts and cracks, and when wet it expands and seals. Infiltration of water is very slow, except when the soil is cracked; then it is very rapid until the cracks seal. Runoff is slow. The available water capacity is moderate, reaction is medium acid to very strongly acid, and natural fertility is high.

Because this soil can be cultivated only within a narrow range of moisture content, farming operations commonly have to be delayed for several days after a rain, unless surface drains have been provided. The preparation of a seedbed is difficult, and tilth is difficult to maintain. (Capability unit IIIw-4; woodland group 6; wildlife group 4)

Alligator clay, gently undulating (0 to 3 percent slopes) (AaB).—This soil is poorly drained. It has a surface layer of very dark gray to dark grayish-brown clay about 6 inches thick and a subsoil of gray clay mottled with yellowish brown. A few spots of Earle and Bowdre soils were included in mapping.

When dry this soil contracts and cracks, and when wet it expands and seals. Infiltration of water is very slow, except when the soil is cracked; then it is very rapid until the cracks seal. Runoff is slow. The available water capacity is moderate, reaction is medium acid to very strongly acid, and natural fertility is high.

Because this soil can be cultivated only within a narrow range of moisture content, farming operations commonly have to be delayed for several days after a rain, unless surface drains have been provided. A seedbed is difficult to prepare, and tilth is difficult to maintain. (Capability unit IIIw–4; woodland group 6; wildlife group 4)

Alligator complex (0 to 1 percent slopes) (Ac).—The soils in this complex are mostly poorly drained. In most places the surface layer is clay, but in spots it is loamy sand. These spots occur as mounds about 25 feet in diameter, and they cover 20 to 25 percent of the area. The loamy sand is underlain by clay at a depth of 6 to 20 inches. In dry years, plants on the sandy spots die but those on the clay survive. A few small spots of Earle soils were included in mapping.

When dry the clay contracts and cracks, and when wet it expands and seals. Infiltration of water is very slow, except when the soil is cracked; then it is very rapid until the cracks seal. Runoff is slow. The available water capacity is moderate, reaction is medium acid to strongly acid, and natural fertility is high. The sandy spots are droughty because infiltration of water is rapid and the available water capacity is low.

The clay is suited to crops, but preparing a seedbed in it is difficult, and farming operations commonly have to be delayed for several days after a rain, unless drainage has been provided. Tilth is easily maintained in the sandy spots. (Capability unit IIIw–4; woodland group 6; wildlife group 4)

Alligator silt loam (0 to 1 percent slopes) (Ag).—This soil is poorly drained. It formed in a thin layer of silty sediments over thick beds of clay. It has a surface layer of dark grayish-brown silt loam about 10 inches thick. Below this layer in some places is a 4-inch layer of dark grayish-brown silty clay loam mottled with yellowish red and underlain by gray, mottled clay. The depth to the clay is 10 to 14 inches. A few small spots of clay were included in mapping.

Runoff is slow, and infiltration of water is moderately slow. The available water capacity is moderate, reaction is medium acid to very strongly acid, and natural fertility is high.

Farming operations commonly have to be delayed for several days after a rain, unless surface drains have been provided. Tilth is easy to maintain. (Capability unit IIIw–4; woodland group 6; wildlife group 4)

Alligator silty clay loam (0 to 1 percent slopes) (Am).—This soil is poorly drained. It has a 6-inch surface layer of very dark gray to dark grayish-brown silty clay loam and a subsoil of dark-gray or gray clay mottled with brown. A few small spots of clay were included in mapping.

When dry this soil contracts and cracks, and when wet it expands and seals. Infiltration of water is very slow, except when the soil is cracked; then it is rapid until the cracks seal. Runoff is slow. The available water capacity is moderate, reaction is medium acid to very strongly acid, and natural fertility is high.

This soil is suited to most of the common crops. Farming operations commonly have to be delayed for several days after a rain, unless drainage has been provided. Preparing a seedbed is difficult. (Capability unit IIIw–4; woodland group 6; wildlife group 4)

Amagon Series

The Amagon series consists of poorly drained, very slowly permeable soils on the lower part of natural levees bordering stream channels. These soils formed in stratified silty alluvium. They have a surface layer of dark grayish-brown to light brownish-gray silt loam and a subsoil of gray silty clay loam.

Amagon soils are adjacent to the moderately well drained Dubbs soils and the somewhat poorly drained Dundee soils. They are grayer in the subsoil and more poorly drained than Dubbs and Dundee soils.

Profile of Amagon silt loam in a moist cultivated area in the SW¼SE¼SE¼ sec. 34, T. 8 N., R. 5 E.:

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

A2g—6 to 19 inches, dark-gray (10YR 4/1) silty clay loam; common, medium, distinct mottles of dark reddish brown a few, fine, faint mottles of yellowish brown; moderate, medium, subangular blocky structure; firm; roots and pores common; common, small, dark-colored, soft and hard concretions; strongly acid; clear, smooth boundary.

Btg—19 to 40 inches, gray (10YR 6/1) silty clay loam; common, coarse, distinct mottles of yellowish brown (10YR 5/6) and few, fine, distinct mottles of yellowish red; moderate, medium, subangular blocky structure; very firm; clay films on peds and lining some root channels and pores; few roots; common, small, dark-colored, hard and soft concretions; strongly acid; diffuse boundary.

Cg—40 to 56 inches +, light brownish-gray (10YR 6/2) silty clay loam; common, medium, distinct mottles of strong brown; massive; firm; few roots; strongly acid.

The color of the Ap horizon ranges from dark grayish brown (10YR 4/2) to light brownish gray (10YR 6/2). The B horizon ranges from grayish brown (10YR 5/2) to gray (10YR 6/1) in color and from 12 to more than 20 inches in thickness. The color of the Cg horizon ranges from light gray (10YR 7/1) to light brownish gray (10YR 6/2).

Amagon silt loam (0 to 1 percent slopes) (An).—This soil is in depressions and is flooded occasionally. It has a 6-inch surface layer of dark grayish-brown to light brownish-gray silt loam and a subsoil of gray silty clay loam mottled with brown and yellowish brown. A few small spots of Dundee soils were included in mapping.

Runoff is very slow, and infiltration of water is moderately slow. The available water capacity is moderate, reaction is medium acid to strongly acid, and natural fertility is moderately low.

This soil is well suited to crops. Tilth is easy to maintain, but farming operations commonly have to be delayed for several days after a rain, unless surface drains have been provided. The response to fertilizer and lime is good. (Capability unit IIIw–2; woodland group 4; wildlife group 3)

Arkabutla Series

The Arkabutla series consists of somewhat poorly drained, moderately permeable soils along stream channels. These soils formed in alluvium washed from loessal soils. They have a surface layer of brown to dark grayish-brown silt loam and a subsoil of brown silt loam over light-gray silt loam.

Arkabutla soils occur on Crowley Ridge and in the loessal plains west of Crowley Ridge. They are adjacent to the moderately well drained Collins soils and the poorly drained Zachary soils. They are grayer in the subsoil than Collins soils and less gray than Zachary soils.

Profile of Arkabutla silt loam in a moist cultivated area in the SW¼SE¼SW¼ sec. 11, T. 9 N., R. 3 E.:

Ap—0 to 6 inches, brown (10YR 5/3) silt loam; weak, fine, subangular blocky structure; friable; few, fine, hard and soft concretions; very strongly acid; abrupt, smooth boundary.

C1—6 to 13 inches, brown (10YR 5/3) silt loam; few, fine, distinct mottles of yellowish brown; weak, fine, subangular blocky structure; friable; few, fine, hard and soft concretions; very strongly acid; abrupt, smooth boundary.

C2g—13 to 20 inches, light-gray (10YR 7/2) silt loam; few, fine, distinct mottles of dark grayish brown and few, medium, distinct mottles of yellowish brown; weak, medium, angular blocky structure; friable; fine pores; common, black, soft concretions; very strongly acid.

C3g—20 to 36 inches, light-gray (10YR 7/1) silt loam; common, medium, distinct mottles of yellowish brown and dark yellowish brown; weak, fine and medium, subangular blocky structure; friable; common fine pores; very strongly acid; gradual, wavy boundary.

C4g—36 to 72 inches +, light brownish-gray (10YR 6/2) silt loam; many coarse, distinct mottles of dark yellowish brown (10YR 4/4) and few, medium, distinct mottles of yellowish brown; weak, medium, subangular blocky structure; friable; common, black, soft concretions; common fine pores; very strongly acid.

The Ap horizon ranges from brown (10YR 5/3) to dark grayish brown (10YR 4/2) in color. The depth to the C2g horizon ranges from 6 to 15 inches. The Cg horizons are gray (10YR 5/1) to light gray (10YR 7/2) in color and silt loam to light silty clay loam in texture.

Arkabutla silt loam (0 to 1 percent slopes) (Ar).—This soil has a 6-inch surface layer of brown to dark grayish-brown silt loam and a subsoil of light-gray to light brownish-gray silt loam mottled with yellowish brown. The depth to the light-gray layer ranges from 6 to 15 inches. A few small spots of Collins and Zachary soils were included in mapping.

This soil is flooded occasionally, but the flooding does not affect productivity or the choice of plants. Runoff is moderately slow, and infiltration of water is moderately slow. The available water capacity is moderate, reaction is very strongly acid, and natural fertility is moderate.

This soil is well suited to crops. Tilth is easy to maintain, but planting may have to be delayed in spring, unless drainage has been provided. (Capability unit IIw-2; woodland group 3; wildlife group 5)

Bowdre Series

The Bowdre series consists of moderately well drained, slowly permeable, level to undulating soils in slack-water areas of the bottom lands. These soils formed in thin beds of clayey sediment underlain by coarser textured sediment. They have a surface layer and subsoil of dark-brown silty clay loam. The steepest gradient is less than 8 percent.

Bowdre soils are adjacent to Dubbs and Earle soils. They are finer textured than Dubbs soils and have a darker colored surface layer and poorer internal drainage. Bowdre soils have better internal drainage than Earle soils, and they are coarser textured in the uppermost 20 inches. They formed in thinner beds of clayey sediment than Earle soils.

Profile of Bowdre silty clay loam, gently undulating, in a moist cultivated area in the SW¼SW¼SE¼ sec. 33, T. 9 N., R. 5 E.:

Ap—0 to 4 inches, dark-brown (10YR 3/3) silty clay loam; weak, fine, granular structure; firm; roots and pores common; medium acid; abrupt, smooth boundary.

B21—4 to 11 inches, dark-brown (10YR 3/3) silty clay loam; moderate, medium, subangular blocky structure; very firm; roots and pores common; few, small, dark-colored, soft concretions; medium acid; clear, smooth boundary.

B22—11 to 16 inches, dark-brown (10YR 3/3) silty clay loam; many, medium, distinct mottles of grayish brown; moderate, medium and fine, subangular blocky structure; firm; few roots and pores; few, small, dark-colored, soft concretions; medium acid; gradual, smooth boundary.

C—16 to 46 inches +, grayish-brown (10YR 5/2) heavy silt loam; few, fine, faint mottles of yellowish brown and few, fine, faint mottles of dark brown; massive; friable; few roots; few, small, dark-colored, soft concretions; medium acid.

The C horizon ranges from silt loam to fine sandy loam in texture, and in places it has 2- to 3-inch lenses of loamy fine sand to silty clay. The depth to the C horizon ranges from 10 to 20 inches.

Bowdre silty clay loam, 0 to 1 percent slopes (BoA).—This soil has a 5-inch surface layer of dark-brown silty clay loam and a subsoil of dark-brown silty clay loam mottled with grayish brown. At a depth of 10 to 20 inches is coarser textured material. A few spots of Earle soils were included in mapping.

When dry this soil contracts and cracks, and when wet it expands and seals. Infiltration of water is slow, except when the soil is cracked; then it is very rapid until the cracks seal. Runoff is slow. The available water capacity is high, and reaction is medium acid.

If drained this soil is suited to crops. Because it can be cultivated only within a limited range of moisture content, planting may have to be delayed in spring, unless drainage has been provided. The preparation of a seedbed is somewhat difficult, and tilth is somewhat difficult to maintain. (Capability unit IIw-3; woodland group 2; wildlife group 4)

Bowdre silty clay loam, gently undulating (0 to 3 percent slopes) (BoB).—This soil has a 5-inch surface layer of dark-brown silty clay loam and a subsoil of dark-brown silty clay loam mottled with grayish brown. At a depth of 10 to 20 inches is coarser textured material. A few spots of Earle soils were included in mapping.

When dry this soil contracts and cracks, and when wet it expands and seals. Infiltration of water is slow, except when the soil is cracked; then it is very rapid until the cracks seal. Runoff is slow. The available water capacity is high, reaction is medium acid, and natural fertility is high.

If drained, this soil is well suited to crops. Because it can be cultivated only within a limited range of moisture content, planting may have to be delayed in spring, unless drainage has been provided. Seedbed preparation is somewhat difficult and also maintenance of soil tilth. (Capability unit IIIw-1; woodland group 2; wildlife group 4)

Bowdre silty clay loam, undulating (0 to 8 percent slopes) (BoC).—This soil has a 5-inch surface layer of dark-brown silty clay loam and a subsoil of dark-brown silty clay loam mottled with grayish brown. At a depth of 10 to 20 inches is coarser textured material. A few spots of Dubbs and Earle soils were included in mapping.

When dry this soil contracts and cracks, and when wet it expands and seals. Infiltration of water is slow, except when the soil is cracked; then it is rapid until the cracks seal. Runoff is slow. The available water capacity is high, reaction is medium acid, and natural fertility is high.

If drained, this soil is well suited to crops. Because it can be cultivated only within a narrow range of moisture content, planting may have to be delayed in spring, unless drainage has been provided. Seedbed preparation is somewhat difficult, and also maintenance of tilth. (Capability unit IIIw-1; woodland group 2; wildlife group 4)

Calhoun Series

The Calhoun series consists of poorly drained, very slowly permeable soils on low ridges. These soils formed in a layer of wind-deposited silt (loess) 8 to 20 feet thick. They have a surface layer of grayish-brown silt loam and a subsoil of dark grayish-brown to gray silty clay loam.

Calhoun soils occur throughout the loessal plains west of Crowley Ridge. They are commonly adjacent to the moderately well drained Grenada soils and the somewhat poorly drained Calloway soils. Calhoun soils are grayer in the subsoil and more poorly drained than Grenada and Calloway soils.

Profile of Calhoun silt loam in a moist cultivated area in the SW¼SE¼NW¼ sec. 33, T. 7 N., R. 2 E.:

Ap—0 to 4 inches, grayish-brown (10YR 5/2) silt loam; few, fine, distinct mottles of dark brown; weak, fine, granular structure; very friable; common roots; few, small, dark-colored, hard concretions; medium acid; clear, smooth boundary.

A2g—4 to 7 inches, grayish-brown (10YR 5/2) silt loam; common, fine, distinct mottles of yellowish brown; weak, coarse, subangular blocky structure; friable; slightly brittle; silt coatings on some peds; few pores; common roots; few, small, dark-colored, hard concretions; very strongly acid; abrupt, smooth boundary.

B&A—7 to 20 inches, light brownish-gray (10YR 6/2) light silty clay loam; common, medium, distinct mottles of yellowish brown; moderate, medium, subangular blocky structure; friable; gray (10YR 6/1) tongues of silt about 1½ inches in diameter ending at a depth of 10 to 20 inches; tongues are massive and very friable; some tongues terminate in gray (10YR 5/1) clay cups; coatings of dark-brown (10YR 4/3) clay on some peds and in some root channels; few roots; common, vesicular pores; few, small, dark-colored, hard concretions; very strongly acid; gradual, wavy boundary.

B2tg—20 to 40 inches, dark grayish-brown (2.5Y 4/2) silty clay loam; few, medium, distinct mottles of light olive brown; moderate, medium, subangular blocky structure; friable; brittle; cracks filled with light-gray (10YR 7/1) silt; common patchy or continuous clay films in pores and on ped faces; few roots; very strongly acid; gradual, wavy boundary.

B3g—40 to 45 inches +, grayish-brown (2.5Y 5/2) silt loam; common, medium, distinct mottles of yellowish brown; moderate, medium, subangular blocky structure; friable; few root holes filled with light-gray (10YR 7/1) silt; common, small, dark-colored, hard concretions; medium acid.

The Ap horizon ranges from grayish brown (10YR 5/2) to dark gray (10YR 4/1) in color and from 4 to 9 inches in thickness. The B&A horizon ranges from 10 to 18 inches in thickness, and the tongues of silt range from few to many in number. The color of the B horizon is dark grayish brown (2.5Y 4/2) to gray (10YR 6/1). The depth to the B2tg horizon ranges from 12 to 25 inches.

Calhoun silt loam (0 to 1 percent slopes) (Ca).—This soil has a 7-inch surface layer of grayish-brown silt loam mottled with dark brown and yellowish brown and a subsoil of dark grayish-brown to gray silty clay loam mottled with yellowish brown. A few small spots of Grenada and Calloway soils were included in mapping.

Runoff is very slow, and infiltration of water is very slow. The available water capacity is moderate, reaction is medium acid to very strongly acid, and natural fertility is moderately low.

If drained this soil is suited to crops. Tilth is easy to maintain, but farming operations commonly have to be delayed for several days, unless drainage has been provided. (Capability unit IIIw-3; woodland group 9; wildlife group 1)

Calloway Series

The Calloway series consists of somewhat poorly drained, slowly permeable soils on broad flats and low ridges. These soils formed in a layer of wind-deposited silt (loess) 8 to 20 feet thick. They have a surface layer of dark-brown to brown silt loam and a subsoil of light brownish-gray silt loam. The slope range is 0 to 3 percent.

Calloway soils occur on the loessal plains west of Crowley Ridge. They are adjacent to the moderately well drained Grenada soils and the moderately well drained to well-drained Loring soils. They are more poorly drained than Grenada and Loring soils, and they are mottled nearer the surface. They have a thicker, more strongly expressed fragipan than Loring soils.

Profile of Calloway silt loam, 0 to 1 percent slopes, in a moist cultivated area in the NW¼SE¼NE¼ sec. 16, T. 8 N., R. 3 E.:

Ap—0 to 5 inches, dark-brown (10YR 4/3) silt loam; few, fine, distinct mottles of yellowish brown and common, medium, distinct mottles of light brownish gray; weak, fine, granular structure; friable; few pores; many roots; yellow mottles follow root channels; medium acid; abrupt, smooth boundary.

A2—5 to 12 inches, brown (10YR 5/3) silt loam; common, medium, distinct mottles of light brownish gray and few, fine, distinct mottles of yellowish brown; weak, medium and coarse, subangular blocky structure; friable; common roots; few, small, dark-colored, hard concretions; medium acid; clear, smooth boundary.

B2g—12 to 20 inches, light brownish-gray (10YR 6/2) heavy silt loam; common, medium, distinct mottles of yellowish brown; moderate, medium, subangular blocky structure; few roots; common pores; common, small, dark-colored, hard concretions; very strongly acid; abrupt, smooth boundary.

A'2x—20 to 30 inches, light-gray (10YR 7/1) silt loam; common, medium, distinct mottles of brown; weak, medium, subangular blocky structure; friable; somewhat compact and brittle; few roots; common pores; common, small, hard, round concretions; very strongly acid; abrupt, smooth boundary.

B'x—30 to 50 inches, brown (10YR 5/3) silty clay loam; many, distinct mottles of light brownish gray and few, fine, distinct mottles of yellowish brown; weak, coarse, subangular blocky structure; firm; compact and brittle; common, patchy clay films; common, dark-colored, hard concretions; coatings of gray silt on some peds; strongly acid; gradual, smooth boundary.

C—50 to 60 inches, yellowish-brown (10YR 5/4) silt loam; common, medium, distinct mottles of grayish brown and few, fine, faint mottles of yellowish brown; massive; friable; few, small, dark-colored, soft and hard concretions; medium acid.

The Ap horizon ranges from dark brown (10YR 4/3) to light brownish gray (10YR 6/2) in color and from 4 to 9 inches in thickness. The depth to the A'2x horizon ranges from 15 to 22 inches. The color of the B'x horizon ranges from brown (10YR 5/3) mottled with shades of gray to gray (10YR 5/1) to light brownish gray (10YR 6/2) mottled with shades of brown and yellowish brown. The mottles are common to many in number.

Calloway silt loam, 0 to 1 percent slopes (ClA).—This soil has a 6-inch surface layer of dark-brown to light brownish-gray silt loam and a subsoil of light brownish-gray, mottled silt loam. A light-gray, mottled fragipan begins at a depth of about 20 inches. A few small spots of Calhoun and Henry soils were included in mapping.

The fragipan restricts the growth of roots and the movement of water but does not seriously affect productivity or the choice of plants. Runoff is slow. The available water capacity is moderate, reaction is medium acid to very strongly acid, and natural fertility is moderate.

If drained and otherwise well managed, this soil is suited to crops. Planting may have to be delayed in spring, unless drainage has been provided. Tilth is easy to maintain. (Capability unit IIw-1; woodland group 8; wildlife group 1)

Calloway silt loam, 1 to 3 percent slopes (ClB).—This soil has a 6-inch surface layer of dark-brown to light brownish-gray silt loam and a subsoil of light brownish-gray silt loam. A light-gray, mottled fragipan begins at a depth of about 20 inches. A few small spots of Grenada soils were included in mapping.

The fragipan restricts the growth of roots and the movement of water but does not seriously affect productivity or the choice of plants. Runoff is moderately slow. The available water capacity is moderate, reaction is medium acid to strongly acid, and natural fertility is moderate.

If drained and otherwise well managed, this soil is well suited to crops. Planting may have to be delayed in spring, unless drainage has been provided. Tilth is easy to maintain. (Capability unit IIw-1; woodland group 8; wildlife group 1)

Calloway silt loam, 1 to 3 percent slopes, eroded (ClB2).—This soil has a 5-inch surface layer of dark-brown to light brownish-gray silt loam and a subsoil of light brownish-gray silt loam. A light-gray, mottled fragipan begins at a depth of about 18 inches. Erosion has removed some of the original surface layer and has exposed patches of subsoil. Small rills are common after rains. In some places plowing has mixed the original surface layer with part of the subsoil. A few small spots of Grenada soils were included in mapping.

This soil puddles easily because it is low in organic-matter content and has weak structure. The fragipan restricts the growth of roots and the movement of water but does not seriously affect productivity or the choice of plants. Runoff is medium. The available water capacity is moderate, reaction is medium acid to strongly acid, and natural fertility is moderate. Erosion is a hazard.

This soil is well suited to crops. Planting may have to be delayed in spring, unless drainage has been provided, and tilth is somewhat difficult to maintain. (Capability unit IIw-1; woodland group 8; wildlife group 1)

Collins Series

The Collins series consists of moderately well drained, moderately permeable, level soils along stream channels. These soils formed in sediments washed from loessal soils. They have a surface layer of dark-brown to grayish-brown silt loam and a subsoil of yellowish-brown silt loam.

Collins soils occur on Crowley Ridge and on the loessal plains west of Crowley Ridge. They are adjacent to the somewhat poorly drained Arkabutla and the poorly drained Zachary soils. They are browner in the subsoil and better drained than Arkabutla and Zachary soils.

Profile of Collins silt loam in a moist cultivated area in the NW¼SW¼SE¼ sec. 28, T. 8 N., R. 3 E.:

Ap1—0 to 3 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; common roots; few pores; few, small, dark-colored, hard concretions; slightly acid; clear, smooth boundary.

Ap2—3 to 7 inches, brown (10YR 5/3) silt loam; weak, fine, granular structure; friable; common roots; few pores; medium acid; clear, smooth boundary.

C1—7 to 19 inches, yellowish-brown (10YR 5/4) silt loam; massive; friable; few roots; few root holes filled with light brownish-gray (10YR 6/2) silt; medium acid; clear, smooth boundary.

C2—19 to 25 inches, yellowish-brown (10YR 5/4) silt loam; common, medium, distinct mottles of light brownish gray and few, fine, faint mottles of dark yellowish brown; massive; friable; few roots; few, small, dark-colored, soft concretions; medium acid; clear, smooth boundary.

C3—25 to 46 inches +, light brownish-gray (10YR 6/2) silt loam; common, coarse, distinct mottles of yellowish brown (10YR 5/6) and common, coarse, distinct mottles of dark yellowish brown (10YR 4/4); massive; friable; small, dark-colored, soft and hard concretions; very strongly acid.

The Ap horizon ranges from dark brown (10YR 4/3) to grayish brown (10YR 5/2) in color and from 4 to 8 inches in thickness. The C1 and C2 horizons are brown (10YR 5/3 or 4/3) in some places. The depth to mottling ranges from 16 to 24 inches.

Collins silt loam (0 to 1 percent slopes) (Co).—This soil is flooded occasionally. It has a 6-inch surface layer of dark-brown to grayish-brown silt loam and a subsoil of yellowish-brown, mottled silt loam. A few small spots of Arkabutla and Zachary soils were included in mapping.

Runoff is slow, and infiltration of water is moderate. The available water capacity is moderate, reaction is medium acid to very strongly acid, and natural fertility is moderate.

This soil is well suited to crops. The occasional flooding does not seriously affect productivity or the choice of plants. Tilth is easy to maintain. (Capability unit I-1; woodland group 1; wildlife group 5)

Crowley Series

The Crowley series consists of poorly drained, very slowly permeable soils. These soils formed in a layer of wind-deposited silt (loess) 8 to 20 feet thick. They have a surface layer of light brownish-gray to dark grayish-brown silt loam. The upper part of the subsoil is light-gray silty clay mottled with red, and the lower part is grayish-brown to light brownish-gray silty clay loam or silt loam. The slope range is 0 to 3 percent.

Crowley soils are adjacent to the somewhat poorly drained Calloway soils and the poorly drained Henry soils. They have a more clayey subsoil than Calloway and Henry soils, but they lack the fragipan that is typical of those soils. Crowley soils are intermingled with Hillemann soils and are much like them, but they lack the transitional B horizon and the moderately high concentration of sodium and magnesium in the lower part of the B horizon.

The Crowley soils in Cross County are mapped only as part of two undifferentiated groups with Hillemann soils.

Profile of Crowley silt loam, 0 to 1 percent slopes, in a moist cultivated area in the NE¼SE¼NE¼ sec. 19, T. 9 N., R. 3 E.:

Ap1—0 to 5 inches, grayish-brown (10YR 5/2) silt loam; common, medium, distinct mottles of yellowish brown along roots and root channels; weak, fine, granular structure; very friable; abundant roots; few pores; common, small, dark-colored, hard concretions; medium acid; abrupt, smooth boundary.

Ap2—5 to 10 inches, light brownish-gray (10YR 6/2) silt loam; common, medium and fine, distinct mottles of yellowish brown and common, medium, distinct mottles of dark yellowish brown; weak, fine, granular structure; friable; common roots; few pores; common, small, dark-colored, soft concretions; medium acid; clear, smooth boundary.

A2g—10 to 13 inches, gray (10YR 6/1) silt loam; common, medium, distinct mottles of dark yellowish brown and few, fine, distinct mottles of yellowish brown; weak, fine, granular structure; very friable; common roots and pores; common, small, dark-colored, hard concretions; very strongly acid; abrupt, smooth boundary.

B21tg—13 to 20 inches, light-gray (10YR 6/1) silty clay; many, medium, prominent mottles of red and few, fine, distinct mottles of yellowish brown; moderate, medium, angular blocky structure; very firm; few roots and pores; common patchy clay films; cracks between peds filled with gray (10YR 6/1) silt; few, small, soft, dark-colored concretions; very strongly acid; clear, wavy boundary.

B22t—20 to 30 inches, grayish-brown (10YR 5/2) silty clay loam; common, coarse, distinct mottles of dark brown (10YR 4/3) and few, fine, distinct mottles of yellowish brown; moderate, medium, subangular blocky structure; firm; few roots; few fine pores; common patchy clay films; many, fine, soft, dark-colored concretions; black coatings in some root channels; black filaments on some ped faces; very strongly acid; gradual, smooth boundary.

B3g—30 to 48 inches +, light brownish-gray (10YR 6/2) heavy silt loam; many, medium, distinct mottles of dark yellowish brown and common, medium, distinct mottles of yellowish brown; weak, medium and fine, angular blocky structure; friable; black coatings on some root channels and on some ped faces; many, fine, dark-colored, soft concretions; slightly acid.

The Ap horizon ranges from light brownish gray (10YR 6/2) to dark grayish brown (10YR 4/2) in color and from 5 to 10 inches in thickness. This horizon is free of mottles except in fields that have been irrigated. A light color in the Ap horizon apparently results in part from leveling in preparation for irrigation. In some irrigated areas the Ap horizon has a neutral reaction. The depth to the B21tg horizon ranges from 10 to 16 inches. This horizon is 6 to 12 inches thick, and its texture is heavy silty clay loam in some areas. The B22t horizon ranges to gray (10YR 5/1 or 10YR 6/1) and light brownish gray (10YR 6/2) in color. In places its texture is silt loam. The B3g horizon ranges to grayish brown (2.5Y 5/2) in color and to strongly acid in reaction. Its texture is silty clay loam in places.

Crowley and Hillemann silt loams, 0 to 1 percent slopes (CrA).—These soils are mapped as an undifferentiated group because they are intermingled, have similar characteristics, and are much alike in management needs. Crowley soils make up as much as 70 percent of some areas mapped but are lacking from others; Hillemann soils make up 30 to 70 percent of the areas mapped. Small spots of Henry and Calloway soils were included in mapping.

Crowley soils have a surface layer of dark grayish-brown to light brownish-gray silt loam. The upper part of the subsoil is light-gray silty clay mottled with red, and the lower part is brown to light brownish-gray, mottled silty clay loam or silt loam. A profile of Hillemann silt loam is described under the heading "Hillemann Series."

Runoff is slow, and wetness is a moderate to severe hazard. The available water capacity is moderate. Reaction is medium acid to strongly acid in the upper part of the profile and slightly acid to medium acid in the lower part. The lower layers of the Hillemann soil contain a large amount of sodium. Natural fertility is moderate.

These soils are suited to crops. Even though they can be worked throughout a wide range of moisture content, farming operations may have to be delayed for several days after a rain, unless drainage has been provided. The response to lime and fertilizer is good. If it is necessary to grade or smooth areas of the Hillemann soil, the depth to the concentration of sodium should be determined before cuts are made. Productivity will be impaired if sodium-affected material is brought too near the surface. (Crowley soil—capability unit IIIw-3, woodland group 4, wildlife group 1; Hillemann soil—capability unit IIw-4, woodland group 4, wildlife group 1)

Crowley and Hillemann silt loams, 1 to 3 percent slopes (CrB).—These soils are mapped as an undifferentiated group because they are intermingled, have similar characteristics, and are much alike in management needs. Crowley soils make up as much as 70 percent of some areas mapped but are lacking from others; Hillemann soils make up 30 to 70 percent of the areas mapped. Crowley soils are in the lowest part of the areas. Small spots of Grenada and Calloway soils were included in mapping.

Crowley soils have a surface layer of dark grayish-brown to light brownish-gray silt loam. The upper part of the subsoil is light-gray silty clay mottled with red, and the lower part is brown to light brownish-gray, mottled silty clay loam or silt loam. A profile of Hillemann silt loam is described under the heading "Hillemann Series."

Runoff is slow, and wetness is a moderate hazard. The available water capacity is moderate. Reaction is medium acid to strongly acid in the upper part of the profile and slightly acid to medium acid in the lower part. The lower layers of the Hillemann soil contain a large amount of sodium. Natural fertility is moderate.

These soils are suited to crops. Even though they can be worked throughout a wide range of moisture content, farming operations may have to be delayed for several days after a rain, unless drainage has been provided. If it is necessary to grade or smooth areas of the Hillemann soil, the depth to the concentration of sodium should be determined before cuts are made. Productivity will be impaired if sodium-affected material is brought too near the surface. (Crowley soil—capability unit IIIw-3, woodland group 4, wildlife group 1; Hillemann soil—capability unit IIw-4, woodland group 4, wildlife group 1)

Dubbs Series

The Dubbs series consists of moderately well drained, moderately to moderately slowly permeable soils that occur on the highest part of natural levees. These soils formed in stratified beds of loamy and silty alluvium. They have a surface layer of dark-brown to dark grayish-brown fine sandy loam and a subsoil of dark-brown silt loam over dark yellowish-brown silty clay loam. The slope range is 0 to 8 percent.

Dubbs soils are adjacent to the somewhat poorly drained Dundee soils and the poorly drained Amagon soils. They are browner in the subsoil and better drained than Dundee and Amagon soils.

Profile of Dubbs fine sandy loam, gently undulating, in a moist cultivated area in the NE¼NE¼SE¼ sec. 10, T. 6 N., R. 4 E.:

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

B21t—5 to 21 inches, dark-brown (10YR 4/3) heavy silt loam; weak, medium and fine, subangular blocky structure; friable; few patchy clay films; common pores; common fine roots; medium acid; abrupt, smooth boundary.

B22t—21 to 26 inches, dark yellowish-brown (10YR 4/4) silty clay loam; few, fine, distinct mottles of grayish brown and few, medium, distinct mottles of yellowish brown; moderate, medium, subangular blocky structure; firm; common, thin, patchy clay films; few roots; common pores; medium acid; gradual, smooth boundary.

C—26 to 48 inches +, yellowish-brown (10YR 5/4) fine sandy loam; common, medium, distinct mottles of grayish brown and few, fine, distinct mottles of dark yellowish brown; massive; friable when moist and slightly hard when dry; few roots; few pores; few, small, dark-colored, hard concretions; medium acid.

The color of the Ap horizon ranges from dark brown (10YR 4/3) to dark grayish brown (10YR 4/2). The B horizon ranges from dark grayish brown (10YR 4/2) to yellowish brown (10YR 5/4) in color and from 15 to 30 inches in thickness.

Dubbs fine sandy loam, gently undulating (0 to 3 percent slopes) (DbB).—This soil has a 4- to 8-inch surface layer of dark-brown to dark grayish-brown fine sandy loam and a subsoil of dark-brown silt loam over yellowish-brown silty clay loam. The lower part of the subsoil is mottled with grayish brown and yellowish brown. The depth to the mottles ranges from 20 to 30 inches. A few spots of Dundee and Amagon soils were included in mapping.

Runoff is medium, and, except where there is a plowpan, infiltration of water is moderate to moderately slow. The available water capacity is high, reaction is medium acid to strongly acid, and natural fertility is moderately high. The hazard of erosion is slight.

This soil is well suited to crops. It warms up early in spring, and early planting is possible. Tilth is easy to maintain. (Capability unit IIe–1; woodland group 2; wildlife group 3)

Dubbs fine sandy loam, undulating (0 to 8 percent slopes) (DbC).—This soil has a 4- to 8-inch surface layer of dark-brown to dark grayish-brown fine sandy loam and a subsoil of dark-brown silt loam over yellowish-brown silty clay loam. The lower part of the subsoil is mottled with grayish brown and yellowish brown. The depth to the mottles ranges from 20 to 30 inches. A few spots of Dundee and Amagon soils were included in mapping.

Runoff is medium, and, except where there is a plowpan, the infiltration of water is moderate to moderately slow. The available water capacity is high, reaction is medium acid to strongly acid, and natural fertility is moderately high. Erosion is a hazard.

This soil is well suited to crops. It warms up early in spring, and early planting is possible. Tilth is easy to maintain. (Capability unit IIIe–1; woodland group 2; wildlife group 3)

Dundee Series

The Dundee series consists of somewhat poorly drained, moderately to moderately slowly permeable soils that occur generally on the lower part of natural levees. These soils formed in stratified beds of loamy and clayey alluvium. They have a surface layer of dark-brown to grayish-brown fine sandy loam or silt loam and a subsoil of dark grayish-brown to yellowish-brown, mottled silty clay loam. The slope range is 0 to 3 percent.

Dundee soils are adjacent to the moderately well drained Dubbs soils and the poorly drained Amagon soils. They are finer textured, less friable, grayer, and more poorly drained than Dubbs soils. Dundee soils are less gray in the subsoil and better drained than Amagon soils.

Profile of Dundee silt loam, 0 to 1 percent slopes, in a moist cultivated area in the NE¼SE¼SW¼ sec. 34, T. 8 N., R. 5 E.:

Ap—0 to 4 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; very friable; medium acid; abrupt, smooth boundary.

B21t—4 to 14 inches, dark grayish-brown (10YR 4/2) silty clay loam; few, fine, distinct mottles of yellowish brown and few, medium, faint mottles of grayish brown; moderate, medium, subangular blocky structure; firm; common patchy clay films; roots and pores common; very strongly acid; clear, smooth boundary.

B22t—14 to 32 inches, yellowish-brown (10YR 5/6) silty clay loam; common, medium, distinct mottles of grayish brown; weak, medium, subangular blocky structure; firm; few vertical seams filled with dark-brown (10YR 3/3) silty clay; common patchy clay films; few, small, dark-colored, hard concretions; few roots and pores; strongly acid; gradual, smooth boundary.

C—32 to 48 inches +, grayish-brown (10YR 5/2) very fine sandy loam; many, medium, distinct mottles of yellowish brown and few, fine, distinct mottles of dark brown; weak, fine, granular structure; friable; strongly acid.

The surface layer is fine sandy loam or silt loam. The Ap horizon ranges from dark grayish brown (10YR 4/2) to grayish brown (10YR 5/2) in color and from 4 to 10 inches in thickness. The B horizon ranges from dark grayish brown (10YR 4/2) to yellowish brown (10YR 5/6) in color. The mottles are few to many in number and range to gray (10YR 6/1) in color. The depth to mottling is 6 to 14 inches. In a few areas the texture of the B horizon is clay loam. This horizon is 15 to 30 inches thick. The C horizon ranges from silt loam to sandy loam in texture.

Dundee fine sandy loam, 0 to 1 percent slopes (DdA).—This soil has a 6-inch surface layer of dark-brown to grayish-brown fine sandy loam and a subsoil of dark grayish-brown and yellowish-brown, mottled silty clay loam. The depth to mottles ranges from 6 to 14 inches. A few small spots of Amagon soils were included in mapping.

Runoff is slow, and, except where there is a plowpan, infiltration of water is moderate to moderately slow. The available water capacity is moderate, reaction is medium acid to very strongly acid, and natural fertility is moderate.

This soil is well suited to crops, but planting may have to be delayed in spring, unless drainage has been provided. Tilth is easy to maintain. (Capability unit I–1; woodland group 2; wildlife group 3)

Dundee fine sandy loam, gently undulating (0 to 3 percent slopes) (DdB).—This soil has a 6-inch surface layer of dark-brown to grayish-brown fine sandy loam and a subsoil of dark grayish-brown and yellowish-brown, mottled silty clay loam. The depth to mottles ranges from 6 to 14 inches. A few small spots of Dubbs and Amagon soils were included in mapping.

Runoff is slow, and except where there is a plowpan, infiltration of water is moderate to moderately slow. The available water capacity is moderate, reaction is medium acid to very strongly acid, and natural fertility is moderate.

This soil is well suited to crops, but planting may have to be delayed in spring, unless drainage has been provided. Tilth is easy to maintain. (Capability unit IIw–2; woodland group 2; wildlife group 3)

Dundee silt loam, 0 to 1 percent slopes (DuA).—This soil has a 5-inch surface layer of dark grayish-brown silt loam and a subsoil of dark grayish-brown and yellowish-brown, mottled silty clay loam. The depth of the mottles ranges from 6 to 14 inches. A few small spots of Amagon soils were included in mapping.

Runoff is slow, and, except where there is a plowpan, infiltration of water is moderate to moderately slow. The available water capacity is moderate, reaction is medium acid to very strongly acid, and natural fertility is moderate.

This soil is well suited to crops, but planting may have to be delayed in spring, unless drainage has been provided. Tilth is easy to maintain. (Capability unit I–1; woodland group 2; wildlife group 3)

Dundee silt loam, gently undulating (0 to 3 percent slopes) (DuB).—This soil has a 5-inch surface layer of dark grayish-brown silt loam and a subsoil of dark grayish-brown and yellowish-brown, mottled silty clay loam. The depth to mottling ranges from 6 to 14 inches. A few small spots of Dubbs and Amagon soils were included in mapping.

Except where there is a plowpan, infiltration of water is moderate or moderately slow. The available water capacity is moderate, reaction is medium acid to very strongly acid, and natural fertility is moderate.

This soil is well suited to crops, but planting may have to be delayed in spring, unless drainage has been provided. Tilth is easy to maintain. (Capability unit IIw–2; woodland group 2; wildlife group 3)

Earle Series

The Earle series consists of somewhat poorly drained, level to undulating, very slowly permeable soils that occur at the higher elevations in slack-water areas of the bottom lands. These soils have a surface layer of very dark gray or dark grayish-brown clay and a subsoil of gray or dark-gray clay. At a depth of 20 to 36 inches is yellowish-brown to gray, mottled, coarser textured material.

Earle soils are adjacent to Alligator and Bowdre soils. They are better drained and have a thinner layer of clay than Alligator soils. Earle soils are less well drained and have a thicker layer of clay than Bowdre soils.

Profile of Earle clay, gently undulating, in a moist cultivated area in the SW¼NW¼NW¼ sec. 5, T. 6 N., R. 5 E.:

Ap—0 to 8 inches, very dark gray (10YR 3/1) clay; moderate, medium to fine, granular structure; hard when dry, firm when moist, and plastic when wet; plentiful roots; few pores; medium acid; clear, smooth boundary.

C1g—8 to 32 inches, gray (10YR 5/1) clay; many, coarse, distinct, yellowish-brown (10YR 5/4) mottles; massive; hard when dry, firm when moist, and plastic when wet; few slickensides; root holes filled with very dark gray (10YR 3/1) clay; few roots; few, small, dark-colored concretions; strongly acid; clear, smooth boundary.

IIC2—32 to 46 inches +, yellowish-brown (10YR 5/4) sandy loam; common, medium, distinct, grayish-brown mottles; structureless; loose; few roots; medium acid.

The Ap horizon is very dark gray (10YR 3/1) or dark grayish-brown (10YR 4/2) clay or silty clay loam 5 to 9 inches thick. The C1g horizon is gray (10YR 5/1) or dark gray (10YR 4/1). The IIC2 horizon ranges from sand to sandy clay loam in texture and from a few to several feet in thickness. In color, it is yellowish brown (10YR 5/4) to gray (10YR 5/1). The mottles in this horizon range from common to many in number and are gray, grayish brown, brown, or yellowish brown. Depth to this horizon ranges from 20 to 36 inches.

Earle clay, 0 to 1 percent slopes (EcA).—This soil has a very dark gray surface layer about 8 inches thick and a subsoil of gray clay mottled with yellowish brown. Below this, at a depth of 20 to 36 inches, is coarser textured material. A few spots of Alligator soils were included in mapping.

When dry this soil contracts and cracks, and when wet it expands and seals. Infiltration of water is very slow, except when the soil is cracked; then it is very rapid until the cracks seal. Runoff is slow. The available water capacity is moderate, reaction is medium acid to strongly acid, and natural fertility is high.

Because this soil can be cultivated only within a narrow range of moisture content, farming operations commonly have to be delayed for several days after a rain, unless drainage has been provided. Preparation of a seedbed is difficult, and tilth is difficult to maintain. (Capability unit IIIw–4; woodland group 6; wildlife group 4)

Earle clay, gently undulating (0 to 3 percent slopes) (EcB).—This soil has a 7-inch surface layer of very dark gray clay and a subsoil of gray clay mottled with yellowish brown. Below this, at a depth of 20 to 36 inches, is coarser textured material. A few small spots of Alligator and Bowdre soils were included in mapping.

When dry this soil contracts and cracks, and when wet it expands and seals. Infiltration of water is very slow, except when the soil is cracked; then it is very rapid until the cracks seal. Runoff is slow. The available water capacity is high, reaction is medium acid to strongly acid, and natural fertility is high.

Because this soil can be cultivated only within a narrow range of moisture content, farming operations commonly have to be delayed for several days after a rain, unless drainage has been provided. Preparation of a seedbed is difficult, and tilth is difficult to maintain. (Capability unit IIIw–4; woodland group 6; wildlife group 4)

Earle clay, undulating (0 to 8 percent slopes) (EcC).—This soil has a 6-inch surface layer of very dark gray clay and a subsoil of gray clay mottled with yellowish brown. Below this, at a depth of 20 to 36 inches, is coarser textured material. A few small spots of Alligator and Bowdre soils were included in mapping.

When dry this soil contracts and cracks, and when wet it expands and seals. Infiltration of water is very slow, except when the soil is cracked; then it is very rapid until the cracks seal. Runoff is slow. The available water capacity is very high, reaction is medium acid to strongly acid, and natural fertility is high.

Because this soil can be cultivated only within a narrow range of moisture content, farming operations commonly have to be delayed for several days after a rain, unless drainage has been provided. The preparation of a seedbed is difficult, and tilth is difficult to maintain. (Capability unit IIIw–4; woodland group 6; wildlife group 4)

Earle silty clay loam, gently undulating (0 to 3 percent slopes) (EsB).—This soil has a 7-inch surface layer of very dark grayish-brown silty clay loam and a subsoil of dark-gray clay mottled with yellowish brown. Beneath this, at a depth of 20 to 36 inches, is coarser textured material. A few small spots of Alligator and Bowdre soils were included in mapping.

When dry this soil contracts and cracks, and when wet it expands and seals. Infiltration of water is very slow, except when the soil is cracked; then it is very rapid until the cracks seal. Runoff is slow. The available water capacity is high, reaction is medium acid to strongly acid, and natural fertility is high.

Because this soil can be cultivated only within a narrow range of moisture content, farming operations commonly have to be delayed for several days after a rain, unless drainage has been provided. Preparation of a seedbed is difficult, and tilth is difficult to maintain. (Capability unit IIIw–1; woodland group 6; wildlife group 4)

Foley Series

The Foley series consists of poorly drained to somewhat poorly drained, slowly permeable soils on flats and very low ridges of the loessal plains. These soils formed in loess 8 to 20 feet thick. They have a surface layer of grayish-brown to light brownish-gray silt loam and a subsoil of light brownish-gray silty clay loam. A concentration of sodium and magnesium begins about 14 inches below the surface. The slope range is 0 to 2 percent.

Foley soils are adjacent to the somewhat poorly drained Calloway and the poorly drained Alligator soils. They lack the fragipan that is typical of Calloway soils. They are lighter gray and less clayey than Alligator soils. Foley soils are intermingled with Grubbs soils, but they are less clayey than those soils.

In this county Foley soils are mapped only as part of an undifferentiated group with Grubbs soils.

Profile of Foley silt loam, 0 to 2 percent slopes, in a moist cultivated area in the NW¼NW¼SW¼ sec. 6, T. 7 N., R. 1 E.:

Ap—0 to 6 inches, grayish-brown (10YR 5/2) silt loam; weak, fine, granular structure; very friable; few roots; few, fine, hard concretions; slightly acid; abrupt, smooth boundary.

A2—6 to 13 inches, light brownish-gray (2.5Y 6/2) silt loam; few, medium, distinct mottles of yellowish brown; weak, fine, subangular blocky structure; friable or firm; most peds coated with gray silt; few fine pores and roots; few, small, dark-colored, soft concretions; very strongly acid; gradual, smooth boundary.

B21t—13 to 25 inches, light brownish-gray (2.5Y 6/2) silty clay loam; few, medium, distinct mottles of brownish yellow; weak, medium and coarse, subangular blocky structure; firm; many peds coated with light-gray (10YR 7/1) silt; thin clay films in pores and on peds; slightly acid; gradual, smooth boundary.

B22t—25 to 38 inches, light brownish-gray (2.5Y 6/2) silty clay loam; common, medium, distinct mottles of yellowish brown and common, medium, distinct mottles of dark yellowish brown; moderate, medium to coarse, angular blocky structure; firm; few thin clay films; few peds coated with black and gray; few, dark-colored, soft concretions; mildly alkaline; gradual, wavy boundary.

B23t—38 to 72 inches +, gray (10YR 6/1) silt loam; many, medium, distinct mottles of dark yellowish brown; moderate, medium and coarse, prismatic structure; firm; brittle; few peds coated with black and gray; few thin clay films; many fine pores; moderately alkaline.

In a few places the Ap horizon is dark grayish brown (10YR 4/2). The B horizon is grayish brown in a few places and has relict cortices filled with gray (10YR 7/1) silt in some places. The depth to the horizons in which sodium is concentrated is about 14 inches, and the depth to the horizons that are alkaline in reaction ranges from 15 to 30 inches.

Foley and Grubbs silt loams, 0 to 2 percent slopes (FgA).—These soils were mapped in an undifferentiated group because they have similar characteristics and are much alike in management needs. Most areas of the mapping unit include both soils, but some areas consist entirely of one or the other. Generally, Foley and Grubbs soils are in the central and the northwestern parts of the county. Some of the areas mapped include small spots of Alligator soils, and others include spots of Calloway soils.

Foley soils have a 6-inch surface layer of grayish-brown silt loam and a subsoil of light brownish-gray silty clay loam mottled with yellowish brown. Grubbs soils have a thin surface layer of dark grayish-brown or grayish-brown silt loam and a subsoil of light brownish-gray or grayish-brown silty clay loam. A profile of Grubbs silt loam is described in detail under the heading "Grubbs Series."

These soils are moderate in natural fertility. They are acid in the upper layers but have, in the subsoil, alkaline layers that are high in sodium and magnesium. The available water capacity is moderate to low, depending on the depth to the alkaline layers. Runoff is slow, and wetness is a severe hazard.

These soils are fairly well suited to crops, although the sodium-affected layers restrict the root zone and limit the available water capacity. The response to lime and fertilizer is fair. Farming operations have to be delayed several days after a rain, unless drainage has been provided.

If grading or smoothing is needed, the depth to the sodium-affected layers should be determined before cuts are made. If sodium-affected material is brought too near the surface, productivity is impaired. (Capability unit IIIw–5; woodland group 10; wildlife group 1)

Grenada Series

The Grenada series consists of moderately well drained, slowly permeable soils on the tops and side slopes of low ridges. These soils formed in a layer of loess 8 to 20 feet thick. They have a surface layer of brown, grayish-brown, or dark grayish-brown silt loam and a subsoil of yellowish-brown silt loam to silty clay loam. Below this is a fragipan. The slope range is 1 to 3 percent.

Grenada soils are on the loessal plains west of Crowley Ridge. They are adjacent to the moderately well drained to well drained Loring soils and the somewhat poorly drained Calloway soils. They are grayer than Loring soils, and they have a more strongly developed fragipan. Grenada soils are browner in the upper part of the profile than Calloway soils, and they lack the gray mottles in the upper part of the B horizon that are typical of Calloway soils.

Profile of Grenada silt loam, 1 to 3 percent slopes, in a moist cultivated area in the SW¼SW¼SE¼ sec. 25, T. 8 N., R. 1 E.:

Ap1—0 to 4 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; very friable; common roots; strongly acid; abrupt, smooth boundary.

Ap2—4 to 8 inches, brown (10YR 5/3) silt loam; few, medium and fine, faint mottles of yellowish brown; weak, medium and fine, subangular blocky structure; friable; common roots; few pores; few, small, dark-colored, hard concretions; strongly acid; abrupt, smooth boundary.

B1—8 to 15 inches, yellowish-brown (10YR 5/4) heavy silt loam; common, medium, faint mottles of brown; weak, medium, subangular blocky structure; friable; few roots and pores; few, small, dark-colored, hard concretions; very strongly acid; smooth boundary.

B2t—15 to 25 inches, yellowish-brown (10YR 5/6) silty clay loam; few, fine, faint mottles of strong brown; moderate, medium and fine, subangular blocky structure; firm; brown (10YR 5/3) coatings on some peds; few, small, dark-colored, hard concretions; some pores lined with clay; patchy clay films; very strongly acid; clear, smooth boundary.

A'2x—25 to 32 inches, light brownish-gray (10YR 6/2) silt loam; common, medium, distinct mottles of dark brown and yellowish brown; weak, medium, subangular blocky structure; friable or firm; compact and somewhat brittle; continuous light-gray (10YR 7/1) silt coatings on peds; cracks filled with light-gray (10YR 7/1) silt; few, small, dark-colored, soft and hard concretions; very strongly acid; abrupt, wavy boundary.

B'x1—32 to 42 inches, grayish-brown (10YR 5/2) silty clay loam; many, coarse, distinct mottles of yellowish brown (10YR 5/6); weak, coarse, prismatic macrostructure that breaks into weak, medium, subangular blocky microstructure; firm; compact and brittle; common patchy clay films; few cracks filled with light-gray (10YR 7/1) silt; crushed mass lighter in color; very strongly acid; clear, smooth boundary.

B'x2—42 to 54 inches, coarsely mottled light brownish-gray (10YR 6/2), yellowish-brown (10YR 5/6), and dark yellowish-brown (10YR 4/4) silt loam; weak, coarse, prismatic macrostructure that breaks into weak, medium, subangular blocky microstructure; firm; compact and brittle; crushed mass lighter in color; very strongly acid; diffuse boundary.

C—54 to 82 inches +, mottled brown (10YR 5/3) and grayish-brown (10YR 5/2) silt loam; medium, distinct mottles; massive; very friable; few, small, dark-colored, soft concretions; very strongly acid.

The Ap horizon is brown (10YR 4/3), dark grayish brown (10YR 4/2), or grayish brown (10YR 5/2) and is 4 to 8 inches thick. The B horizon is 15 to 25 inches thick. The depth to the A'2x horizon is 22 to 30 inches.

Grenada silt loam, 1 to 3 percent slopes (GrB).—This soil has a 6-inch surface layer of dark grayish-brown silt loam and a subsoil of yellowish-brown silty clay loam. At a depth of 22 to 30 inches is a mottled fragipan. A few small spots of Loring and Calloway soils were included in mapping.

The fragipan restricts the growth of roots and the movement of water but does not seriously affect productivity or choice of plants. Runoff is medium. The available water capacity is moderate, and reaction is strongly acid to very strongly acid. Erosion is a hazard.

This soil is suited to crops. It is easily kept in good tilth. (Capability unit IIe–2; woodland group 8; wildlife group 2)

Grenada silt loam, 1 to 3 percent slopes, eroded (GrB2).—This soil has a 4-inch surface layer of grayish-brown silt loam and a subsoil of yellowish-brown silty clay loam. A mottled fragipan begins at a depth of 20 to 28 inches. Erosion has removed some of the original surface layer and exposed patches of subsoil. Small rills are common after rains. In some places plowing has mixed the original surface layer with part of the subsoil. A few small spots of Loring and Calloway soils were included in mapping.

Runoff is medium, and erosion is a hazard. The fragipan restricts the growth of roots and the movement of water but does not seriously affect productivity or the choice of plants. The available water capacity is moderate, reaction is strongly acid to very strongly acid, and natural fertility is moderate.

This soil is suited to crops, but the surface soil tends to puddle easily because the organic-matter content is low and the structure weak. Tilth is somewhat difficult to maintain. (Capability unit IIe–2; woodland group 8; wildlife group 2)

Grubbs Series

The Grubbs series consists of somewhat poorly drained, very slowly permeable soils. These soils formed in clayey sediments. They have a thin surface layer of silt loam and a subsoil of light brownish-gray to grayish-brown silty clay loam. A strong concentration of sodium and magnesium begins about 14 inches below the surface.

Grubbs soils are associated with Alligator soils and, in places, are intermingled with Foley soils. They are less clayey and better drained than Alligator soils, which lack a B horizon.

The Grubbs soils in Cross County are mapped only as part of an undifferentiated group with Foley soils. This mapping unit is described under the heading "Foley Series."

Profile of Grubbs silt loam, 0 to 2 percent slopes, in a moist cultivated area in the SW¼NE¼SW¼ sec 5, T. 9 N., R. 1 E.:

Ap—0 to 4 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; common roots; few, small, dark-colored, hard concretions; slightly acid; abrupt, smooth boundary.

B21t—4 to 9 inches, light brownish-gray (10YR 6/2) silty clay loam; common, fine, distinct mottles of yellowish brown and few, medium, distinct mottles of dark brown; moderate, medium, angular blocky structure; firm when moist and slightly sticky when wet; common patchy clay films; common roots; few pores; slightly acid; gradual, smooth boundary.

B22t—9 to 17 inches, grayish-brown (10YR 5/2) silty clay loam; few, fine, faint mottles of yellowish brown; moderate, medium, angular blocky structure; firm; common patchy and few continous clay films; continuous gray (10YR 7/1) silt coatings on peds; few, small, dark-colored, hard concretions; medium acid; clear, smooth boundary.

B23t—17 to 26 inches, grayish-brown (10YR 5/2) silty clay; few, medium and fine mottles of yellowish brown and dark brown; moderate, coarse, prismatic structure; very firm when moist and slightly sticky when wet; common patchy clay films; black coatings on some peds; mildly alkaline; clear, smooth boundary.

C—26 to 48 inches +, grayish-brown (10YR 5/2) silty clay loam; common, medium, distinct mottles of yellowish brown; massive; firm; few crevices lined with brown clay; black coatings on some peds; irregular, coarse, black concretions; mildly alkaline.

The Ap horizon is dark grayish brown (10YR 4/2) or grayish brown (10YR 5/2) in color and strongly acid to neutral in reaction. The B and C horizons are gray (10YR 5/1 or 5Y 5/1) to light brownish-gray (10YR 6/2) silty clay or silty clay loam. Sodium-affected material begins about 14 inches below the surface.

Gullied Land

Gullied land (Gu) occurs throughout the county but is most common on Crowley Ridge (fig. 5). This land type consists of severely eroded areas that originally were made up of Loring and Memphis soils, which were derived from thick deposits of loess.

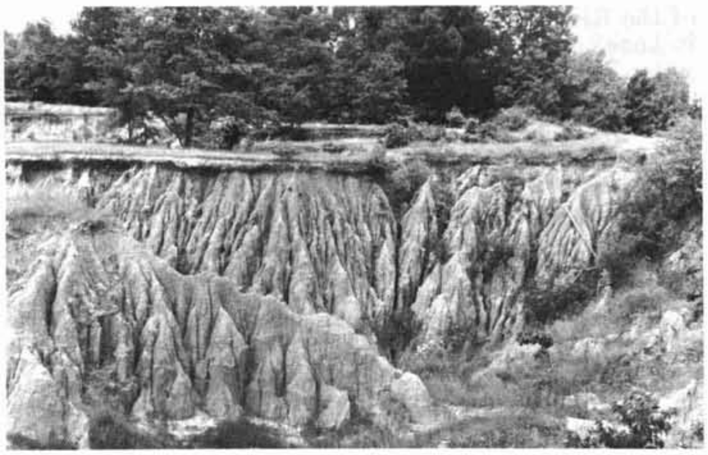

Figure 5.—**Gullied land on Crowley Ridge.**

The surface is a network of gullies a few feet to many feet deep. Between the gullies, erosion has removed most of the surface layer of the original soil and has exposed the subsoil, which is brown silt loam or silty clay loam in texture.

The present surface material puddles easily because it has poor structure. Runoff is very rapid, and the hazard of erosion is very severe.

This land type was cultivated for many years, but it cannot be used for cropland now unless the gullies are filled and smoothed. It is best suited to woodland or to use as wildlife shelter areas. The surface is too irregular for the use of farm machinery. Most of the acreage is idle or in brush or pasture. (Capability unit VIIe–1; woodland group 11; wildlife group 2)

Henry Series

The Henry series consists of poorly drained, very slowly permeable soils in broad level areas and slight depressions. These soils formed in a layer of loess 8 to 20 feet thick. They have a surface layer of gray silt loam and a subsoil of gray silty clay loam over grayish-brown silty clay loam. The lowest part of the B horizon is a fragipan.

Henry soils are on the loessal plains west of Crowley Ridge. They are commonly adjacent to the moderately well drained Grenada soils and the somewhat poorly drained Calloway soils, but they are grayer in the subsoil and more poorly drained than those soils.

Profile of Henry silt loam in a moist cultivated area in the NW¼NE¼NE¼ sec. 8, T. 8 N., R. 1 E.:

Ap—0 to 4 inches, gray (10YR 5/1) silt loam; common, medium, distinct mottles of yellowish brown along root channels; weak, fine, granular structure; friable; many roots; few fine pores; few, fine, dark-colored, soft and hard concretions; medium acid; abrupt, smooth boundary.

A2g—4 to 17 inches, gray (10YR 6/1) silt loam; common fine root channels coated with yellowish brown (10YR 5/8); weak, fine, angular blocky structure; friable; few fine pores; very strongly acid; gradual, smooth boundary.

B21tg—17 to 24 inches, gray (10YR 6/1) light silty clay loam; common, medium, distinct mottles of yellowish brown; weak, fine and medium, subangular blocky structure; firm; patchy clay films on most peds and in pores; very strongly acid; clear, wavy boundary.

B22tg—24 to 31 inches, grayish-brown (2.5Y 5/2) silty clay loam; common, medium, distinct mottles of light olive brown; weak, coarse, subangular blocky structure; firm; common patchy clay films; few fine roots; few cracks filled with gray silt; few peds coated with gray silt; very strongly acid; clear, wavy boundary.

Bxg—31 to 52 inches +, grayish-brown (2.5Y 5/2) silty clay loam; few to common, medium, distinct mottles of yellowish brown; poorly defined polygonal structure to massive; breaks into irregular angular fragments; very firm; compact and brittle; difficult to dig with handtools; few streaks of gray that suggest polygonal faces; few, hard, black concretions; very strongly acid.

In the uppermost 6 inches of the profile, these soils have yellowish-brown mottles that are more numerous and more distinct in irrigated areas than in nonirrigated areas. The Ap horizon ranges from grayish brown (10YR 5/2) to dark gray (10YR 4/1) in color and from 4 to 10 inches in thickness. The B horizon is grayish-brown (2.5Y 5/2) to gray (10YR 6/1) silt loam or silty clay loam mottled with yellowish brown, dark brown, and olive brown. These mottles are few to many in number and distinct to prominent in contrast. The depth to the Bxg horizon ranges from 23 to 36 inches.

Henry silt loam (0 to 1 percent slopes) (He).—This soil has a 4- to 10-inch surface layer of gray silt loam and a subsoil of gray silty clay loam mottled with yellowish brown. Beginning at a depth of 23 to 36 inches is a mottled fragipan. A few small spots of Grenada and Calloway soils were included in mapping.

Runoff is very slow, and infiltration of water is very slow. The available water capacity is moderate, reaction is medium acid to very strongly acid, and natural fertility is moderately low.

If drained this soil is suited to crops. Farming operations commonly have to be delayed several days after a rain, unless drainage has been provided. Tilth is easy to maintain. (Capability unit IIIw–3; woodland group 9; wildlife group 1)

Hillemann Series

The Hillemann series consists of somewhat poorly drained, slowly permeable soils that formed in a thick layer of loess. They have a surface layer of dark grayish-brown to light brownish-gray silt loam. The upper part of the subsoil is light brownish-gray silt loam mottled with yellowish brown, the middle part is gray silty clay loam mottled with red, and the lower part is brown to light brownish-gray, mottled silt loam or silty clay loam. The lower part of the subsoil contains a moderately large amount of sodium and magnesium. The slope range is 0 to 3 percent.

Hillemann soils are on the plains in the western part of the county. They are adjacent to Calloway, Grenada, and Zachary soils, none of which have concentrations of sodium and magnesium. Hillemann soils lack the fragipan that is characteristic of Calloway and Grenada soils, and they are grayer and more poorly drained than Grenada soils. They are at higher elevations than the gray, poorly drained Zachary soils, which are on flood plains. Hillemann soils are intermingled with Crowley soils. The upper part of their B horizon is less clayey than that of Crowley soils, and the lower part contains a moderately large amount of sodium, which Crowley soils do not have.

The Hillemann soils in Cross County are mapped only as parts of two undifferentiated groups with Crowley soils. These mapping units are described under the heading "Crowley Series."

Profile of Hillemann silt loam, 0 to 1 percent slopes, in a moist cultivated area in the SE¼NW¼SE¼ sec. 18, T. 7 N., R. 2 E.:

Ap1—0 to 3 inches, dark grayish-brown (10 YR 4/2) silt loam; few, medium, distinct mottles of dark yellowish brown and faint mottles of grayish brown; weak, fine, granular structure; very friable; abundant roots; few pores; few, small, dark-colored, hard concretions; medium acid; abrupt, smooth boundary.

Ap2—3 to 7 inches, grayish-brown (10YR 5/2) silt loam; common, medium, distinct mottles of dark yellowish brown; weak, fine, granular structure; very friable; abundant roots; few pores; few, small, dark-colored, hard concretions; medium acid; abrupt, smooth boundary.

A21g—7 to 12 inches, light brownish-gray (10YR 6/2) silt loam; common, medium, distinct mottles of brownish yellow and dark yellowish brown; weak, fine, granular structure; very friable; common roots; few pores; few, small, dark-colored, hard concretions; strongly acid; abrupt, smooth boundary.

B1—12 to 15 inches, light brownish-gray (10YR 6/2) silt loam; common, medium, distinct mottles of yellowish brown; weak, fine, granular structure; friable when moist and slightly sticky or slightly plastic when wet; roots and pores common; common, dark-colored, soft and hard concretions; strongly acid; abrupt, wavy boundary.

B21tg—15 to 21 inches, gray (10YR 6/1) silty clay loam; many, medium, distinct mottles of red; weak, medium, prismatic structure breaking to moderate, medium, angular blocky; tongues of gray silt penetrating 1 inch to 3 inches between some prisms; very firm; few roots and pores; many, medium, patchy films and some continuous clay films on ped surfaces and lining the pores; few, small, dark-colored, soft and hard concretions; strongly acid; clear, wavy boundary.

B22t—21 to 33 inches, brown (10YR 5/4) silty clay loam; common, medium, distinct mottles of dark yellowish brown and few, fine, faint mottles of yellowish brown; moderate, medium, subangular blocky structure; firm; few roots; few fine pores; common, small, dark-colored, soft concretions; strongly acid; gradual, smooth boundary.

B3—33 to 48 inches +, light brownish-gray (10YR 6/2) heavy silt loam; common, medium, distinct mottles of yellowish brown and dark yellowish brown; weak, medium and fine, angular blocky structure; friable; black coatings on some root channels; common, small, dark-colored, soft concretions; medium acid.

The Ap horizon is dark grayish brown (10YR 4/2) to brown (10YR 5/3) or grayish brown (10YR 5/2) and, in areas that have been leveled for irrigation, light brownish gray (10YR 6/2). Although generally free of mottles, it is mottled in areas that have been irrigated. In some of these areas, it is neutral in reaction. The depth to the B21tg horizon ranges from 10 to 18 inches. This horizon is 6 to 12 inches thick. The B22t horizon is brown (10YR 5/3), grayish brown (10YR 5/2), or light brownish gray (10YR 6/2). Its texture is silt loam in some areas. The B3 horizon ranges to grayish brown (10YR 5/2 or 2.5Y 5/2) in color, is silty clay loam or silt loam in texture, and ranges from strongly acid to neutral in reaction.

Iuka Series

The Iuka series consists of moderately well drained, moderately permeable soils on alluvial fans. These soils have a dark-brown to dark grayish-brown surface layer and a subsoil of yellowish-brown fine sandy loam over light-gray very fine sandy loam. The slope range is 0 to 8 percent.

Iuka soils are along the eastern foot slopes of Crowley Ridge and along the streams that drain the eastern part of the Ridge. They are adjacent to the well-drained Ochlockonee and the somewhat poorly drained Mantachie soils. They are less well drained than Ochlockonee soils, and they have a grayer subsoil. Iuka soils are better drained than Mantachie soils, and they have a less gray subsoil.

Profile of Iuka loam, 0 to 1 percent slopes, in a moist cultivated area in the SW¼NE¼ sec. 4, T. 9 N., R. 4 E.:

Ap1—0 to 5 inches, dark grayish-brown (10YR 4/2) loam; weak, fine, granular structure; very friable; common roots; slightly acid; abrupt, smooth boundary.

Ap2—5 to 10 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, medium, subangular blocky structure that breaks into weak, fine, granular structure; friable; compact plowpan; few, small, dark-colored, hard concretions; strongly acid; clear, smooth boundary.

C1—10 to 22 inches, yellowish-brown (10YR 5/4) fine sandy loam; few, medium and fine, faint mottles of dark yellowish brown throughout; few, medium, faint mottles of grayish brown in lower part; massive in place, breaks into weak, fine, granular fragments; very friable; few roots; common pores; few, small, dark-colored, soft concretions; strongly acid; clear, smooth boundary.

C2g—22 to 46 inches +, light-gray (10YR 7/1) very fine sandy loam; common, coarse, distinct mottles of dark brown (10YR 4/3) and few, coarse, distinct mottles of yellowish brown (10YR 5/6); massive in place but breaks into weak, fine, granular fragments; very friable; common, dark-colored, soft concretions; very strongly acid.

The Ap horizon is dark grayish-brown (10YR 4/2) or grayish-brown (10YR 5/2) loam to loamy fine sand 6 to 10 inches thick. In some places the C horizon consists of thinly stratified silt loam, loam, and fine sandy loam. The depth to the C2g horizon ranges from 18 to 30 inches.

Iuka loam, 0 to 1 percent slopes (IuA).—This soil has a 7-inch surface layer of dark grayish-brown loam and a stratified subsoil of loam, very fine sandy loam, and fine sandy loam. The upper part of the subsoil is yellowish brown, and the lower part is light gray mottled with dark grayish brown and dark brown. A few spots of Ochlockonee and Mantachie soils were included in mapping.

Except where there is a plowpan, the infiltration of water is moderate. Reaction is strongly acid to very strongly acid, and natural fertility is moderate.

This soil is well suited to crops. It warms up early in spring, so early planting is possible. Tilth is easy to maintain. (Capability unit I-1; woodland group 1; wildlife group 3)

Iuka loam, gently undulating (0 to 3 percent slopes) (IuB).—This soil is on foot slopes. It has a 7-inch surface layer of dark grayish-brown loam and a stratified subsoil of loam, very fine sandy loam, and fine sandy loam. The upper part of the subsoil is yellowish brown, and the lower part is light gray mottled with yellowish brown and brown. A few small spots of Ochlockonee and Mantachie soils were included in mapping.

Runoff is slow, and the infiltration of water is moderate. Reaction is strongly acid to very strongly acid, and natural fertility is moderate. Erosion is a hazard.

This soil is well suited to crops. It warms up early in spring, so early planting is possible. Tilth is easy to maintain. (Capability unit IIe-1; woodland group 1; wildlife group 3)

Iuka soils, local alluvium, 1 to 3 percent slopes (IvB).—These soils have a 5-inch surface layer of grayish-brown loam to loamy fine sand and a thinly stratified subsoil of loam, fine sandy loam, and loamy sand. The upper part of the subsoil is brown or yellowish brown, and the lower part is gray or grayish brown mottled with yellowish brown. A few small spots of Ochlockonee soils were included in mapping.

Runoff is medium, and the infiltration of water is moderate. Natural fertility is moderate, and reaction is strongly acid to very strongly acid. Erosion is a hazard.

These soils are well suited to crops. They warm up early in spring, so early planting is possible. Tilth is easy to maintain. (Capability unit IIe-1; woodland group 1; wildlife group 3)

Iuka soils, local alluvium, 3 to 8 percent slopes (IvC).—These soils have a 4-inch surface layer of grayish-brown loam to loamy fine sand and a thinly stratified subsoil of loam, loamy sand, fine sandy loam, and silt loam. The upper part of the subsoil is brown or yellowish brown, and the lower part is gray or grayish brown mottled with yellowish brown. A few spots of Ochlockonee soils were included in mapping.

Runoff is moderately rapid, and the infiltration of water is moderate. Reaction is strongly acid to very strongly acid, and natural fertility is moderate. Erosion is a hazard.

These soils warm up early in spring, so early planting is possible. Tilth is easy to maintain. Under careful management, cultivated crops can be grown. (Capability unit IIIe-1; woodland group 1; wildlife group 3)

Lexington Series

The Lexington series consists of well-drained, moderately permeable soils that formed in loess 2½ to 3½ feet thick underlain by sandy, river-deposited sediments many feet thick. These soils have a surface layer of dark-brown silt loam and a subsoil of reddish-brown and yellowish-red silty clay loam. Below this is reddish-brown very fine sandy loam. The slope range is 3 to 8 percent.

Lexington soils are on the tops and sides of ridges on the loessal plains west of Crowley Ridge. They are adjacent to the moderately well drained Providence, the somewhat poorly drained Calloway, and the poorly drained Henry soils. They lack the fragipan that is characteristic of Providence, Calloway, and Henry soils. Lexington soils are better drained than Providence soils and have fewer mottles in the B horizon. They are better drained than Calloway and Henry soils, and they formed in thin loess underlain by sandy sediments rather than in thick loess.

Profile of Lexington silt loam, 3 to 8 percent slopes, eroded, in a moist cultivated area in the SW¼NE¼NW¼ sec. 22, T. 8 N., R. 1 E.:

Ap1—0 to 2 inches, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure; very friable; abundant roots; common pores; slightly acid; abrupt, smooth boundary.

Ap2—2 to 7 inches, dark-brown (10YR 4/3) silt loam; weak, medium and fine, subangular blocky structure; very friable; roots and pores common; few, small, dark-colored, hard concretions; slightly acid; clear, smooth boundary.

B1—7 to 10 inches, strong-brown (7.5YR 5/6) heavy silt loam; weak, medium and fine, subangular blocky structure; friable; common roots; few pores; some root holes filled with dark-brown (10YR 4/3) silt; very strongly acid; clear, smooth boundary.

B21t—10 to 18 inches, reddish-brown (5YR 5/4) silty clay loam; moderate, medium, subangular blocky structure; firm; few roots and pores; common patchy and few continuous clay films; some vertical ped surfaces coated with light brownish-gray (10YR 6/2) silt; strongly acid; gradual, smooth boundary.

B22t—18 to 32 inches, yellowish-red (5YR 4/6) silty clay loam; moderate, medium and fine, subangular blocky structure; firm; few roots and pores; common patchy clay films; some peds coated with very dark grayish-brown (10YR 3/2) silt; very strongly acid; clear, smooth boundary.

IIB3—32 to 45 inches +, reddish-brown (5YR 5/4) very fine sandy loam; few, medium, distinct mottles of light brownish gray; weak, coarse, subangular blocky structure; friable; few roots; strongly acid.

The Ap horizon ranges from 5 to 8 inches in thickness and is dark brown (10YR 3/3) to brown (10YR 5/3) in color. The B2t horizon is 18 to 32 inches thick. The B21t horizon ranges from brown (10YR 4/3) to reddish brown (5YR 4/4) in color, and the B22t from brown (10YR 4/3) to yellowish red (5YR 4/6) or reddish brown (5YR 4/4 or 5YR 5/4). The IIB3 horizon ranges from reddish brown to yellowish red or strong brown in color and from very fine sandy loam to sandy clay in texture. The depth to this horizon ranges from 30 to 42 inches.

Lexington silt loam, 3 to 8 percent slopes, eroded (LeC2).—The surface layer of this soil is dark-brown or brown silt loam 5 to 8 inches thick, and the upper part of the subsoil is reddish-brown and yellowish-red silty clay loam. Erosion has removed some of the surface layer and has exposed patches of subsoil. Small rills are common after rain. In most places the original surface layer has been mixed with part of the subsoil in plowing. A few small spots of Providence soils were included in mapping.

This soil puddles easily because it is low in organic-matter content and has weak structure. Runoff is rapid, and the erosion hazard is severe. The available water capacity is moderate, reaction is medium acid to very strongly acid, and natural fertility is moderate.

Under careful management, most of the common crops can be grown. Tilth is somewhat difficult to maintain. (Capability unit IIIe-2; woodland group 5; wildlife group 2)

Loring Series

The Loring series consists of moderately well drained to well drained, moderately permeable soils on the tops and sides of ridges. These soils formed in a layer of loess 8 to 20 feet thick (fig. 6). They have a surface layer of grayish-brown, dark grayish-brown, or dark yellowish-brown silt loam and a subsoil of brown silt loam over yellowish-brown silty clay loam. Below this is a weak fragipan. The slope range is 1 to 45 percent.

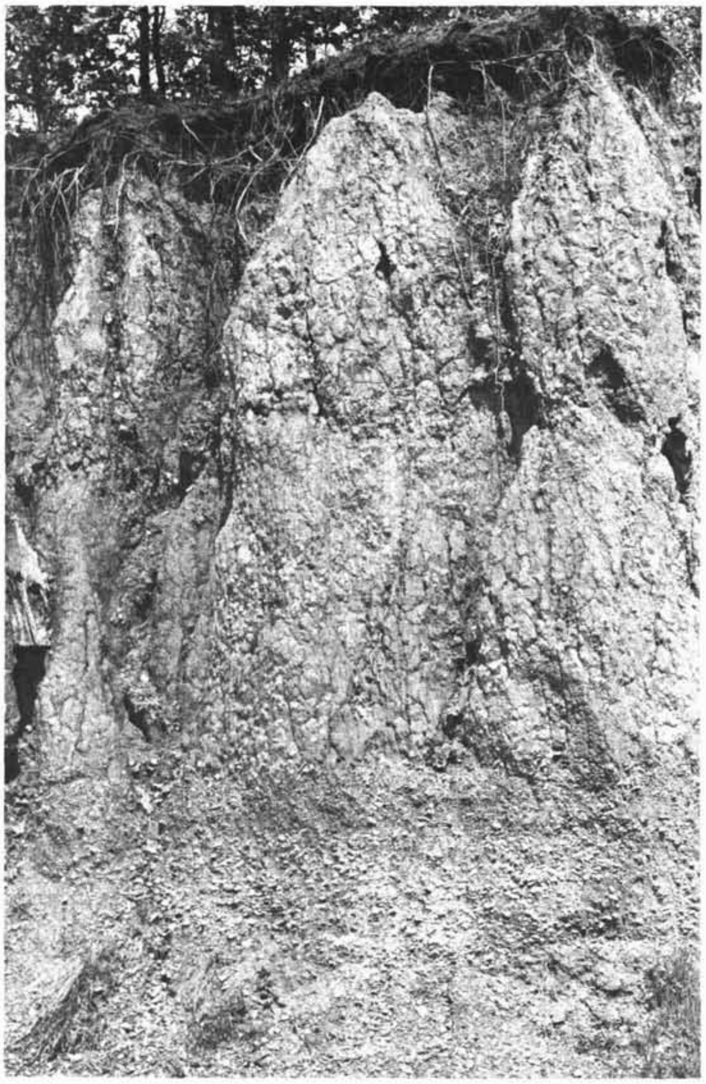

Figure 6.—**Profile of Loring silt loam that formed in about 15 feet of loess.**

Loring soils are adjacent to Memphis, Grenada, and Calloway soils. They have a fragipan, which Memphis soils lack. They lack the bleached A'2 horizon that is typical of Grenada soils, and they have a weaker fragipan than Grenada soils. They are browner in the subsoil than Calloway soils, have a weaker fragipan, and lack the gray mottling in the upper part of the B horizon.

Profile of Loring silt loam, 3 to 8 percent slopes, eroded, in a moist cultivated area in the NE¼SW¼NW¼ sec. 28, T. 7 N., R. 2 E.:

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

B1—5 to 10 inches, brown (10YR 4/3) heavy silt loam; weak, medium and fine, subangular blocky structure; friable; common roots; few pores; strongly acid; clear, smooth boundary.

B2t—10 to 30 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, medium and fine, subangular blocky structure; firm; common patchy clay films; few roots; few pores; few, small, dark-colored, hard concretions; very strongly acid; clear, smooth boundary.

Bx1—30 to 34 inches, yellowish-brown (10YR 5/4) heavy silt loam; common, medium, distinct mottles of gray; weak, medium, subangular blocky structure; firm; compact and brittle; common patchy clay films; common, small, dark-colored, soft and hard concretions; few roots; very strongly acid; clear, smooth boundary.

Bx2—34 to 48 inches +, dark yellowish-brown (10YR 4/4) silt loam; common, medium, distinct mottles of gray; weak, medium, subangular blocky structure; firm; compact and brittle; common patchy clay films; common, medium, soft and hard concretions; few small roots; very strongly acid.

The Ap horizon is dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), or yellowish brown (10YR 5/4). The B2t horizon ranges from yellowish brown (10YR 5/4) to brown (7.5YR 5/4). The depth to the Bx horizon ranges from 24 to 36 inches. Below the Ap horizon, the reaction is strongly acid to very strongly acid.

Loring silt loam, 1 to 3 percent slopes (LgB).—This soil has a 5-inch surface layer of dark grayish-brown silt loam and a subsoil of brown or yellowish-brown silty clay loam. A mottled fragipan begins at a depth of 30 to 36 inches. A few small spots of Grenada soils were included in mapping.

The fragipan restricts the growth of roots and the movement of water but does not affect productivity or the choice of plants. Runoff is medium. The available water capacity is moderate, reaction is strongly acid to very strongly acid, and natural fertility is moderate. Erosion is a hazard.

This soil is well suited to crops (fig. 7). Tilth is easy to maintain. (Capability unit IIe-2; woodland group 8; wildlife group 2)

Figure 7.—**A cover crop of vetch in a peach orchard on Loring silt loam, 1 to 3 percent slopes.**

Loring silt loam, 1 to 3 percent slopes, eroded (LgB2).—This soil has a 5-inch surface layer of grayish-brown silt loam and a subsoil of brown or yellowish-brown silty clay loam. A mottled fragipan begins at a depth of 27 to 33 inches. Erosion has removed some of the original surface layer and exposed patches of subsoil. There are a few shallow gullies, and small rills are common after rain. In some places plowing has mixed the original surface layer with part of the subsoil. A few small spots of Grenada soils were included in mapping.

The surface layer puddles easily because it is low in organic-matter content and has weak structure. The fragipan restricts the growth of roots and the movement of water but does not seriously affect productivity or the choice of plants. Runoff is medium. The available water capacity is moderate, reaction is strongly acid to very strongly acid, and natural fertility is moderate. Erosion is a hazard. (Capability unit IIe-2; woodland group 8; wildlife group 2)

Loring silt loam, 3 to 8 percent slopes (LgC).—This soil has a 5-inch surface layer of grayish-brown silt loam and a subsoil of brown or yellowish-brown silty clay loam. A mottled fragipan begins at a depth of 24 to 30 inches. A few small spots of Memphis soils were included in mapping.

The fragipan restricts the growth of roots and the movement of water but does not seriously affect productivity or the choice of plants. Runoff is rapid, and erosion is a hazard. The available water capacity is moderate, reaction is strongly acid to very strongly acid, and natural fertility is moderately low.

If well managed this soil is suited to crops. Tilth is easy to maintain. (Capability unit IIIe-2; woodland group 5; wildlife group 2)

Loring silt loam, 3 to 8 percent slopes, eroded (LgC2).—This soil has a 4-inch surface layer of dark yellowish-brown silt loam and a subsoil of brown and yellowish-brown silty clay loam. A mottled fragipan begins at a depth of 24 to 30 inches. Erosion has removed some of the original surface layer, and there are a few shallow gullies. In some places plowing has mixed the original surface layer with part of the subsoil. A few small spots of Memphis soils were included in mapping.

The surface layer puddles easily because it is low in organic-matter content and has weak structure. The fragipan restricts the growth of roots and the movement of water but does not seriously affect productivity or the choice of plants. Runoff is rapid, and erosion is a hazard. The available water capacity is moderate, reaction is strongly acid to very strongly acid, and natural fertility is moderately low.

If well managed this soil is suited to crops (fig. 8). Tilth is somewhat difficult to maintain. (Capability unit IIIe-2; woodland group 5; wildlife group 2)

***Figure 8.*—A cover crop of bermudagrass and ryegrass on Loring silt loam, 3 to 8 percent slopes, eroded.**

Loring silt loam, 8 to 12 percent slopes, eroded (LgD2).—This soil has a 4-inch surface layer of dark yellowish-brown silt loam and a subsoil of yellowish-brown silty clay loam. A fragipan begins at a depth of 24 to 30 inches. Erosion has removed some of the original surface layer and exposed patches of subsoil. There are a few shallow gullies, and small rills are common after rain. In some places plowing has mixed the original surface layer with part of the subsoil. A few small spots of Memphis soils and Gullied land were included in mapping.

The surface layer puddles easily because it is low in organic-matter content and has weak structure. The fragipan restricts the growth of roots and the movement of water but does not seriously affect productivity or the choice of plants. Runoff is very rapid, and the hazard of erosion is high. The available water capacity is moderate, reaction is strongly acid to very strongly acid, and natural fertility is moderately low.

This soil is not well suited to cultivated crops because of the erosion hazard, but it is suitable for pasture and woodland. It is also suitable for peach orchards, provided the trees are planted on contour ridges. Tilth is somewhat difficult to maintain. (Capability unit IVe-1; woodland group 5; wildlife group 2)

Loring and Memphis silt loams, 12 to 20 percent slopes (LmE).—The soils in this group have a dark-brown or grayish-brown surface layer about 5 inches thick and a subsoil of brown or yellowish-brown silty clay loam. In the Loring soils there is a fragipan at a depth of 30 to 36 inches. A few small areas of steeper soils were included in mapping.

Runoff is very rapid, and the hazard of erosion is high. The available water capacity is moderate, reaction is strongly acid to very strongly acid, and natural fertility is moderately low.

These soils are not suited to cultivated crops, but they are suitable for pasture and woodland. Tilth is easy to maintain. (Capability unit VIe-1; woodland group 7; wildlife group 2)

Loring and Memphis silt loams, 12 to 20 percent slopes, eroded (LmE2).—The soils in this group have a 4-inch surface layer of dark-brown silt loam and a subsoil of brown or yellowish-brown silty clay loam. In the Loring soils there is a fragipan at a depth of 24 to 30 inches. Erosion has removed some of the original surface layer and exposed patches of subsoil. There are a few shallow gullies, and small rills are common after rain. In some places plowing has mixed the original surface layer with part of the subsoil. A few small spots of Gullied land were included in mapping.

The surface layer puddles easily because it is low in organic-matter content and has weak structure. Runoff is very rapid, and the hazard of erosion is high. The available water capacity is moderate, reaction is strongly acid to very strongly acid, and natural fertility is moderately low.

These soils are not suited to cultivated crops, but they are suitable for pasture and for woodland. Tilth is somewhat difficult to maintain. (Capability unit VIe-1; woodland group 7; wildlife group 2)

Loring and Memphis silt loams, 12 to 20 percent slopes, severely eroded (LmE3).—The soils in this group have a 4-inch surface layer of dark yellowish-brown silt loam and a subsoil of brown or yellowish-brown silty clay loam. In the Loring soils there is a fragipan at a depth of 24 to 30 inches. Erosion has removed most of the original surface layer and exposed the subsoil in many places. The surface layer is now a mixture of the original surface layer and part of the subsoil. Rills and shallow gullies are common. A few spots of Gullied land were included in mapping.

The surface layer puddles easily because it is low in organic-matter content and has weak structure. Runoff is very rapid, and the hazard of erosion is high. The available water capacity is moderate, reaction is strongly acid to very strongly acid, and natural fertility is moderately low.

These soils are not suited to cultivated crops, but they are suitable for pasture and for woodland. Tilth is very difficult to maintain. (Capability unit VIe–1; woodland group 11; wildlife group 2)

Loring and Memphis silt loams, 20 to 45 percent slopes (LmF).—The soils in this group have a 4-inch surface layer of grayish-brown silt loam and a subsoil of brown or yellowish-brown silty clay loam. In the Loring soil there is a fragipan at a depth of 24 to 30 inches.

Runoff is very rapid, and the hazard of erosion is high. The available water capacity is moderate, reaction is strongly acid to very strongly acid, and natural fertility is moderately low.

These soils are not suited to cultivated crops, but they are suitable for woodland and for wildlife. (Capability unit VIIe–1; woodland group 7; wildlife group 2)

Mantachie Series

The Mantachie series consists of somewhat poorly drained, moderately to moderately slowly permeable soils on flood plains. These soils formed in a mixture of sandy and silty material washed from the eastern part of Crowley Ridge. They have a surface layer of dark-brown to grayish-brown loam and a subsoil of light-gray, mottled, stratified silt loam and very fine sandy loam.

Mantachie soils are along streams that drain the eastern part of Crowley Ridge. They commonly are adjacent to the well drained Ochlockonee and the moderately well drained Iuka soils. They are grayer in the subsoil, more mottled, and less well drained than Ochlockonee and Iuka soils.

Profile of Mantachie loam in a moist cultivated area in the NW¼NW¼SE¼ sec. 3, T. 9 N., R. 4 E.:

Ap1—0 to 7 inches, dark-brown (10YR 4/3) loam; weak, fine, granular structure; very friable; abundant roots; medium acid; abrupt, smooth boundary.

Ap2—7 to 11 inches, dark-brown (10YR 4/3) very fine sandy loam; weak, medium, subangular blocky structure that breaks to weak, fine, granular; friable; lower 3 inches is a platy compact plowpan; common roots; few, small, dark-colored, hard concretions; medium acid; abrupt, smooth boundary.

C1g—11 to 19 inches, light-gray (10YR 6/1) silt loam; common, medium, distinct mottles of yellowish brown and few, medium, distinct mottles of dark yellowish brown; massive in place but breaks into weak, fine, granular fragments; roots and pores common; few, dark-colored, soft and hard concretions; strongly acid; clear, smooth boundary.

C2g—19 to 46 inches +, light-gray (10YR 6/1) very fine sandy loam; common, medium, distinct mottles of yellowish brown and common, medium, distinct mottles of dark yellowish brown; massive in place but breaks into weak, fine, granular fragments; few roots; common, small, dark-colored, soft concretions; very strongly acid.

The Ap horizon ranges from dark brown (10YR 3/3) to grayish brown (10YR 5/2) in color. The depth to the C1 horizon ranges from 8 to 14 inches. In places these soils consist of thin strata of loam, silt loam, and very fine sandy loam.

Mantachie loam (0 to 1 percent slopes) (Ma).—This soil has a 7-inch surface layer of dark-brown to grayish-brown loam and a subsoil of light-gray, stratified silt loam and very fine sandy loam mottled with yellowish brown. A few spots of Iuka and Ochlockonee soils were included in mapping.

Runoff is slow. Except where there is a plowpan, the infiltration of water is moderate to moderately slow. The available water capacity is moderate, reaction is medium acid to very strongly acid, and natural fertility is moderate.

This soil is well suited to crops, but planting may have to be delayed in spring, unless drainage has been provided. Tilth is easy to maintain. (Capability unit IIw–2; woodland group 3; wildlife group 3)

Memphis Series

The Memphis series consists of well-drained, moderately permeable soils that formed in a layer of loess 8 to 20 feet thick. They have a surface layer of dark-brown to dark grayish-brown silt loam and a subsoil of brown or yellowish-brown silty clay loam. The slope range is 12 to 45 percent.

Memphis soils are adjacent to the moderately well drained Loring soils. They are free of mottles and lack the fragipan that is typical of Loring soils.

The Memphis soils in Cross County are mapped only as a part of four undifferentiated groups with Loring soils. The mapping units are described under the heading "Loring Series."

Profile of Memphis silt loam within an area of Loring and Memphis silt loams, 12 to 20 percent slopes, in a moist wooded area of the SW¼SW¼SW¼ sec. 10, T. 6 N., R. 3 E.:

O2—¼ inch to 0, partly decomposed organic debris.

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

A2—4 to 9 inches, brown (10YR 5/3) silt loam; weak, medium and fine, subangular blocky structure; friable; common roots; strongly acid; clear, smooth boundary.

B21t—9 to 17 inches, yellowish-brown (10YR 5/4) silty clay loam; weak, medium, subangular blocky structure; friable; patchy clay films; few cracks filled with gray (10YR 5/1) silt; few pores; common roots; medium acid; clear, smooth boundary.

B22t—17 to 31 inches, brown (10YR 5/3) silty clay loam; moderate, medium, subangular blocky structure; firm; continuous clay films on most peds; few cracks filled with gray (10YR 5/1) silt; roots and pores common; medium acid; clear, smooth boundary.

B23t—31 to 45 inches, brown (7.5YR 5/4) silt loam; weak, medium, subangular blocky structure; friable; patchy clay films; dark stains on some peds; few pores; few roots; medium acid; gradual, smooth boundary.

C—45 to 54 inches +, dark-brown (7.5YR 4/4) silt loam; massive; dark stains around root channels; few roots; medium acid.

The A1 or Ap horizon ranges from dark brown (10YR 3/3) to dark grayish brown (10YR 4/2) in color and from 4 to 8 inches in thickness. The B horizon is yellowish brown (10YR

5/4) to dark yellowish brown (10YR 4/4) and brown (10YR 5/3 or 7.5YR 5/4). In some profiles there is a brown (10YR 5/3) B1 horizon 3 to 6 inches thick. The Bt horizon ranges from 36 to 50 inches in thickness and from medium acid to strongly acid in reaction. In places the C horizon is slightly acid below a depth of 50 inches.

Ochlockonee Series

The Ochlockonee series consists of level, well-drained, moderately rapidly permeable soils on flood plains. These soils formed in sandy and silty material washed from the eastern part of Crowley Ridge. They have a surface layer of dark grayish-brown loam over dark-brown very fine sandy loam and a subsoil of brown to yellowish-brown fine sandy loam.

Ochlockonee soils are along streams that drain the eastern part of Crowley Ridge. They are adjacent to Iuka and Mantachie soils. They are browner in the subsoil and better drained than Iuka and Mantachie soils.

Profile of Ochlockonee loam in a moist cultivated area in the NW¼SE¼SE¼ sec. 5, T. 9 N., R. 4 E.:

Ap1—0 to 6 inches, dark grayish-brown (10YR 4/2) loam; weak, fine, granular structure; very friable; plentiful roots; medium acid; abrupt, smooth boundary.

Ap2—6 to 11 inches, dark-brown (10YR 4/3) very fine sandy loam; compact, weak, thick, platy plowpan that breaks to weak, fine, granular structure; friable; common roots; few pores; strongly acid; clear, smooth boundary.

C1—11 to 32 inches, brown (10YR 5/3) fine sandy loam; massive; friable; few roots; very strongly acid; gradual, smooth boundary.

C2—32 to 48 inches, yellowish-brown (10YR 5/4) fine sandy loam; common, medium, distinct mottles of grayish brown; massive; very friable; few, small, dark-colored, soft concretions; very strongly acid.

The Ap horizon is dark grayish brown (10YR 4/2) or dark brown (10YR 4/3). The depth to the mottled C2 horizon ranges from 30 to 42 inches. In places, the C horizon consists of thin strata of sandy and silty sediments without regular pattern. These strata range from yellowish brown (10YR 5/4) to brown (10YR 5/3 or 7.5YR 5/4) in color.

Ochlockonee loam (0 to 1 percent slopes) (Oc).—This soil has a dark grayish-brown or dark-brown surface layer about 6 inches thick and a subsoil of brown and yellowish-brown fine sandy loam. A few spots of Iuka and Mantachie soils were included in mapping.

Except where there is a plowpan, the infiltration of water is moderately rapid. The available water capacity is moderate, reaction is medium acid to very strongly acid, and natural fertility is moderate.

This soil is suited to crops. It warms up early in spring, so early planting is possible. Tilth is easy to maintain. (Capability unit I–1; woodland group 1; wildlife group 3)

Providence Series

The Providence series consists of moderately well drained, moderately slowly permeable soils on the tops and side slopes of low ridges. These soils formed in loess 2½ to 3½ feet thick over reddish-brown, sandy, river-deposited sediments many feet thick. They have a surface layer of dark-brown silt loam over yellowish-brown silt loam and a subsoil of strong-brown silt loam over brown silty clay loam. The lower part of the B horizon is a fragipan. The substratum is reddish-brown very fine sandy loam. The slope range is 1 to 8 percent.

Providence soils are on the loessal plains. They are adjacent to Lexington soils, in insular areas surrounded by, and 10 to 25 feet higher than, Calloway and Henry soils. Providence soils are less well drained and have a more mottled subsoil than Lexington soils, which lack a fragipan. They are browner in the subsoil and better drained than Calloway and Henry soils, and they formed in thin loess over sandy strata rather than in thick loess.

Profile of Providence silt loam, 3 to 8 percent slopes, eroded, in a moist cultivated area in the NW¼NW¼NE¼ sec. 34, T. 9 N., R. 1 E.:

Ap1—0 to 3 inches, dark-brown (7.5YR 4/4) silt loam; weak, fine, granular structure; very friable; abundant roots; strongly acid; abrupt, smooth boundary.

Ap2—3 to 6 inches, brown (10YR 5/3) silt loam; weak, medium, platy structure breaking to weak, fine, granular structure; friable; compact plowpan; abundant roots; few pores; strongly acid; abrupt, smooth boundary.

B21t—6 to 13 inches, strong-brown (7.5YR 5/6) heavy silt loam; weak, medium and fine, subangular blocky structure; friable; roots and pores common; few, small, dark-colored, soft concretions; few root holes filled with dark-brown (7.5YR 4/4) silt; patchy clay films; very strongly acid; clear, smooth boundary.

B22t—13 to 21 inches, strong-brown (7.5YR 5/6) silty clay loam; few, medium, faint mottles of light brownish gray; moderate, medium, subangular blocky structure; firm; few roots; common pores; common patchy clay films and few continuous clay films; few, small, dark-colored, hard concretions; very strongly acid; gradual, wavy boundary.

IIBx1—21 to 32 inches, dark-brown (7.5YR 4/4) clay loam; common, medium, distinct mottles of light brownish gray; moderate, medium, angular blocky structure; firm; compact and brittle; most peds coated and cracks filled with light-gray (10YR 7/1) silt; black stains on some peds; ped faces darker than crushed mass; common patchy clay films; few roots and pores; few, small, dark-colored, soft and hard concretions; very strongly acid; clear, smooth boundary.

IIBx2—32 to 39 inches, reddish-brown (5YR 4/4) very fine sandy loam; common, medium, distinct mottles of light brownish gray and few, fine, faint mottles of yellowish brown; moderate, medium, angular blocky structure; firm; compact and brittle; some peds coated with light-gray (10YR 7/1) silt; black stains on some peds; ped faces darker than crushed mass; patchy clay films; common, dark-colored, soft concretions; very strongly acid; abrupt, smooth boundary.

IIC—39 to 60 inches +, red (2.5YR 4/6) sandy clay loam; common, coarse, distinct mottles of light brownish gray (10YR 6/2); massive; friable; slightly compact; strongly acid.

The Ap horizon ranges from dark brown (10YR 3/3) to grayish brown (10YR 5/2) in color and from 4 to 7 inches in thickness. The B2t horizon is brown (10YR 5/3) or strong brown (7.5YR 5/6). The depth to the IIBx horizon ranges from 20 to 30 inches. The texture of this horizon ranges from sticky silt loam to clay loam. The IIC horizon ranges from dark brown (10YR 4/4) to red (2.5YR 4/6) in color and from loam to clay loam in texture.

Providence silt loam, 1 to 3 percent slopes (PrB).—This soil has a 5-inch surface layer of dark-brown to grayish-brown silt loam and a subsoil of strong-brown silt loam over strong-brown silty clay loam. A fragipan begins at a depth of about 26 inches. Below this is sandy material. A few small spots of Lexington soils were included in mapping.

The fragipan restricts the growth of roots and the movement of water but does not affect productivity or the choice of plants. Runoff is medium. The available water capacity is moderate, reaction is strongly acid to very strongly acid, and natural fertility is moderate. Erosion is a hazard.

This soil is well suited to crops. Tilth is easy to maintain. (Capability unit IIe-2; woodland group 8; wildlife group 2)

Providence silt loam, 3 to 8 percent slopes, eroded (PrC2).—This soil has a dark-brown to grayish-brown surface layer about 4 inches thick and a subsoil of strong-brown silt loam over strong-brown silty clay loam. A fragipan begins at a depth of about 24 inches. Erosion has removed some of the original surface layer and exposed patches of subsoil. Small rills are common after rain. In most places plowing has mixed the original surface layer with part of the subsoil. A few small spots of Lexington soils were included in mapping.

Runoff is rapid, and the erosion hazard is severe. The fragipan restricts the growth of roots and the movement of water but does not seriously affect productivity or choice of plants. The available water capacity is moderate, reaction is strongly acid to very strongly acid, and natural fertility is moderate.

This soil puddles easily, because it is low in organic-matter content and has weak structure. Tilth is somewhat difficult to maintain. Under careful management, most of the common crops can be grown. (Capability unit IIIe-2; woodland group 8; wildlife group 2)

Rough Broken Land

Rough broken land (Rb) occurs along the eastern slopes of Crowley Ridge. It consists of gravelly, sandy, and silty soil material on irregular, strongly dissected slopes. The material at the surface is dark grayish brown to brown and has silt loam to gravelly sandy loam texture. The underlying material is brown and has silt loam, sandy loam, or gravelly sandy clay loam texture. The reaction is strongly acid to very strongly acid. Drainage is good. The slope range is 20 to 60 percent.

Rough broken land is adjacent to the moderately well drained to well drained Loring and the well drained Memphis soils.

This land type is best suited to woodland and wildlife. Cultivation should not be attempted, because of the severe erosion hazard. (Capability unit VIIe-1; woodland group 11; wildlife group 2)

Zachary Series

The Zachary series consists of poorly drained, slowly permeable soils that formed in alluvium washed from loessal soils. The surface layer of these soils is dark-gray silt loam over gray and light-gray silt loam. Below this, at a depth of about 30 inches, is gray silty clay or silty clay loam.

Zachary soils occur mainly on the bottom lands of the L'Anguille River. They are adjacent to Collins and Arkabutla soils. They are grayer in the subsoil and more poorly drained than Collins and Arkabutla soils and have a clayey B horizon, which is lacking in Collins and Arkabutla soils.

Profile of Zachary silt loam in a moist wooded area in the SW¼SE¼SW¼ sec. 5, T. 7 N., R. 1 E.:

O2—1 inch to 0, organic debris, partly decomposed.

A1—0 to 5 inches, dark-gray (10YR 4/1) silt loam; common, medium, distinct mottles of dark brown; weak, fine, granular structure; very friable; many roots; few, small, soft and hard concretions; very strongly acid; clear, smooth boundary.

A21g—5 to 15 inches, gray (10YR 6/1) heavy silt loam; common, medium, distinct mottles of yellowish brown and common, medium, distinct mottles of dark brown; weak, medium and fine, subangular blocky structure; very friable; many roots; few pores; few, dark-colored, soft concretions; very strongly acid; clear, smooth boundary.

A22g—15 to 26 inches, gray (10YR 6/1) silt loam; common, medium, distinct mottles of yellow and common, medium, distinct mottles of yellowish red; weak, medium and fine, subangular blocky structure; friable; few roots and pores; few, small, dark-colored, hard concretions; very strongly acid; clear, smooth boundary.

B1g—26 to 31 inches, light-gray (10YR 7/1) silt loam; common, medium, distinct mottles of yellowish brown; weak, medium and coarse, subangular blocky structure; friable; few patchy clay films; few roots and pores; common, dark-colored, soft concretions; very strongly acid; clear, smooth boundary.

B2tg—31 to 47 inches +, gray (10YR 6/1) silty clay; few, fine, distinct mottles of brownish yellow; weak, medium, subangular blocky structure; firm; common clay films on peds and in seams and pores; some root holes filled with light-gray (10YR 7/1) silt; few roots; few, small, dark-colored, soft concretions; very strongly acid.

In some cultivated areas the Ap horizon is grayish brown (10YR 5/2). The depth to the B2tg horizon ranges from 28 to 34 inches. The texture of the horizon ranges from silty clay loam to silty clay.

Zachary silt loam (0 to 1 percent slopes) (Za).—This soil is flooded frequently. Its surface layer is dark gray and about 5 inches thick. The upper part of the subsoil is gray and light-gray silt loam mottled with yellow, yellowish red, and yellowish brown. Below this is gray silty clay mottled with yellowish brown. A few small spots of Collins and Arkabutla soils were included in mapping.

Ponding occurs, and the infiltration of water is very slow. The available water capacity is moderate, the reaction is very strongly acid, and natural fertility is moderate.

This soil is well suited to hardwood forest and to use as wildlife habitat. It is not suitable for cultivation because of the frequent floods. (Capability unit IIIw-2 if protected from flooding, capability unit VIw-1 if not protected from flooding; woodland group 6; wildlife group 5)

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 soils in Cross County by capability units. It also describes the management of soils for woodland and wildlife and their relative suitability for engineering and certain other nonfarm uses. A table showing predicted yields under improved management is provided.

Capability Groups of Soils

Capability classification is the grouping of soils to show, in a general way, their suitability for most kinds of farming. It is a practical classification based on the limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. The classification does not apply to most horticultural crops or to rice and other crops that have special requirements. The soils are classified according to degree and kind of permanent limitation, without consideration of major and generally expensive land-forming that would change the slope, depth, or other characteristics of the soils, and without consideration of possible but unlikely major reclamation projects.

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

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

- Class I. Soils have few limitations that restrict their use.
- Class II. Soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.
- Class III. Soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
- Class IV. Soils have very severe limitations that reduce the choice of plants, require very careful management, or both.
- Class V. Soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover. (There are no class V soils in Cross County.)
- 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 food and cover.
- Class VII. Soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture, range, woodland, or wildlife.
- Class VIII. Soils and landforms have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes. (There are no class VIII soils in Cross County.)

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 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 subclasses indicated by *w*, *s*, and *c*, because the soils in it 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 IIIe–2. 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 the subclass.

Management by Capability Units

In the following pages each of the capability units in Cross County is described, and suggestions for the use and management of the soils in each unit are given. The names of the soil series represented are mentioned in the description of each unit, but that does not mean that all the soils in a given series are in the unit. The capability classification of each individual soil is given in the "Guide to Mapping Units."

Capability unit I–1

This unit consists of deep, well-drained to somewhat poorly drained, level soils on bottom lands. These soils are members of the Collins, Dundee, Iuka, and Ochlockonee series. They have a 6- to 8-inch surface layer of friable fine sandy loam, loam, or silt loam and a subsoil of fine sandy loam, silt loam, silty clay loam, or clay loam.

These soils are medium acid to very strongly acid and are moderate in natural fertility. The organic-matter content is medium. Infiltration and permeability are moderately rapid to moderately slow, and the available water capacity is moderate.

Many crops, including cotton, soybeans, corn, and small grain, are suitable. Bermudagrass and dallisgrass are suitable grasses; vetch, lespedeza, and white clover are suitable legumes; pecan, cottonwood, oak, hickory, and sweetgum are suitable trees.

These soils are easy to till. Under good management, cultivated crops that leave a large amount of residue can be grown year after year.

Capability unit IIe–1

This unit consists of moderately well drained, nearly level to gently undulating soils on natural levees of the bottom lands. These soils are members of the Dubbs and Iuka series. They have a 4- to 8-inch surface layer of very friable loam or fine sandy loam and a subsoil of loam, loamy sand, fine sandy loam, silty clay loam, or clay loam.

These soils are medium acid to very strongly acid and are moderate to high in natural fertility. The organic-matter content is medium to low. Permeability and infiltration are moderate, except where there is a plowpan, and the available water capacity is low to high.

Cotton, corn, soybeans, small grain, and truck crops are suitable cultivated crops. Vetch and Austrian Winter peas are suitable winter cover crops, and bermudagrass, dallisgrass, tall fescue, white clover, and lespedeza are suitable pasture plants. Sudangrass and other summer grasses do well. Pecan, cottonwood, oak, hickory, and sweetgum are suitable trees.

These soils are easy to till. Artificial drainage may be needed to remove water that collects in the depressions on the undulating soils. Furrow irrigation is possible if the undulating areas are smoothed and graded. Under good management, clean-tilled crops that leave large amounts of residue can be grown year after year. Close-growing crops can be grown without special attention to row direction.

Capability unit IIe-2

This unit consists of moderately well drained, nearly level soils that have a fragipan in the subsoil. These soils are members of the Grenada, Loring, and Providence series. They have a 4- to 6-inch surface layer of silt loam, and the subsoil of firm silty clay loam.

These soils are medium acid to very strongly acid and are moderate in natural fertility. The organic-matter content is low. Infiltration is moderate, permeability is slow, and the available water capacity is moderate.

Cotton, soybeans, corn, and small grain are suitable cultivated crops. Sericea lespedeza, red clover, white clover, annual lespedeza, crimson clover, vetch, and Austrian Winter peas are suitable legumes, and bermudagrass, dallisgrass, tall fescue, and ryegrass are suitable grasses. Many truck crops and nursery crops grow well. Oak, hickory, and sweetgum are suitable trees. Pecan also is suited.

Cultivated crops that leave large amounts of residue can be grown continuously if fields are terraced and contour cultivated and otherwise well managed. If there are no terraces, contour or cross-slope cultivation is needed if row crops are grown in a cropping system with grasses and legumes. Even without terraces, close-growing crops can be grown continuously without special row direction.

A moderate hazard of erosion is the chief limitation. Diversion terraces are needed above long slopes to intercept runoff.

Capability unit IIw-1

This unit consists of somewhat poorly drained, level to nearly level soils that have a fragipan. These soils are members of the Calloway series. They have a surface layer of friable silt loam 4 to 6 inches thick and a subsoil of silt loam and silty clay loam.

These soils are medium acid to very strongly acid and are low to moderate in fertility. The organic-matter content is low. Infiltration, permeability, and the available water capacity are moderate.

Rice, soybeans, cotton (fig. 9), grain sorghum, and small grains are suitable cultivated crops. Sericea lespedeza, red clover, white clover, annual lespedeza, vetch, and Austrian Winter peas are suitable legumes; bermudagrass, tall fescue, and ryegrass are suitable grasses; sweetgum, oak, hickory, and pecan trees, as well as many nursery crops, are suitable.

These soils are easy to till. Wetness is the chief limitation; erosion is a secondary limitation in some areas. Grading and smoothing are needed for good drainage and efficient management of irrigation water in many fields. Under good management, cultivated crops that leave large amounts of residue can be grown year after year.

An example of a suitable cropping system is 1 or 2 years of rice followed by a crop that produces a large amount of residue—either a row crop or a close-growing crop, such as lespedeza. Growing rice is risky, unless the irrigation and drainage systems permit rapid application and rapid removal of water. If the drainage system is adequate, the same irrigation system used for the rice can be used for crops that otherwise are dry-farmed.

***Figure 9.*—Cotton on Calloway silt loam, 0 to 1 percent slopes, which is in capability unit IIw-1. In the left foreground is an irrigation levee.**

Capability unit IIw-2

This unit consists of somewhat poorly drained, level to gently undulating soils on bottom lands. These soils are members of the Arkabutla, Dundee, and Mantachie series. They have a 4- to 8-inch surface layer of friable loam, fine sandy loam, or silt loam and a subsoil of silt loam, very fine sandy loam, or silty clay loam.

These soils are medium acid to very strongly acid and are moderate to high in natural fertility. The organic-matter content is medium. Except where there is a plowpan, permeability is moderate to moderately slow and infiltration is moderate. The available moisture capacity is moderate.

Cotton, soybeans, corn, grain sorghum, and small grain are suitable cultivated crops. Bahiagrass, bermudagrass, dallisgrass, tall fescue, white clover, and lespedeza are suitable pasture plants. Pecan, oak, hickory, cottonwood, and sweetgum are suitable trees.

These soils are easy to till. Furrow irrigation is feasible, but some areas have to be smoothed before efficient use of irrigation water is possible. Under good management, cultivated crops that leave large amounts of residue can be grown year after year.

Capability unit IIw-3

This unit consists of Bowdre silty clay loam, 0 to 1 percent slopes, a moderately well drained soil. This soil has a 5-inch surface layer. The subsoil is silty clay loam underlain at a depth of 10 to 20 inches by coarser textured material.

This soil is medium acid and is moderate in natural fertility. It is hard and cracked when dry and plastic when wet. The organic-matter content is low to medium. Infiltration and permeability are slow, and the available water capacity is high.

Cotton, corn, soybeans, small grain, and grain sorghum are suitable cultivated crops.

Alfalfa, red clover, white clover, and lespedeza are suitable legumes; bermudagrass, ryegrass, and tall fescue are suitable grasses; and pecan, cottonwood, oak, hickory, and sweetgum are suitable trees.

Wetness is the chief limitation. Furrow irrigation is feasible. Under good management, crops that leave large amounts of residue can be grown year after year.

Capability unit IIw-4

This unit consists of somewhat poorly drained, level to nearly level soils. These soils are members of the Hillemann series. They have a 4- to 10-inch surface layer of friable silt loam. The upper part of the subsoil is silt loam, and the lower part is silty clay loam or silt loam.

These soils are slightly acid to strongly acid and are low to moderate in natural fertility. The organic-matter content is low to medium. Infiltration and permeability are slow, and the available water capacity is moderate. In most areas the lower part of the subsoil contains moderately strong concentrations of sodium, which are harmful to some crops.

Rice, soybeans, grain sorghum, and small grain are suitable cultivated crops. Cotton can be grown also. White clover, vetch, and Austrian Winter peas are suitable legumes, and bermudagrass, ryegrass, and tall fescue are suitable grasses.

In grading and smoothing, only shallow cuts should be made, so that the lower part of the subsoil will not be brought to the surface. Under good management, clean-tilled crops that leave large amounts of residue can be grown year after year.

Growing rice on these soils is risky unless there is an irrigation system that allows rapid application of water and a drainage system that provides for rapid removal of excess irrigation water or excess rainfall. A cropping system suitable for rice culture consists of 1 or 2 years of rice and then 2 years of a close-growing crop or of a row crop that leaves large amounts of residue. If adequate provision has been made for drainage, the other crops can be irrigated through the rice irrigation system.

Capability unit IIIe-1

This unit consists of moderately well drained soils on undulating natural levees and gently sloping alluvial fans. These soils are members of the Dubbs and Iuka series. They have a 4- to 8-inch surface layer of very friable loam, loamy fine sand, or fine sandy loam and a subsoil of loam, silt loam, fine sandy loam, loamy sand, silty clay loam, or clay loam.

These soils are medium acid to very strongly acid and are moderate to high in natural fertility. The organic-matter content is medium to low. Except where there is a plowpan, permeability and infiltration are moderate. The available water capacity is moderate to high.

Cotton, soybeans, corn, small grain, okra, tomatoes, lima beans, and strawberries are suitable cultivated crops. Bermudagrass, white clover, lespedeza, alfalfa, tall fescue, and dallisgrass are suitable grasses and legumes; vetch and Austrian Winter peas are suitable winter cover crops; and pecan, cottonwood, oak, hickory, and sweetgum are suitable trees.

Under good management, clean-tilled crops that leave a large amount of residue can be grown year after year. Close-growing crops that leave a large amount of residue can be grown year after year without special attention to row direction.

Capability unit IIIe-2

This unit consists of poorly drained to well-drained, gently sloping soils on uplands. These soils are members of the Lexington, Loring, and Providence series. They have a 4- to 8-inch surface layer of friable silt loam and a subsoil of silty clay loam. A fragipan begins at a depth of 24 to 32 inches in the Providence and Loring soils of this unit. Some soils in this unit are eroded, and in places there are a few shallow gullies.

These soils are medium acid to very strongly acid and are moderate to moderately low in natural fertility. The organic-matter content is low. Permeability and infiltration are slow to moderate, and the available water capacity is moderate.

Cotton, soybeans, corn, small grain, and grain sorghum are suitable cultivated crops. Bermudagrass, tall fescue, and ryegrass are suitable grasses; sericea lespedeza, annual lespedeza, and white clover are suitable legumes; and pine, oak, hickory, yellow-poplar, beech, and sweetgum are suitable trees. Peaches do especially well on these soils.

Erosion control practices of varying intensity are needed, depending on the slope and on the degree of past erosion. On the milder slopes, clean-tilled crops that leave large amounts of residue can be grown year after year if the soils are protected by terracing and contour tillage. On the stronger slopes, grasses and legumes should be grown half to three-fourths of the time, depending on the intensity of erosion control.

Capability unit IIIw-1

This unit consists of gently undulating to undulating, somewhat poorly drained to moderately well drained soils. These soils are members of the Bowdre and Earle series. They have a 5- to 7-inch surface layer of silty clay loam and a subsoil of silty clay loam to clay. Below this, at a depth of 15 to 36 inches, is coarser textured material.

These soils are slightly acid to strongly acid and are moderate to high in natural fertility. They are hard and cracked when dry and plastic when wet. The organic-matter content is low to medium. Infiltration and permeability are slow, and the available water capacity is moderate to high.

Cotton, corn, soybeans, small grain, and grain sorghum are suitable cultivated crops. Bermudagrass, ryegrass, and tall fescue are suitable grasses; alfalfa, red clover, white clover, and lespedeza are suitable legumes; and pecan, cottonwood, oak, hickory, and sweetgum are suitable trees.

Wetness is the chief limitation. Under good management that includes adequate drainage, clean-tilled crops that leave large amounts of residue can be grown year after year. The areas where the slopes are mildest can be smoothed. After smoothing, furrow irrigation of some crops is practical.

Capability unit IIIw-2

This unit consists of somewhat poorly drained to poorly drained, level soils on bottom lands. These soils are members of the Amagon and Zachary series. They are protected from flooding. They have a 4- to 8-inch surface layer of friable fine sandy loam or silt loam and a subsoil of silt loam or silty clay loam.

These soils are medium acid to very strongly acid and are moderately low to high in natural fertility. The organic-matter content is medium. Infiltration, permeability, and the available water capacity are moderate.

Cotton, soybeans, rice, corn, grain sorghum, and small grain are suitable cultivated crops. Bermudagrass and tall fescue are suitable grasses; lespedeza, vetch, and Austrian Winter peas are suitable legumes; and pecan, oak, hickory, cotonwood, and sweetgum are suitable trees.

Under good management, clean-tilled crops that leave large amounts of residue can be grown year after year. These areas can be smoothed. After smoothing, furrow irrigation of some crops is practical.

Capability unit IIIw-3

This unit consists of poorly drained, level soils on uplands. These soils are members of the Calhoun, Crowley, and Henry series. They have a 4- to 10-inch surface layer of friable silt loam. The upper part of the subsoil is friable silt loam or silty clay loam, and the lower part is firm to very firm silty clay loam or light silty clay. A fragipan begins at a depth of 24 to 37 inches in the Henry soil.

These soils are medium acid to very strongly acid and are moderate to moderately low in natural fertility. The organic-matter content is low. Infiltration is moderate, permeability is very slow, and the available water capacity is moderate.

Rice, soybeans, and grain sorghum are suitable cultivated crops. Bermudagrass, dallisgrass, and tall fescue are suitable grasses; vetch, Austrian Winter peas, white clover, and annual lespedeza are suitable legumes; and oak, sweetgum, blackgum, and tupelo-gum are suitable trees.

Under good management that includes adequate drainage, clean-tilled crops that leave large amounts of residue can be grown year after year.

Growing rice on these soils is risky without an irrigation system that allows rapid application of water and a drainage system that provides for rapid removal of excess irrigation water or excess rainfall. A cropping system suitable for rice culture consists of 1 or 2 years of rice and then 2 years of a close-growing crop or of a row crop that leaves large amounts of residue. If adequate provision has been made for drainage, the other crops can be irrigated through the rice irrigation system.

Capability unit IIIw-4

This unit consists of poorly drained, level to undulating soils in slack-water areas. These soils are members of the Alligator and Earle series. They have a surface layer of silt loam, silty clay loam, or clay and a subsoil of clay. In some places the clay is underlain at a depth of 20 inches by silty and sandy material.

These soils are medium acid to very strongly acid and are high in natural fertility. The organic-matter content is high. Infiltration and permeability are very slow, and the available water capacity is moderate to very high.

Cotton, soybeans, and grain sorghum are suitable cultivated crops. Rice is suitable for level areas. Bermudagrass, tall fescue, and dallisgrass, are suitable grasses; white clover, vetch, and Austrian Winter peas are suitable legumes; and pecan, oak, hickory, cottonwood, sweetgum, and tupelo-gum are suitable trees.

Under good management that includes adequate drainage, clean-tilled crops that leave large amounts of residue can be grown year after year.

Growing rice on these soils is risky, unless there is an irrigation system that allows rapid application of water and a drainage system that provides for rapid removal of excess irrigation water or excess rainfall. A cropping system suitable for rice culture consists of 1 or 2 years of rice and then 2 years of row crops that leave large amounts of residue. The other crops in the system can be irrigated through the rice irrigation system.

Capability unit IIIw-5

This unit consists of Foley and Grubbs silt loams, 0 to 2 percent slopes. These are somewhat poorly drained to poorly drained soils that have a surface layer of friable silt loam and a subsoil of silty clay loam or silty clay.

These soils are acid in the upper part and alkaline in the lower part. Fertility is moderate. The organic-matter content is low. Infiltration is slow, permeability is very slow, and the available water capacity is low to moderate. Strong concentrations of sodium and magnesium, beginning about 14 inches below the surface, damage some crops.

Soybeans and small grain are the principal crops, but rice and cotton are grown in some spots. Bermudagrass and tall fescue are suitable grasses; lespedeza and white clover are suitable legumes; and water-tolerant oak, elm, and honeylocust are suitable trees.

Wetness and the concentrations of salts are the chief limitations. Smoothing should be done carefully so that the cuts are shallow and the material in the lower part of the subsoil is not brought too near the surface. Clean-tilled crops can be grown year after year.

Capability unit IVe-1

This unit consists of Loring silt loam, 8 to 12 percent slopes, eroded, a deep, moderately well drained to well drained soil that has a fragipan. This soil has a surface layer of silt loam and a subsoil of silty clay loam. There are a few shallow gullies and a few deep ones.

This soil is strongly acid to very strongly acid and is moderately low in natural fertility. Infiltration, permeability, and the available water capacity are moderate.

These soils are not well suited to cultivated crops. Small grains can be grown. Peaches do well. Bermudagrass and ryegrass are suitable grasses, and sericea lespedeza, white clover, annual lespedeza, and vetch are suitable legumes. Pine, oak, hickory, beech, and yellow-poplar are suitable trees.

These soils are better suited to permanent pasture and woodland than to crops, but under management that includes contour stripcropping, row crops can be grown 1 year out of 4 years, in a cropping system with grasses and legumes, and close-growing crops can be grown occasionally. Peach trees should be planted on the contour, and a cover crop should be grown in the orchard each year. All tillage operations should be on the contour. Diversion terraces are needed to control runoff.

Capability unit VIe-1

This unit consists of moderately well drained to well drained, moderately steep soils on Crowley Ridge. These soils are members of the Loring and Memphis series. They have a 4- to 6-inch surface layer of friable silt loam and a subsoil of silty clay loam. There are shallow gullies in some fields. The Loring soils in this unit have a fragipan.

Runoff is rapid, and the hazard of erosion is severe. Infiltration, permeability, and the available water capacity are moderate. Natural fertility is moderately low, and reaction is medium acid to very strongly acid. The organic-matter content is medium to low.

These soils need to be kept in permanent cover. Bermudagrass is the most suitable of the locally grown grasses; sericea lespedeza and annual lespedeza are the most suitable legumes. Oak, hickory, pine, yellow-poplar, sweetgum, and black walnut are suitable trees.

Some pastures need special erosion control measures. Bare spots should be fertilized and reseeded or sodded, and unstabilized gullies should be shaped, then seeded, sodded, or planted to closely spaced trees.

Capability unit VIw-1

This unit consists of the areas of Zachary silt loam that are not protected from flooding; the areas of this soil that are protected are in capability unit IIIw-2. This is a level and poorly drained soil on bottom lands. It is frequently flooded, in some areas for periods of several weeks. The water table is at the surface most of the year. This soil has a 5- to 7-inch surface layer of grayish-brown silt loam and a subsoil of gray, mottled silt loam and silty clay.

Infiltration and permeability are slow, and the available water capacity is moderate. Natural fertility is moderate, and reaction is very strongly acid. The organic-matter content is medium to low.

In its natural state, this soil is not suited to cultivated crops but is suited to woodland. Cypress, blackgum, sweetgum, and water-tolerant species of oak and hickory grow well. Bermudagrass, dallisgrass, and tall fescue are suitable grasses. Cotton, soybeans, grain sorghum, and rice can be grown in areas that can be protected from flooding.

Capability unit VIIe-1

This unit consists of moderately well drained to well drained soils and land types on Crowley Ridge. The land types are Gullied land and Rough broken land. The soils are members of the Loring and Memphis series. They have a surface layer of friable silt loam, silty clay loam, or sandy loam and a subsoil of silty clay loam or gravelly, sandy, and clayey material. The soils are steep, and the land types are gently sloping to steep. The Loring soils in this unit have a fragipan.

Runoff is rapid, and the hazard of erosion is severe. Infiltration, permeability, and the available water capacity are moderate. Natural fertility is moderate to low, and the reaction is medium acid to very strongly acid. The organic-matter content is medium to low.

The use of these areas is limited to woodland and wildlife cover. Suitable trees are oak, hickory, yellow-poplar, pine, and black walnut. The trees should be planted close together in areas where erosion is active. Runoff should be diverted from these areas until the trees have become established.

Predicted Yields

The predicted yields of the principal crops shown in table 2 are based mainly on data supplied by farmers and other agricultural workers in Cross County. These yields are not the highest that can be obtained, but they are generally obtained by (a) using the proper equipment at the right time to prepare the soil, plant the crops, control weeds, and harvest the crops; (b) following a systematic program for controlling insects and plant diseases; (c) choosing crop varieties that are well suited to the soil and to the type of farming operation; (d) draining wet soils; and (e) irrigating crops.

TABLE 2.—*Predicted acre yields of principal crops*

[These yields can be obtained under practices defined in the text. Absence of figure indicates that the crop is not suited or is not commonly grown]

Mapping unit	Cotton	Soybeans	Rice	Wheat	Corn	Lespedeza	Peaches (orchard)	Pasture	
								Common bermudagrass	Fescue
	Lb. of lint	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Bu.*	*A.U.M.*[1]	*A.U.M.*[1]
Alligator clay, 0 to 1 percent slopes	475	30	95	35	------	1.25	--------	6.0	8.0
Alligator clay, gently undulating	410	30	------	40	------	1.00	--------	6.0	8.0
Alligator complex	480	28	80	45	------	1.00	--------	7.0	8.0
Alligator silt loam	500	35	100	45	------	1.25	--------	7.0	8.0
Alligator silty clay loam	500	36	100	42	------	1.30	--------	7.0	8.0
Amagon silt loam	620	32	90	------	------	1.20	--------	7.5	9.0
Arkabutla silt loam	650	35	------	45	70	1.20	--------	7.0	8.0
Bowdre silty clay loam, 0 to 1 percent slopes	650	36	------	40	60	1.40	--------	8.0	9.0
Bowdre silty clay loam, gently undulating	600	36	------	45	60	1.20	--------	8.0	9.0
Bowdre silty clay loam, undulating	590	34	------	45	55	1.00	--------	8.0	9.0
Calhoun silt loam	400	28	85	------	------	1.10	--------	6.0	7.0
Calloway silt loam, 0 to 1 percent slopes	560	30	95	38	50	1.60	--------	7.0	8.0
Calloway silt loam, 1 to 3 percent slopes	550	30	90	38	50	1.55	--------	7.0	8.0
Calloway silt loam, 1 to 3 percent slopes, eroded	500	28	80	37	40	1.25	--------	7.0	8.0
Collins silt loam	700	34	------	47	85	1.80	--------	9.0	8.0
Crowley and Hillemann silt loams, 0 to 1 percent slopes	550	30	95	40	55	1.50	--------	7.0	7.0
Crowley and Hillemann silt loams, 1 to 3 percent slopes	500	30	90	40	55	1.40	--------	7.0	7.0

See footnote at end of table.

TABLE 2.—*Predicted acre yields of principal crops*—Continued

Mapping unit	Cotton	Soybeans	Rice	Wheat	Corn	Lespedeza	Peaches (orchard)	Pasture	
								Common bermudagrass	Fescue
	Lb. of lint	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Bu.*	*A.U.M.*[1]	*A.U.M.*[1]
Dubbs fine sandy loam, gently undulating	680	40	------	44	70	1.50	--------	8.0	9.0
Dubbs fine sandy loam, undulating	580	38	------	42	65	1.20	--------	8.0	9.0
Dundee fine sandy loam, 0 to 1 percent slopes	715	36	------	42	75	1.60	--------	9.0	9.0
Dundee fine sandy loam, gently undulating	700	36	------	42	70	1.70	--------	9.0	9.0
Dundee silt loam, 0 to 1 percent slopes	715	36	------	42	75	1.80	--------	9.0	9.0
Dundee silt loam, gently undulating	700	36	------	42	70	1.80	--------	9.0	9.0
Earle clay, 0 to 1 percent slopes	625	30	------	42	55	1.80	--------	7.5	9.0
Earle clay, gently undulating	600	30	------	42	55	1.80	--------	7.5	9.0
Earle clay, undulating	575	28	------	40	50	1.80	--------	7.5	9.0
Earle silty clay loam, gently undulating	625	30	------	46	60	1.80	--------	7.5	9.0
Foley and Grubbs silt loams, 0 to 2 percent slopes	300	15	40	------	------	.80	--------	3.5	-------
Grenada silt loam, 1 to 3 percent slopes	615	28	------	38	70	1.50	350	7.0	8.0
Grenada silt loam, 1 to 3 percent slopes, eroded	575	27	------	36	65	1.40	330	7.0	8.0
Gullied land	--------	------	------	------	------	------	--------	--------	-------
Henry silt loam	400	28	95	------	------	1.20	--------	6.0	7.0
Iuka loam, 0 to 1 percent slopes	725	37	------	47	75	2.00	--------	8.0	9.0
Iuka loam, gently undulating	675	35	------	42	75	1.80	--------	8.0	9.0
Iuka soils, local alluvium, 1 to 3 percent slopes	575	27	------	42	70	1.50	--------	8.0	9.0
Iuka soils, local alluvium, 3 to 8 percent slopes	500	25	------	42	65	1.20	--------	7.0	8.0
Lexington silt loam, 3 to 8 percent slopes, eroded	550	28	------	40	55	1.25	280	7.0	8.0
Loring silt loam, 1 to 3 percent slopes	700	30	------	43	60	1.60	390	7.0	8.0
Loring silt loam, 1 to 3 percent slopes, eroded	600	28	------	42	55	1.50	375	6.0	7.0
Loring silt loam, 3 to 8 percent slopes	600	26	------	38	60	1.40	330	6.5	7.5
Loring silt loam, 3 to 8 percent slopes, eroded	550	24	------	36	45	1.00	280	6.0	7.0
Loring silt loam, 8 to 12 percent slopes, eroded	--------	------	------	------	------	.50	240	5.0	-------
Loring and Memphis silt loams, 12 to 20 percent slopes	--------	------	------	------	------	------	--------	5.0	-------
Loring and Memphis silt loams, 12 to 20 percent slopes, eroded	--------	------	------	------	------	------	--------	4.0	-------
Loring and Memphis silt loams, 12 to 20 percent slopes, severely eroded	--------	------	------	------	------	------	--------	4.0	-------
Loring and Memphis silt loams, 20 to 45 percent slopes	--------	------	------	------	------	------	--------	--------	-------
Mantachie loam	625	35	------	45	70	1.25	--------	6.0	8.0
Ochlockonee loam	670	40	------	46	72	1.20	--------	6.0	8.0
Providence silt loam, 1 to 3 percent slopes	640	29	------	40	70	1.60	350	7.0	8.0
Providence silt loam, 3 to 8 percent slopes, eroded	550	24	------	28	55	1.00	280	6.0	6.0
Rough broken land	--------	------	------	------	------	------	--------	--------	-------
Zachary silt loam:									
Protected from flooding	500	25	80	------	------	1.00	--------	4.5	-------
Not protected from flooding	--------	25	------	------	------	1.00	--------	4.5	-------

[1] A.U.M. is animal-unit-months, a term used to express the number of months that 1 animal unit can graze 1 acre without injury to the pasture. An animal unit is 1 cow, 1 steer, 1 horse, 5 hogs, or 7 sheep.

Use of the Soils for Woodland [1]

Hardwood forests originally covered this county. The principal commercial trees were southern red oak, cherrybark oak, pin oak, water oak, willow oak, Nuttall oak, Shumard oak, white oak, cow oak, overcup oak, sweetgum, tupelo-gum, cypress, pecan, hackberry, ash, shortleaf pine, and yellow-poplar.

Now, as a result of overcutting, burning, and land clearing, forests cover less than 30 percent of the county. The trend is toward the clearing of more land. Improved drainage and flood control have made clearing practical.

Management of woodland can be planned more effectively if soils are grouped according to those characteristics that affect the growth of trees and the management of the stands. The soils of Cross County have been placed in 11 woodland suitability groups, each consisting of soils that have about the same suitability for wood crops, require about the same management, and have about the same potential productivity.

Listed in table 3 (p. 32) are the woodland groups, a brief description of the soils in each group, the hazards and limitations that affect management, the potential productivity of the soils of each group for selected kinds of trees, and the kinds of trees to be preferred in management of existing stands and for planting. The figures given for potential productivity are adapted from soil-site studies performed by the U.S. Soil Conservation Service and the U.S. Forest Service (*14, 15, 18, 20*).[2]

[1] J. T. BEENE, forester, Soil Conservation Service, helped prepare this section.

[2] Italic numbers in parentheses refer to Literature Cited, page 58.

The erosion hazard is rated according to the risk of erosion in well-managed woodland that is not protected by special practices. The hazard is *slight* if a small loss of soil is expected. The hazard is *moderate* where there is a moderate loss of soil if runoff is not controlled and the vegetative cover is not adequate for protection. The hazard is *severe* on moderately steep and steep slopes where runoff is rapid and infiltration and permeability are slow.

The equipment limitation is *slight* if there are no restrictions on the type of equipment or the time of year that the equipment can be used, except for short periods after a heavy rainfall. It is *moderate* if slopes are moderately steep, if the use of heavy equipment is restricted by wetness in winter and early in spring, or if the use of equipment would damage tree roots to some extent. For this county, a moderate limitation means that equipment can be used only from March through November in most years, or that the use is limited by moderately steep slopes or by a severe erosion hazard. The limitation is *severe* if many types of equipment cannot be used, if equipment cannot be used more than 3 months a year, or if use of the equipment would severely damage the roots of trees and the structure and stability of the soil. Steeply sloping soils and low wet soils have severe limitations. For this county, a severe limitation means that the use of equipment is limited because of steep slopes, and in most years, is limited to the driest months—July through October.

Seedling mortality occurs to some extent even under the most favorable conditions. In Cross County some of the adverse conditions that cause seedling mortality are unfavorable soil texture, poor drainage, and flooding. Seedling mortality is *slight* if not more than 25 percent of the planted seedlings die. It is *moderate* if 25 to 50 percent of the seedlings die, and *severe* if more than 50 percent of the planted seedlings die.

The potential productivity of a soil for a specified kind of tree is expressed as site index. The site index for a given soil is the height, in feet, that a specified kind of tree will reach in a given number of years. Table 3 shows, under the heading "Estimated site index range," a range in site index for selected species, according to woodland group. The site indexes used are based on the height of cottonwood at 30 years of age and on the height of other hardwoods and pine at the age of 50 years.

The preferred species shown in table 3 were selected on the basis of their growth rate, their commercial value, the quality of their wood products, and the hazards and limitations of management.

Wildlife [3]

Soils are closely related to the kinds and abundance of wildlife. Soil characteristics and land use largely determine the vegetation and the other elements that make up a favorable habitat. Planting choice food plants, managing existing vegetation, and locating water developments where water is scarce are practices by which the wildlife habitat can be improved.

The soils in Cross County have been placed in five groups according to their suitability as habitat for specified kinds of wildlife. The following paragraphs describe these groups. The "Guide to Mapping Units," at the back of this survey, shows which group each soil is in. Table 4 (p. 34) lists plants that provide food for wildlife and shows the relative suitability of each of these plants as food for specified kinds of wildlife. Table 5 (p. 35) shows the relative suitability of the same plants to the soils of each wildlife group.

Wildlife group 1

This group consists of somewhat poorly drained to poorly drained, gray and brown, loamy soils on the loessal plains west of Crowley Ridge.

Rice, soybeans, corn, cotton, grain sorghum, and small grain are commonly grown. Lespedeza, Austrian Winter peas, vetch, and crimson clover are well suited legumes, and bahiagrass, bermudagrass, ryegrass, and tall fescue are suitable grasses.

The soils in this group can produce food for bobwhites, doves, rabbits, squirrels, deer, and ducks. They are also suitable for ponds for fish and waterfowl.

Wildlife group 2

This group consists of moderately well drained and well drained, brown, loamy soils and land types on the loessal plains and on Crowley Ridge.

Soybeans, corn, grain sorghum, and small grain are commonly grown. Lespedeza and clover are suitable legumes, and bermudagrass and ryegrass are suitable grasses. Because of slopes and the hazard of erosion, some areas are not suitable for cultivation.

Most of the soils in this group can produce food for bobwhites, doves, rabbits, squirrels, and deer. Some are suited to ponds for fish. Ponds on Crowley Ridge need special measures, such as fertilization or the addition of organic matter, to reduce turbidity.

Wildlife group 3

This group consists of poorly drained, sandy and silty soils on bottom lands.

Cotton, soybeans, corn, small grain, and grain sorghum are commonly grown. Lespedeza, Austrian Winter peas, and clover are well suited legumes, and bahiagrass, bermudagrass, ryegrass, and tall fescue are suitable grasses.

The soils in this group can produce food for bobwhites, doves, and rabbits. They are not generally suitable for ponds.

Wildlife group 4

This group consists of poorly drained to moderately well drained, clayey soils on bottom lands.

Cotton, soybeans, rice, corn, small grain, and grain sorghum are commonly grown. Red clover, white clover, vetch, and Austrian Winter peas are suitable legumes, and bahiagrass, bermudagrass, ryegrass, and tall fescue are suitable grasses.

The soils in this group can produce food for bobwhites, doves, rabbits, squirrels, deer, and ducks. Areas of Alligator soil are suitable for ponds for fish and waterfowl.

Wildlife group 5

This group consists of poorly drained soils in alluvium. Some areas are frequently flooded.

[3] ROY A. GRIZZELL, Jr., biologist, Soil Conservation Service, helped prepare this section.

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TABLE 3.—*Woodland groups and*

Woodland group, map symbols, and description of soils	Management problems		
	Erosion hazard	Equipment limitation	Seedling mortality
Group 1 Co, IuA, IuB, IvB, IvC, Oc. Level to gently sloping, well drained and moderately well drained, loamy soils on bottom lands. Runoff is slow to moderately rapid, permeability is moderate, and the available water capacity is moderate.	Slight	Slight	Slight
Group 2 BoA, BoB, BoC, DbB, DbC, DdA, DdB, DuA, DuB. Moderately well drained and somewhat poorly drained, level to undulating, loamy soils on bottom lands. Runoff is slow to medium, permeability is slow to moderately slow, and the available water capacity is moderate to high.	Slight	Slight	Slight
Group 3 Ar, Ma. Somewhat poorly drained, level, loamy soils on bottom lands. Runoff is slow to moderately slow, permeability is moderate to moderately slow, and the available water capacity is moderate.	Slight	Moderate	Moderate
Group 4 An, CrA, CrB. Somewhat poorly drained and poorly drained, level and gently sloping, loamy soils on bottom lands and uplands.	Slight	Moderate	Moderate
Group 5 LeC2, LgC, LgC2, LgD2. Moderately well drained to well drained, gently sloping and moderately sloping, loamy soils on uplands.	Moderate	Slight	Slight
Group 6 AaA, AaB, Ac, Ag, Am, EcA, EcB, EcC, EsB, Za. Somewhat poorly drained and poorly drained, level to undulating, loamy and clayey soils on bottom lands.	Slight	Severe	Severe
Group 7 LmE, LmE2, LmF. Moderately well drained and well drained, moderately steep and steep, loamy soils on uplands. Runoff is rapid, permeability is moderate to slow, and the available water capacity is moderate.	Severe	Moderate to severe.	Slight
Group 8 ClA, ClB, ClB2, GrB, GrB2, LgB, LgB2, PrB, PrC2. Somewhat poorly drained to moderately well drained, level to gently sloping, loamy soils on uplands. Runoff is slow to medium, permeability is slow to moderate, and the available water capacity is moderate.	Slight	Slight	Slight
Group 9 Ca, He. Poorly drained, level, loamy soils on uplands. Runoff is slow to ponded, permeability is very slow, and the available water capacity is moderate.	Slight	Moderate	Moderate
Group 10 FgA. Somewhat poorly drained to poorly drained silt loams on bottom lands and uplands. Runoff is slow, permeability is slow to very slow, and available water capacity is moderate to low. The subsoil contains a moderate to large amount of salts.	Slight	Moderate	Moderate
Group 11 Gu, LmE3, Rb. Moderately well drained to well drained, moderately sloping to steep soils and land types on uplands. Runoff is rapid, permeability is moderate to slow, and the available water capacity is moderate.	Severe	Severe	Moderate

[1] Site index ratings are adapted from soil-site studies performed by the U.S. Soil Conservation Service and the U.S. Forest Service (*14*, *15*, *18*, *20*).

[2] Yields shown for pine are for well-stocked, unmanaged, even-aged stands to age 60 (*12*); yields shown for cottonwoods are for well-stocked, even-aged, managed stands to age 30; those shown for other hardwoods are for well-stocked, even-aged, managed stands to

factors in woodland management

Potential productivity			Preferred species—	
Selected species	Estimated site index range [1]	Average yearly growth [2]	In existing stands	For planting
		Bd. ft./acre Doyle rule		
Cherrybark oak Sweetgum Cottonwood Loblolly pine Shortleaf pine	100 to 114 95 to 109 100 to 114 75 to 84 70 to 79	410+ 370 to 555 495 to 765 235 to 250 225 to 310	Black cherry, cottonwood, cherrybark oak, black walnut, Shumard oak, sweetgum, yellow-poplar, white ash, cow oak, basswood, shortleaf pine, southern red oak, water oak, hackberry.	Cottonwood, cherrybark oak, Shumard oak, yellow-poplar, sweetgum, loblolly pine, sycamore, black walnut.
Cherrybark oak Cottonwood Sweetgum Water oak	100 to 109 100 to 114 95 to 109 95 to 109	410+ 495 to 765 370 to 555 345+	Black cherry, cottonwood, cherrybark oak, black walnut, Shumard oak, sweetgum, white ash, cow oak, basswood, southern red oak, water oak, hackberry.	Cottonwood, cherrybark oak, Shumard oak, sweetgum, sycamore, black walnut.
Cottonwood Cherrybark oak Water oak Sweetgum Loblolly pine	100 to 114 95 to 104 95 to 104 100 to 109 70 to 79	495 to 765 345+ 345+ 430 to 555 170 to 255	Cottonwood, cherrybark oak, Nuttall oak, Shumard oak, black walnut, sweetgum, yellow-poplar, green ash, cow oak, water oak, hackberry, persimmon.	Cottonwood, cherrybark oak, Nuttall oak, Shumard oak, black walnut, sweetgum, yellow-poplar, green ash, cow oak, water oak, hackberry, persimmon.
Cherrybark oak	85 to 94	240 to 335	Cherrybark oak, Nuttall oak, sweetgum, water oak, hackberry, green ash, sycamore.	Sweetgum, Nuttall oak, sycamore, green ash.
Cherrybark oak Sweetgum Loblolly pine Shortleaf pine Red oak and black oak	85 to 94 85 to 94 70 to 79 65 to 74 75 to 84	240 to 335 260 to 360 170 to 255 170 to 250 155 to 230	All slopes: shortleaf pine. Middle and lower slopes: cherrybark oak, Shumard oak, water oak, sweetgum, black oak, southern red oak, yellow-poplar, black walnut, white oak.	All slopes: lobolly pine, shortleaf pine. Middle and lower slopes: cherrybark oak, Shumard oak, sweetgum, black oak, yellow-poplar, black walnut.
Cottonwood Cherrybark oak Water oak Sweetgum	85 to 99 85 to 94 85 to 94 85 to 94	285 to 400 240 to 335 240 to 335 260 to 360	Cottonwood, Nuttall oak, cherrybark oak, persimmon, Shumard oak, sweetgum, sycamore, baldcypress, green ash, hackberry, water oak.	Cottonwood, Nuttall oak, cherrybark oak, sweetgum, sycamore, green ash.
Cherrybark oak Sweetgum Loblolly pine Shortleaf pine Red oak and black oak	85 to 94 85 to 94 70 to 79 65 to 74 75 to 84	240 to 335 260 to 360 170 to 255 170 to 250 155 to 230	All slopes: shortleaf pine. Middle and lower slopes: cherrybark oak, Shumard oak, water oak, sweetgum, black oak, southern red oak, yellow-poplar, black walnut, white oak.	All slopes: loblolly pine, shortleaf pine. Middle and lower slopes: cherrybark oak, Shumard oak, sweetgum, black oak, yellow-poplar, black walnut.
Cherrybark oak Sweetgum Loblolly pine Shortleaf pine Red oak and black oak	85 to 94 85 to 94 70 to 79 65 to 74 75 to 84	240 to 335 260 to 360 170 to 255 170 to 250 155 to 230	All slopes: shortleaf pine. Middle and lower slopes: cherrybark oak, Shumard oak, water oak, sweetgum, black oak, southern red oak, yellow-poplar, black walnut, white oak.	All slopes: loblolly pine, shortleaf pine. Middle and lower slopes: cherrybark oak, Shumard oak, sweetgum, black oak, yellow-poplar, black walnut.
Loblolly pine Cherrybark oak Sweetgum	65 to 74 75 to 84 70 to 79	130 to 210 155 to 230 140 to 205	Cherrybark oak, Shumard oak, water oak, sweetgum.	Loblolly pine, cherrybark oak, Shumard oak, sweetgum.
Loblolly pine Sweetgum	55 to 64 80 to 89	40 to 120 215 to 300	Sweetgum, sycamore	Loblolly pine, sweetgum, sycamore.
(3)	(3)	(3)	Shortleaf pine, eastern redcedar	Loblolly pine, shortleaf pine.

age 60. The yields for hardwoods are adapted from published research on southern hardwoods (*16*) and upland central hardwoods (*19*) and tree-growth data from soil-site studies performed by the U.S. Soil Conservation Service.

[3] Data not available. Species, site index, and yearly growth vary with the degree of erosion.

TABLE 4.—*Suitability of plants as food for wildlife*

[The figure 1 indicates that the plant is *choice* (attractive and nutritious) for the given kind of wildlife; the figure 2, *fair* (eaten only when choice foods are not available); the figure 3, *unimportant* (eaten only in small amounts)]

Plant	Bob-white	Deer	Dove	Duck	Goose	Rabbit	Squir-rel	Turkey	Nongame birds [1]		
									Fruit eaters	Grain and seed eaters	Nut and acorn eaters
Barnyardgrass	3	3	1	1	1	3	3	3	3	2	3
Blackberry	1	2	3	3	3	3	1	1	1	3	1
Blackgum	2	2	3	3	3	3	2	1	1	3	3
Browntop millet	1	2	1	1	2	1	3	1	3	1	3
Cherry, black	1	2	3	3	3	3	1	2	1	3	3
Clover, crimson and white (forage)	1	1	3	3	1	1	3	1	3	3	3
Corn	1	1	1	1	1	1	1	1	3	1	1
Cowpeas	1	1	2	3	3	1	3	1	3	3	3
Dogwood	1	1	3	3	3	3	2	1	1	3	2
Duckweed	3	3	3	1	3	3	3	3	3	3	3
Elm	3	2	3	3	3	3	1	2	3	2	3
Farkleberry (winter huckleberry)	2	2	3	3	3	3	2	2	2	3	3
Fescue (forage)	3	2	3	3	2	2	3	2	3	3	3
Grapes, wild	3	1	3	3	3	3	2	1	1	3	3
Greenbrier	3	1	3	3	3	1	3	2	2	3	3
Hackberry	2	1	3	3	3	3	2	1	1	3	3
Hickory	3	2	3	3	3	3	1	3	3	3	1
Honeysuckle	3	1	3	3	3	3	3	3	1	3	3
Huckleberry and blueberry	2	2	3	3	3	3	2	2	1	3	3
Japanese millet	1	3	1	1	3	1	3	3	3	1	3
Johnsongrass	2	2	2	3	3	3	3	3	3	1	3
Lespedeza, annual	1	1	2	3	3	2	3	2	3	2	3
Lespedeza, bush	1	1	3	3	3	2	2	3	3	3	3
Maple	3	1	3	3	3	3	2	2	3	3	3
Milkpea	1	2	3	3	3	1	3	3	3	3	3
Mulberry	1	2	3	3	3	3	1	1	1	3	3
Naiads (Najas)	3	3	3	1	1	3	3	3	3	3	3
Oak (acorns)	1	1	3	1	3	3	1	1	3	3	1
Oats	1	1	2	2	1	1	1	1	3	1	3
Panicgrass	1	2	1	1	2	2	3	1	3	1	3
Partridgepea	1	2	3	3	3	3	3	3	3	3	3
Paspalum	1	2	1	2	2	3	3	1	3	1	3
Pecan	1	2	3	3	3	3	1	1	3	3	1
Persimmon	3	2	3	3	3	3	2	2	2	3	3
Pine	1	3	1	3	3	3	1	1	3	3	1
Pokeberry	2	1	1	3	3	3	3	2	1	3	3
Pondweed (Potamogetons)	3	3	3	1	3	3	3	3	3	3	3
Ragweed, common	1	2	1	3	3	3	3	3	3	1	3
Rice	2	3	2	1	1	3	1	1	3	1	1
Ryegrass (forage)	3	1	3	1	1	1	3	1	3	3	3
Sassafras	2	1	3	3	3	3	2	2	1	3	3
Smartweed	3	3	3	1	2	3	3	3	3	2	3
Sorghum	1	1	1	1	1	1	1	1	3	1	1
Soybeans	2	1	2	1	2	2	3	1	3	3	3
Sumac	2	1	3	3	3	2	3	2	1	3	3
Sunflower	1	1	1	3	3	3	1	1	3	1	1
Sweetgum	1	2	1	3	3	3	2	1	3	3	1
Tickclover (beggarweed)	1	1	3	3	3	3	3	2	3	3	3
Vetch (hairy)	1	1	2	3	3	2	3	2	3	3	3
Walnut	3	3	3	3	3	3	1	3	3	3	1
Wheat	1	1	1	1	1	1	1	1	3	1	1

[1] Among the fruit eaters are bluebirds, catbirds, mockingbirds, and robins; grain and seed eaters include blackbirds, cardinals, and sparrows; nut and acorn eaters include bluejays, chickadees, grackles, and woodpeckers.

TABLE 5.—*Suitability of plants to soils in wildlife groups*

[The figure 1 indicates that the plant is suited to the soils in the given group; the figure 2, that it is marginally suited; the figure 3, that it is poorly suited or not suited]

Plant	Wildlife groups				
	1	2	3	4	5
Barnyardgrass	1	3	2	2	1
Blackberry	1	1	1	3	3
Blackgum	2	2	1	1	1
Browntop millet	1	1	1	2	3
Cherry, black	1	1	2	2	3
Clovers, crimson and white (forage)	1	2	1	2	3
Corn	1	1	1	1	2
Cowpeas	1	1	1	1	2
Dogwood	1	1	3	3	3
Duckweed	1	3	3	1	3
Elm	2	1	3	2	2
Farkleberry (winter huckleberry)	1	2	2	3	3
Fescue (forage)	1	2	1	2	3
Grapes, wild	1	1	2	2	1
Greenbrier	1	1	1	1	1
Hackberry	1	2	2	1	3
Hickory	1	1	1	1	1
Honeysuckle	2	1	2	3	3
Huckleberry and blueberry	1	1	3	3	3
Japanese millet	1	2	1	1	1
Johnsongrass	2	3	1	1	1
Lespedeza, annual	1	1	1	1	3
Lespedeza, bush	2	1	2	3	3
Maple	3	1	3	3	3
Milkpea	3	3	3	3	3
Mulberry	3	3	3	3	3
Naiads (Najas)	1	2	3	3	1
Oak (acorns)	1	1	1	1	1
Oats	3	3	3	3	3
Panicgrass	3	3	3	3	3
Partridgepea	3	3	3	3	3
Paspalum	3	3	3	3	3
Pecan	1	2	1	1	1
Persimmon	1	2	3	3	3
Pine	2	1	3	3	3
Pokeberry	2	2	1	2	3
Pondweed (Potamogetons)	1	2	3	2	1
Ragweed, common	2	1	1	3	3
Rice	1	3	3	1	2
Ryegrass (forage)	1	1	1	2	1
Sassafras	2	1	3	3	3
Smartweed	2	3	1	1	1
Sorghum	3	3	3	3	3
Soybeans	1	2	1	1	1
Sumac	3	3	3	3	3
Sunflower	2	2	1	3	3
Sweetgum	1	2	1	1	1
Tickclover (beggarweed)	2	1	1	3	3
Vetch (hairy)	2	2	1	2	3
Walnut	3	3	3	3	3
Wheat	1	1	1	2	1

Crops suitable for areas that are not flooded are cotton, rice, soybeans, and grain sorghum. White clover, vetch, and Austrian Winter peas are suitable legumes, and bermudagrass and tall fescue are suitable grasses. Zachary soils are frequently flooded and are not suitable for cultivation.

Most of the soils in this group can produce food for deer, squirrels, doves, and ducks. The soils are suitable for ponds for fish and waterfowl.

Engineering Uses of the Soils [4]

Soil engineering deals with soil as a structural material and as the foundation material upon which structures rest. Important steps in soil engineering are locating the various soils, determining their engineering properties, correlating those properties with the requirements of the job, and selecting the best material available for each job.

Information in this publication can be used to—

1. Make studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates of soil properties that are significant in the planning of agricultural drainage systems, farm ponds, irrigation systems, and diversion terraces.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways, airports, pipelines, and cables and in planning detailed investigations at the selected locations.
4. Locate probable sources of gravel and other construction materials.
5. Correlate performance of engineering structures with soil mapping units, to develop information that will be useful in designing and maintaining engineering structures.
6. Determine the suitability of soils for cross-country movement of vehicles and construction equipment.
7. Supplement information from other sources in making maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

With the use of the soil map for identification, the engineering interpretations reported here can be useful for many purposes. It should be emphasized that they do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and excavations deeper than the depths of layers here reported. Even in these situations, the soil map is useful for planning in engineering. These terms and others are defined in the kinds of problems that may be expected.

Some terms used in soil science, for example, clay, silt, and sand, may differ in meaning from the same terms used in engineering. These terms and others are defined in the Glossary.

Engineering classification systems

Most highway engineers classify soil material according to the system approved by the American Association of State Highway Officials (AASHO) (*1*). In the AASHO system, soil materials are classified in seven groups, ranging from A–1, which consists of gravelly soils having high bearing capacity, to A–7, which consists of clay soils having low bearing capacity when wet. The relative engineering value of the soils can be indicated by a group index number, which ranges from 0 for the best materials to 20

[4] KIRK WALKER, JR., agricultural engineer, Soil Conservation Service, helped prepare this section.

for the poorest. The group index number, if it has been determined, is shown in parentheses after the soil group symbol, thus, A-4(8).

Some engineers prefer to use the Unified classification system (*22*) developed by the Corps of Engineers, U.S. Army. In this system, soil materials are identified as coarse grained (eight classes), fine grained (six classes), or highly organic (one class).

Engineering test data

To help evaluate the soils in Cross County for engineering purposes, three samples of soils were tested according to standard procedures. The results are given in table 6.

Moisture-density data are obtained by compacting soil material at successively higher moisture content. Assuming that the compactive effort remains constant, the density of the compacted material increases until the optimum moisture content is reached. After that, the density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed "maximum dry density." Moisture-density data are important in earthwork because, as a rule, optimum stability is obtained if the soil is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

The relative proportions of the different size particles in the soil samples are determined through mechanical analysis made by a combination of sieve and hydrometer methods.

The tests for the plastic limit and liquid limit of soil measure the effect of water on the consistence of the soil material. As the moisture content of a clayey soil increases from a very dry state, the material changes from a semisolid to a plastic state; the moisture content at which this change occurs is the plastic limit. As the moisture content is further increased, the material changes from a plastic to a liquid state; the moisture content at which this change occurs is the liquid limit. The plasticity index is the nu-

TABLE 6.—*Engineering*

[Tests performed by the Arkansas State Highway Department in cooperation with the U.S. Department of Commerce, Bureau of Public

Soil name and location	Parent material	BPR sample No.	Depth from surface	Horizon	Moisture-density data [1]	
					Maximum dry density	Optimum moisture
			In.		*Lb./cu. ft.*	*Pct.*
Arkabutla silt loam: SW¼SE¼SW¼ sec. 11, T. 4 N., R. 3 E. (Ortho).	Loess	63-Ark-19-23-3	13 to 20	C2g	106	17
		63-Ark-19-23-5	36 to 72	C4g	108	16
Foley silt loam: NW¼NW¼SW¼ sec. 6, T. 7 N., R. 1 E. (Ortho).	Loess	63-Ark-19-21-2	6 to 13	A2	109	16
		63-Ark-19-21-3	13 to 29	B21t	105	19
		63-Ark-19-21-5	38 to 72	Cg	107	19
Henry silt loam: NW¼NE¼NE¼ sec. 8, T. 8 N., R. 1 E. (Ortho).	Loess	63-Ark-19-22-2	4 to 17	A2g	108	16
		63-Ark-19-22-3	17 to 24	Bltg	108	18
		63-Ark-19-22-5	31 to 72	Bxg	98	22

[1] Based on AASHO Designation: T 99-57, Method A (*1*).

[2] Mechanical analysis according to AASHO Designation: T 88-57 (*1*). Results by this procedure may differ somewhat from results 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,

TABLE 7.—*Estimated soil properties*

Soil series and map symbol	Depth to seasonal high water table [1]	Depth from surface	Classification		
			USDA texture	Unified	AASHO
	Ft.	*In.*			
Alligator: (AaA, AaB)	0 to ½	0 to 50	Clay	CH	A-7
(Ac, loamy sand part)	0 to ½	0 to 10	Loamy sand	SM	A-2
		10 to 50	Clay	CH	A-7
(Ag)	0 to 1	0 to 10	Silt loam	ML or CL	A-4
		10 to 14	Silty clay loam	ML or CL	A-6
		14 to 50	Clay	CH	A-7
(Am)	0 to ½	0 to 4	Silty clay loam	ML or CL	A-6
		4 to 50	Clay	CH	A-7
Amagon (An)	0 to 1	0 to 6	Silt loam	ML or CL	A-4
		6 to 56	Silty clay loam	ML or CL	A-6

See footnotes at end of table.

merical difference between the liquid limit and the plastic limit (*3*). It indicates the range of moisture content within which a soil material is in a plastic condition.

Estimated properties

Table 7 shows estimates of some of the physical properties of soils that affect engineering work. The data are based on laboratory tests, on field experience with the same kinds of soils in other counties, and on information in other parts of this report.

The rates for permeability are based on the movement of water through the soils in their undisturbed state. These rates depend largely on the texture and structure of the soils.

Available water capacity is approximately the amount of capillary water in the soil at field capacity. At the wilting point of common crops, this amount of water will wet the soil material described to a depth of 1 inch without deeper percolation.

Reaction, which indicates the degree of acidity or alkalinity of the soils, is expressed in pH values.

Dispersion refers to the degree and speed with which soil structure breaks down, or slakes, in water. High dispersion means that the soil aggregates slake readily.

Shrink-swell potential indicates the volume change to be expected when the soil material changes in moisture content. In general, soils classed as CH and A–7 have high shrink-swell potential. Clean sand and most other nonplastic materials have low shrink-swell potential.

Engineering interpretations

Table 8 (p. 42) shows the suitability of the soils as sources of construction material and their suitability for such engineering work as the construction of farm ponds, drainage and irrigation systems, sewage systems, and conservation structures. Following are explanations of some of the column headings in this table.

test data

Roads, in accordance with standard procedures of the American Association of State Highway Officials (AASHO) (*1*)]

Percentage passing sieve [2]—			Liquid limit	Plasticity index	Classification	
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)			AASHO	Unified [3]
100	99	97	26	6	A–4(8)	ML–CL.
	100	96	34	12	A–6(9)	ML–CL.
100	99	98	30	11	A–6(8)	CL.
	100	99	44	25	A–7–6(15)	CL.
	100	97	41	20	A–7–6(12)	CL.
	100	94	29	9	A–4(8)	CL.
	100	95	29	9	A–4(8)	CL.
[4] 99	98	92	41	14	A–7–6(11)	ML–CL.

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.

[3] SCS and BPR have agreed to consider that all soils having plasticity indexes within 2 points of the A-line are to be given a borderline classification. An example of a borderline classification obtained by this use is ML–CL.

[4] 100 percent passed the No. 4 sieve.

significant in engineering

Percentage passing sieve—		Permeability [2]	Available water capacity [3]	Reaction	Dispersion	Shrink-swell potential
No. 10 (2.0 mm.)	No. 200 (0.074 mm.)					
		In./hr.	*In./in. of soil*	*pH*		
100	95 to 98	<0.2	0.19	4.5 to 6.0	Low	Very high.
100	15 to 30	>6.3	.08	5.5 to 6.5	High	Low.
100	95 to 98	<0.2	.19	4.5 to 6.0	Low	Very high.
100	95 to 98	0.2 to 0.63	.22	5.5 to 6.5	High	Low.
100	90 to 98	0.2 to 0.63	.21	5.0 to 6.0	Moderate	Moderate.
100	95 to 98	<0.2	.19	4.5 to 6.5	Low	Very high.
100	90 to 98	0.2 to 0.63	.21	5.5 to 6.5	Moderate	Moderate.
100	95 to 98	<0.2	.19	4.5 to 6.0	Low	Very high.
100	70 to 90	0.2 to 0.63	.22	5.0 to 6.0	High	Low.
100	80 to 95	0.2 to 0.63	.21	5.0 to 6.0	Moderate	Moderate.

TABLE 7.—*Estimated soil properties*

Soil series and map symbol	Depth to seasonal high water table [1]	Depth from surface	Classification		
			USDA texture	Unified	AASHO
	Ft.	*In.*			
Arkabutla (Ar)	2 to 4	0 to 20	Silt loam	ML	A–4
		20 to 36	Silt loam	CL	A–4
		36 to 72	Silt loam	ML or CL	A–4
Bowdre (BoA, BoB, BoC)	½ to 6	0 to 16	Silty clay loam	CL	A–6
		16 to 46	Silt loam	CL	A–4
Calhoun (Ca)	0	0 to 7	Silt loam	ML or CL	A–4
		7 to 40	Silty clay loam	ML or CL	A–6
		40 to 45	Silt loam	ML or CL	A–4
Calloway (ClA, ClB, ClB2)	2	0 to 12	Silt loam	ML	A–4
		12 to 30	Silt loam	ML or CL	A–4
		30 to 50	Silty clay loam	ML or CL	A–6
		50 to 60	Silty clay loam	ML	A–4
Collins (Co)	2 to 4	0 to 46	Silt loam	ML	A–4
Crowley (CrA, CrB) (For Hillemann part of these units, see Hillemann series).	2	0 to 13	Silt loam	ML	A–4
		13 to 20	Silty clay	CL	A–6
		20 to 30	Silty clay loam	CL	A–6
		30 to 48	Silt loam	CL	A–4
Dubbs (DbB, DbC)	4	0 to 5	Fine sandy loam	SM	A–2
		5 to 21	Silt loam	ML or CL	A–4
		21 to 26	Silty clay loam	ML or CL	A–6
		26 to 48	Fine sandy loam	SM	A–2
Dundee:					
(DdA, DdB)	2 to 4	0 to 4	Fine sandy loam	SM	A–2
		4 to 32	Silty clay loam	ML or CL	A–6
		32 to 48	Very fine sandy loam	ML or SM	A–4 or A–2
(DuA, DuB)	2 to 4	0 to 4	Silt loam	ML or CL	A–4
		4 to 32	Silty clay loam	ML or CL	A–6
		32 to 48	Very fine sandy loam	ML or SM	A–4 or A–2
Earle:					
(EcA, EcB, EcC)	2 to 4	0 to 32	Clay	CL or CH	A–7
		32 to 46	Sandy loam	SC	A–2 or A–4
(EsB)	2 to 4	0 to 8	Silty clay loam	ML or CL	A–6
		8 to 32	Clay	CL	A–7
		32 to 46	Sandy loam	SC	A–2 or A–4
Foley (FgA) (For Grubbs part of this unit, see Grubbs series).	1 to 3	0 to 13	Silt loam	ML or CL	A–4 or A–6
		13 to 38	Silty clay loam	CL	A–6 or A–7
		38 to 72	Silt loam	CL	A–6 or A–7
Grenada (GrB, GrB2)	2 to 4	0 to 4	Silt loam	ML	A–4
		4 to 15	Silt loam	CL	A–4
		15 to 25	Silty clay loam	CL	A–6
		25 to 32	Silt loam	CL	A–4
		32 to 54	Silty clay loam	CL	A–6
		54 to 82	Silt loam	ML or CL	A–4
Grubbs	0 to 1	0 to 4	Silt loam	ML or CL	A–4
		4 to 17	Silty clay loam	CL	A–6
		17 to 26	Silty clay	CL or CH	A–7
		26 to 48	Silty clay loam	CL	A–6 or A–7
Gullied land (Gu)	10+	(4)	Silt loam or silty clay loam.	ML or CL	A–4 or A–6
Henry (He)	0	0 to 17	Silt loam	CL	A–4
		17 to 31	Silty clay loam	CL	A–4 or A–6
		31 to 72	Silty clay loam	ML or CL	A–4 or A–6
Hillemann	2	0 to 13	Silt loam	ML	A–4
		13 to 20	Silty clay	CL	A–6
		20 to 30	Silty clay loam	CL	A–6
		30 to 48	Silt loam	CL	A–4

See footnotes at end of table.

significant in engineering—Continued

Percentage passing sieve—		Permeability [2]	Available water capacity [3]	Reaction	Dispersion	Shrink-swell potential
No. 10 (2.0 mm.)	No. 200 (0.074 mm.)					
		In./hr.	*In./in. of soil*	*pH*		
100	90 to 98	0. 2 to 0. 63	0. 22	5. 0 to 6. 0	High	Low.
100	90 to 98	0. 2 to 0. 63	. 22	4. 5 to 5. 5	High	Low.
100	90 to 98	0. 2 to 0. 63	. 22	4. 5 to 5. 5	High	Low.
100	90 to 98	0. 2 to 0. 63	. 21	5. 5 to 7. 0	Moderate	Moderate.
100	90 to 98	0. 2 to 0. 63	. 22	5. 0 to 6. 0	High	Low.
100	90 to 98	0. 2 to 0. 63	. 22	4. 5 to 7. 0	High	Low.
100	90 to 98	0. 2 to 0. 63	. 21	4. 5 to 5. 5	Moderate	Moderate.
100	90 to 98	0. 2 to 0. 63	. 22	4. 5 to 6. 0	High	Low.
100	90 to 99	0. 2 to 0. 63	. 22	5. 0 to 7. 0	High	Low.
100	90 to 99	0. 2 to 0. 63	. 22	4. 5 to 5. 5	High	Low.
100	90 to 99	0. 2 to 0. 63	. 21	4. 5 to 5. 5	Moderate	Moderate.
100	90 to 99	0. 2 to 0. 63	. 22	4. 5 to 6. 0	High	Low.
100	95 to 100	0. 2 to 0. 63	. 22	4. 5 to 6. 0	High	Low.
100	90 to 98	0. 2 to 0. 63	. 22	5. 5 to 7. 0	High	Low.
100	90 to 98	0. 2 to 0. 63	. 18	4. 5 to 6. 0	Low	High.
100	90 to 98	0. 2 to 0. 63	. 21	4. 5 to 6. 0	Moderate	Moderate.
100	90 to 98	0. 2 to 0. 63	. 22	5. 5 to 6. 5	High	Low.
100	30 to 50	2. 0 to 6. 3	. 14	5. 5 to 6. 5	High	Low.
100	90 to 98	0. 2 to 0. 63	. 22	5. 0 to 6. 0	High	Low.
100	90 to 98	0. 2 to 0. 63	. 17	5. 5 to 6. 0	Moderate	Moderate.
100	30 to 50	2. 0 to 6. 3	. 14	4. 5 to 5. 5	High	Low.
100	30 to 50	2. 0 to 6. 3	. 14	5. 0 to 7. 0	High	Low.
100	90 to 98	0. 2 to 0. 63	. 21	4. 5 to 5. 5	Moderate	Moderate.
100	30 to 60	0. 63 to 2. 0	. 22	4. 5 to 5. 5	High	Low.
100	90 to 98	0. 2 to 0. 63	. 22	5. 0 to 6. 0	High	Low.
100	90 to 98	0. 2 to 0. 63	. 21	4. 5 to 5. 5	Moderate	Moderate.
100	30 to 60	0. 63 to 2. 0	. 22	4. 5 to 5. 5	High	Low.
100	95 to 98	$<$0. 2	. 19	4. 5 to 6. 0	Low	Very high.
100	20 to 40	$>$0. 63	. 08	4. 5 to 6. 0	High	Low.
100	90 to 98	0. 2 to 0. 63	. 21	5. 5 to 6. 0	Moderate	Moderate.
100	95 to 98	$<$0. 2	. 19	4. 5 to 6. 0	Low	Very high.
100	20 to 40	$>$0. 63	. 08	4. 5 to 6. 0	High	Low.
100	90 to 98	0. 2 to 0. 63	. 22	5. 0 to 7. 0	High	Low.
100	90 to 98	0. 2 to 0. 63	. 21	5. 5 to 8. 5	Moderate	Moderate.
100	90 to 98	0. 2 to 0. 63	. 22	7. 5 to 9. 0	High	Low.
100	90 to 98	0. 2 to 0. 63	. 22	5. 5 to 6. 5	High	Low.
100	90 to 98	0. 2 to 0. 63	. 22	4. 5 to 6. 0	High	Low.
100	95 to 98	0. 2 to 0. 63	. 21	4. 5 to 5. 5	Moderate	Moderate.
100	90 to 98	0. 2 to 0. 63	. 22	4. 5 to 5. 5	High	Low.
100	95 to 98	0. 2 to 0. 63	. 21	4. 5 to 5. 5	Moderate	Moderate.
100	90 to 98	0. 2 to 0. 63	. 22	4. 5 to 6. 0	High	Low.
100	90 to 98	0. 2 to 0. 63	. 23	4. 5 to 7. 0	High	Low.
100	95 to 98	0. 2 to 0. 63	. 21	5. 5 to 6. 5	Moderate	Moderate.
100	95 to 99	$<$0. 2	. 19	7. 0 to 8. 0	Low	High.
100	95 to 98	0. 2 to 0. 63	. 21	7. 0 to 8. 5	Moderate	Moderate.
100	90 to 98 or 95 to 98	0. 2 to 0. 63	([4])	([4])	High or moderate	Low or moderate.
100	90 to 98	0. 2 to 0. 63	. 22	4. 5 to 6. 5	High	Low.
100	95 to 98	0. 2 to 0. 63	. 21	4. 5 to 5. 5	Moderate	Moderate.
100	95 to 98	0. 2 to 0. 63	. 21	4. 0 to 5. 5	Moderate	Moderate.
100	90 to 98	0. 2 to 0. 63	. 22	5. 5 to 7. 0	High	Low.
100	90 to 98	0. 2 to 0. 63	. 18	4. 5 to 6. 0	Low	High.
100	90 to 98	0. 2 to 0. 63	. 21	4. 5 to 6. 0	Moderate	Moderate.
100	90 to 98	0. 2 to 0. 63	. 22	5. 5 to 6. 5	High	Low.

TABLE 7.—*Estimated soil properties*

Soil series and map symbol	Depth to seasonal high water table [1]	Depth from surface	Classification		
			USDA texture	Unified	AASHO
	Ft.	*In.*			
Iuka (IuA, IuB, IvB, IvC)	2 to 4	0 to 5	Loam	SM or ML	A–2 or A–4
		5 to 22	Fine sandy loam	SM or ML	A–2 or A–4
		22 to 46	Very fine sandy loam	SM or ML	A–2 or A–4
Lexington (LeC2)	10+	0 to 10	Silt loam	ML or CL	A–4
		10 to 32	Silty clay loam	CL	A–6
		32 to 45	Very fine sandy loam	SM, ML or CL	A–2 or A–4
Loring (LgB, LgB2, LgC, LgC2, LgD2, LmE, LmE2, LmE3, LmF). (For Memphis part of LmE, LmE2, LmE3, LmF, see Memphis series).	10+	0 to 10	Silt loam	ML or CL	A–4
		10 to 30	Silty clay loam	ML or CL	A–6
		30 to 48	Silt loam	ML or CL	A–4
Mantachie (Ma)	2 to 4	0 to 7	Loam	SM	A–2
		7 to 11	Very fine sandy loam	SM	A–2
		11 to 19	Silt loam	CL	A–4
		19 to 46	Very fine sandy loam	SM	A–2
Memphis	10+	0 to 10	Silt loam	ML or CL	A–4
		10 to 22	Silty clay loam	CL	A–6
		22 to 52	Silt loam	CL	A–4
Ochlockonee (Oc)	2 to 4	0 to 6	Loam	SM	A–2
		6 to 11	Very fine sandy loam	SM	A–2
		11 to 49	Fine sandy loam	SM	A–2
Providence (PrB, PrC2)	2 to 4	0 to 13	Silt loam	ML or CL	A–4
		13 to 21	Silty clay loam	ML or CL	A–6
		21 to 32	Silt loam	ML or CL	A–4
		32 to 39	Very fine sandy loam	SM	A–2
		39 to 60	Sandy clay loam	MH or SC	A–6 or A–7
Rough broken land (Rb)	10+	(4)	(4)	(4)	(4)
Zachary (Za)	0	0 to 31	Silt loam	ML or CL	A–4
		31 to 47	Silty clay	CL	A–6

[1] In winter the water table can be expected to rise.
[2] Permeability is for uncompacted soil.

Topsoil is needed to maintain vegetation for control of erosion on embankments, road shoulders, ditches, and cut slopes. Loring and Memphis soils are the best sources of topsoil.

Road fill is needed in constructing roads in areas that are flooded, are swampy, have a high water table, or are ponded for long periods. Good sources of road fill are Dubbs, Iuka, Lexington, and Ochlockonee soils.

Sand and gravel are needed for subbase and base courses, for pavements, and for surfacing county roads. Generally the soils in the county are poor, unsuitable, or only fair sources of sand and gravel.

Soils were rated for winter grading on the basis of drainage and the workability of the soil material when it is wet. Grenada, Lexington, Loring, Memphis, and Ochlockonee soils are suitable for this practice.

Farm ponds in this county are generally constructed by excavation or by building an earthen embankment across a natural drainageway. Ponds can be excavated on such soils as Alligator, Calhoun, Foley, and Zachary and can be impounded on Loring and Memphis soils. Both kinds of ponds are suitable on Grenada soils.

Agricultural drainage is essential to the use of many of the soils on bottom lands, especially the Alligator, Amagon, and Earle soils (fig. 10). It is also required for Henry, Calhoun, Calloway, and other soils that have poor drainage as a result of a slowly permeable layer. Drainage generally is improved in Cross County by land grading and by open ditches.

Irrigation during part of the growing season is beneficial on many of the soils. Water for irrigation is obtained from wells and from rivers and other streams. It is also stored in farm reservoirs. Several methods of irrigation, including furrow, contour levee, and sprinkler, are widely used. Land leveling is necessary in order to irrigate many of the soils. Amagon, Arkabutla, and Grenada are examples of soils suitable for irrigation.

Irrigation dikes and levees are difficult to construct in some soils that contain a large amount of clay, such as Alligator, Bowdre, and Earle, or a large amount of sand, *significant in engineering*—Continued

Percentage passing sieve— No. 10 (2.0 mm.)	Percentage passing sieve— No. 200 (0.074 mm.)	Permeability [2]	Available water capacity [3]	Reaction	Dispersion	Shrink-swell potential
		In./hr.	*In./in. of soil*	*pH*		
100	30 to 60	0.63 to 6.3	0.17	5.5 to 6.5	High	Low.
100	30 to 60	2.0 to 6.3	.14	4.5 to 6.0	High	Low.
100	30 to 60	0.63 to 2.0	.22	4.5 to 6.0	High	Low.
100	90 to 98	0.2 to 0.63	.22	4.5 to 7.0	High	Low.
100	90 to 98	0.2 to 0.63	.21	4.5 to 6.0	Moderate	Moderate.
100	30 to 60	0.63 to 2.0	.22	4.5 to 6.0	High	Low.
100	95 to 100	0.2 to 0.63	.22	5.0 to 7.0	High	Low.
100	95 to 100	0.2 to 0.63	.21	4.5 to 5.0	Moderate	Moderate.
100	95 to 100	0.2 to 0.63	.22	4.5 to 5.5	High	Low.
100	30 to 50	0.63 to 6.3	.17	5.5 to 7.0	High	Low.
100	30 to 50	2.0 to 6.3	.22	5.0 to 6.5	High	Low.
100	90 to 98	0.2 to 0.63	.22	4.5 to 6.0	High	Low.
100	30 to 50	0.63 to 6.3	.14	4.5 to 6.0	High	Low.
100	95 to 100	0.2 to 0.63	.22	5.0 to 6.5	High	Low.
100	95 to 100	0.2 to 0.63	.21	5.0 to 6.0	Moderate	Moderate.
100	95 to 100	0.2 to 0.63	.22	5.0 to 6.0	High	Low.
100	30 to 50	0.63 to 2.0	.17	5.5 to 7.0	High	Low.
100	30 to 50	0.63 to 2.0	.22	5.0 to 6.5	High	Low.
100	30 to 50	2.0 to 6.3	.14	4.5 to 6.0	High	Low.
100	90 to 98	0.2 to 0.63	.22	4.5 to 6.0	High	Low.
100	95 to 98	0.2 to 0.63	.21	4.5 to 5.5	Moderate	Moderate.
100	90 to 98	0.2 to 0.63	.22	4.5 to 5.5	High	Low.
100	30 to 50	0.63 to 2.0	.22	4.5 to 5.5	High	Low.
100	40 to 60	0.2 to 0.63	.17	4.5 to 5.5	Moderate	Moderate.
(4)	(4)	(4)	(4)	(4)	(4)	(4).
100	95 to 98	0.2 to 0.63	.22	4.0 to 6.0	High	Low.
100	95 to 100	<0.2	.18	4.0 to 5.5	Low	Very high.

[3] Values for available water capacity are midpoint in a range.
[4] Variable materials; not classified.

***Figure 10.*—Water ponded as a result of inadequate drainage on Earle clay, gently undulating.**

such as Iuka and Ochlockonee. Clayey soils have a high shrink-swell potential and, consequently, crack during the process of drying. Sandy soils permit water to seep through the dike or levee.

Land leveling reshapes the land surface by the removal of knolls, mounds, and ridges and by the filling of swales, potholes, and gullies. It increases the efficiency of irrigation and improves surface drainage. Some of the soils that can be improved by leveling are Amagon, Henry, Arkabutla, Dundee, and Dubbs.

Terraces, diversions, and waterways are essential for effective erosion control (*10*) on many of the soils on Crowley Ridge and in the steeper areas of the loessal plain. Some of these soils are Memphis, Loring, and Grenada.

Many soils in Cross County have features that severely limit their use for sewage lagoons, generally because they are flooded or are underlain by sand. Some of these soils are Collins, Dubbs, and Earle. A few soils, such as the Memphis soils and some Loring soils, are too steep.

TABLE 8.—*Engineering*

Soil series and map symbols	Suitability as source of—			Suitability for winter grading	Soil features affecting suitability for—
	Topsoil	Road fill	Sand and gravel		Farm ponds
Alligator (AaA, AaB, Ac, Ag, Am).	Poor	Poor	Poor: no gravel; sand below a depth of 12 feet in places.	Very poor: poor drainage; large amount of clay; seasonal high water table.	Soil features favorable for excavated ponds.
Amagon (An)	Poor	Fair	Poor: no gravel; sand below a depth of 60 inches in places.	Poor: poor drainage; seasonal high water table.	High seepage rate
Arkabutla (Ar)	Fair	Fair	Unsuitable	Poor: somewhat poor drainage; seasonal high water table.	Soil features favorable for excavated ponds.
Bowdre (BoA, BoB, BoC).	Poor	Poor	Poor: no gravel; sand below a depth of 48 inches in places.	Poor: moderately good drainage; large amount of clay; seasonal high water table.	High seepage rate
Calhoun (Ca)	Poor	Fair	Unsuitable	Poor: poor drainage; seasonal high water table.	Soil features favorable for excavated ponds.
Calloway (ClA, ClB, ClB2).	Fair	Fair	Unsuitable	Fair: somewhat poor drainage; seasonal high water table.	Soil features favorable for excavated ponds.
Collins (Co)	Fair	Fair	Unsuitable	Fair: moderately good drainage; occasional flooding.	Soil features favorable for excavated ponds.
Crowley (CrA, CrB) (For Hillemann part of these units, see Hillemann series).	Poor	Fair	Unsuitable	Poor: poor drainage; high water table.	Soil features favorable for excavated ponds.
Dubbs (DbB, DbC)	Fair	Good	Poor: no gravel; sand below a depth of 26 inches.	Fair: good drainage; seasonal high water table.	High seepage rate
Dundee (DdA, DdB, DuA, DuB).	Fair	Fair	Poor: no gravel; sand below a depth of 32 inches.	Fair: somewhat poor drainage; seasonal high water table.	High seepage rate
Earle (EcA, EcB, EcC, EsB).	Poor	Poor	Poor: no gravel; sand below a depth of 36 inches in places.	Very poor: somewhat poor drainage; large amount of clay; seasonal high water table.	High seepage rate in places.
Foley (FgA) (For Grubbs part of this unit, see Grubbs series).	Poor	Poor	Unsuitable	Poor: poor drainage; dispersion.	Soil features favorable for excavated ponds.
Grenada (GrB, GrB2).	Fair	Fair	Fair: sand and gravel below a depth of 5 feet in places.	Good: moderately good drainage.	Severe erosion hazard; soil features favorable for excavated and impounded ponds.

See footnote at end of table.

interpretations of soils

Soil features affecting suitability for—Continued					Degree and kind of limitation for sewage lagoons
Agricultural drainage	Irrigation	Irrigation dikes and levees	Land leveling	Terraces, diversions, and waterways	
Poor drainage; seasonal high water table; very slow permeability.	Rapid intake rate when dry and very slow when wet; moderate water-holding capacity.	High shrink-swell potential.	Soil features favorable.	No erosion hazard	No limitations.
Poor drainage; seasonal high water table; very slow permeability.	Moderate intake rate; moderate water-holding capacity.	Soil features favorable.	Soil features favorable.	No erosion hazard	Severe: sand below a depth of 60 inches in places.
Somewhat poor drainage; seasonal high water table; moderate permeability.	Moderate intake rate; moderate water-holding capacity.	Soil features favorable.	Soil features favorable.	No erosion hazard	Severe: occasional flooding.
Moderately good drainage; banks slough if cut into underlying sand.	Rapid intake rate when dry and slow when wet; high water-holding capacity.	High shrink-swell potential.	Soil features favorable.	No erosion hazard	Severe: sand below a depth of 48 inches in places.
Poor drainage; seasonal high water table.	Very slow intake rate: moderate water-holding capacity.	Soil features favorable.	Soil features favorable.	No erosion hazard	No limitations.
Somewhat poor drainage; fragipan restricts drainage; seasonal high water table.	Slow intake rate; moderate water-holding capacity.	Soil features favorable.	Soil features favorable.	Needed in some eroded areas where tilth is difficult to maintain.	No limitations.
Moderately good natural drainage.	Moderate intake rate; moderate water-holding capacity.	Soil features favorable.	Soil features favorable.	No erosion hazard	Severe: occasional flooding.
Poor drainage; seasonal high water table.	Slow intake rate; moderate water-holding capacity.	Soil features favorable.	Soil features favorable.	No erosion hazard	No limitations.
Good natural drainage	Moderate intake rate; moderate water-holding capacity.	Soil features favorable.	Soil features favorable.	Irregular slopes	Severe: sand below a depth of 26 inches.
Somewhat poor drainage; seasonal high water table; undulating surface.	Moderate intake rate; moderate water-holding capacity.	Soil features favorable.	Soil features favorable.	No erosion hazard	Severe: sand below a depth of 32 inches.
Somewhat poor drainage; banks slough if cut into underlying sand.	Very rapid intake rate when dry and very slow when wet; very high water-holding capacity.	High shrink-swell potential.	Soil features favorable.	No erosion hazard	Severe: sand below a depth of 36 inches in places.
Poor drainage; large amount of salts; low crop yields; benefits do not warrant cost.	Very slow intake rate; moderate water-holding capacity.	Soil features favorable.	Large amount of salts.	Salts toxic to plants.	No limitations.
Moderately good natural drainage.	Moderate intake rate; moderate water-holding capacity.	Soil features favorable.	Limited cuts; fragipan at a depth of 22 to 30 inches.	Severe erosion hazard; structures difficult to maintain.	No limitations.

TABLE 8.—*Engineering*

Soil series and map symbols	Suitability as source of—			Suitability for winter grading	Soil features affecting suitability for—
	Topsoil	Road fill	Sand and gravel		Farm ponds
Grubbs	Poor	Poor	Unsuitable	Poor: somewhat poor drainage; clayey; high water table.	Soil features favorable for excavated ponds.
Gullied land (Gu)	([1])	([1])	([1])	([1])	([1])
Henry (He)	Poor	Fair	Unsuitable	Poor: poor drainage; seasonal high water table.	Soil features favorable for excavated ponds.
Hillemann	Fair	Poor	Unsuitable	Poor: somewhat poor drainage.	Soil features favorable for excavated ponds.
Iuka (IuA, IuB, IvB, IvC).	Fair	Good	Fair: no gravel; sand throughout, and coarse sand below a depth of 50 inches.	Fair: moderately good drainage; seasonal high water table.	High seepage rate
Lexington (LeC2)	Fair	Good	Fair: no gravel; sand below a depth of 30 inches.	Good: good drainage	Soil features favorable for impounded ponds.
Loring (LgB, LgB2, LgC, LgC2, LgD2, LmE, LmE2, LmE3, LmF). (For Memphis part of LmE, LmE2, LmE3, LmF, see Memphis series).	Good in uneroded or slightly eroded areas; fair in severely eroded areas.	Fair	Fair: sand and gravel below a depth of 5 feet.	Good: moderately good drainage.	Severe erosion hazard; soil features favorable for impounded ponds.
Mantachie (Ma)	Fair	Fair	Fair: no gravel; sand below a depth of 20 inches.	Fair: somewhat poor drainage; seasonal high water table.	High seepage rate
Memphis	Good in uneroded or slightly eroded areas; fair in severely eroded areas.	Fair	Fair: sand and gravel below a depth of 5 feet in places.	Good: good drainage	Severe erosion hazard; soil features favorable for impounded ponds.
Ochlockonee (Oc)	Fair	Good	Fair: no gravel; sand throughout, and coarse sand below a depth of 50 inches.	Good: good drainage; seasonal high water table.	High seepage rate
Providence (PrB, PrC2)	Fair	Fair	Fair: no gravel; sand below a depth of 32 inches.	Fair: moderately good drainage.	High seepage rate
Rough broken land (Rb).	([1])	([1])	([1])	([1])	([1])
Zachary (Za)	Poor	Poor	Unsuitable	Very poor: poor drainage; seasonal high water table; frequent flooding.	Soil features favorable for excavated ponds.

[1] Variable materials; not classified.

interpretations of soils—Continued

Soil features affecting suitability for—Continued					Degree and kind of limitation for sewage lagoons
Agricultural drainage	Irrigation	Irrigation dikes and levees	Land leveling	Terraces, diversions, and waterways	
Somewhat poor drainage; benefits do not warrant cost.	Benefits do not warrant cost.	Soil features favorable.	Shallow to salts; benefits do not warrant cost.	No erosion hazard	No limitations.
(1)	(1)	(1)	(1)	(1)	(1).
Poor drainage; seasonal high water table.	Very slow intake rate; moderate water-holding capacity.	Soil features favorable.	Soil features favorable.	No erosion hazard	No limitations.
Somewhat poor drainage; seasonal high water table.	Slow intake rate; moderate water-holding capacity.	Soil features favorable.	Limited cuts; large amount of salts.	Little or no erosion hazard.	No limitations.
Moderately good natural drainage.	Moderate intake rate; moderate water-holding capacity.	Large amount of sand in places.	Soil features favorable.	Erosion hazard on slopes.	Severe: flooding; coarse sand below a depth of 50 inches.
Good natural drainage	Moderate intake rate; moderate water-holding capacity.	Soil features favorable.	Limited cuts; sand below a depth of 30 inches.	Erosion hazard; structure difficult to maintain.	Severe: sand below a depth of 30 inches.
Moderately good natural drainage.	Moderate intake rate; slopes; benefits do not warrant cost.	Soil features favorable.	Slopes; limited cuts; fragipan at depths of 24 to 36 inches.	Severe erosion hazard; structures difficult to maintain.	No limitations on slopes of 1 to 3 percent; severe on steeper slopes.
Somewhat poor drainage; seasonal high water table.	Moderate to moderately slow intake rate; moderate water-holding capacity.	Soil features favorable.	Soil features favorable.	No erosion hazard	Severe: sand below a depth of 20 inches.
Good natural drainage	Moderate intake rate; slopes of 12 to 20 percent; benefits do not warrant cost.	Slopes of 12 to 20 percent.	Slopes of 12 to 20 percent; fragipan in places at depths of 30 to 36 inches.	Slopes of 12 to 20 percent; severe erosion hazard.	Severe: slopes of 12 to 20 percent.
Good natural drainage	Moderately rapid intake rate; moderate water-holding capacity.	Large amount of sand in places.	Soil features favorable.	No erosion hazard	Severe: flooding; coarse sand below a depth of 50 inches.
Moderately good natural drainage.	Moderate intake rate; moderate water-holding capacity.	Soil features favorable.	Limited cuts; fragipan.	Erosion hazard; structures difficult to maintain.	Severe: sand below a depth of 32 inches.
(1)	(1)	(1)	(1)	(1)	(1).
Benefits do not warrant cost, unless soils are protected from flooding.	Very slow intake rate; moderate water-holding capacity.	Soil features favorable.	Soil features favorable.	No erosion hazard	Severe: frequent flooding.

The interpretations in table 8 are useful in evaluating the suitability of the soils for highway construction. For example, Alligator, Bowdre, Earle, and other soils that have a high shrink-swell potential are not suitable for use as subgrade material. Many of the soils have a high water table or are ponded. Roads on these soils should be constructed on fill sections that are provided with underdrains and surface drains.

The natural levees and ridges are generally the best sites for roads because they have good surface drainage. Dubbs, Grenada, Lexington, Loring, and Providence are in such locations. The Dubbs and some of the other soils on natural levees are made up of sandy material that is suitable for use in pavement foundations. Most of the medium-textured soils are suitable for low-maintenance farm roads.

Bedrock is at such great depth that it is not a problem in highway construction, and for the same reason, it cannot be used as a footing for foundations.

Clay mineralogy of selected soils and its effect on engineering use [5]

The presence of clay in soils is important in engineering because clay influences the retention and movement of water and the stability of soils as foundation material.

Samples of Arkabutla, Foley, and Henry soils were collected and tested by chemical analysis, X-ray diffraction, and other analytical techniques according to standard procedures (*4*, *7*, *8*). The results of these tests provide the basis for the clay mineralogy data reported in table 9.

The data show that the three soils developed in similar parent material. Consequently, the differences in mineralogy are the result of slight variations in internal drainage, in extent of leaching, and in the chemical environment in which secondary clay formation took place.

[5] By M. E. Horn, associate professor, and W. R. Coston, graduate assistant, University of Arkansas, Agricultural Experiment Station.

TABLE 9.—*Clay mineralogy*

[Dashed lines mean

Soil	Sample number	Horizon	Depth from surface	Fine silt (5 to 2 microns) [1]		Coarse clay (2 microns to 0.2 micron) [2 3]	
				Percentage of sample	Mineralogy of sample	Percentage of sample	Mineralogy of sample
			In.				
Arkabutla silt loam	S-62-Ark-19-23-3	C1g	13 to 20	5.7	75 percent quartz, 15 percent illite, 5 percent kaolinite, 3 percent potassium feldspars, 2 percent plagioclase feldspars.	9.9	45 percent kaolinite, 23 percent vermiculite, 17 percent illite, 10 percent montmorillonite; 5 percent quartz.
	S-63-Ark-19-23-5	C3g	36 to 72	3.2	60 percent quartz, 24 percent illite, 7 percent kaolinite, 3 percent chlorite, 3 percent potassium feldspars, 3 percent plagioclase feldspars.	8.3	42 percent kaolinite, 18 percent montmorillonite; 17 percent illite, 10 percent vermiculite, 10 percent interstratified minerals, 3 percent quartz.
Foley silt loam	S-63-Ark-19-21-2	A2	6 to 13	4.3	75 percent quartz, 20 percent illite, 3 percent plagioclase feldspars, 2 percent kaolinite, 1 percent potassium feldspars.	18.4	39 percent montmorillonite, 35 percent vermiculite, 11 percent illite, 10 percent kaolinite, 3 percent quartz, 1 percent interstratified minerals, 1 percent chlorite.
	S-63-Ark-19-21-3	B21t	13 to 29	5.2	70 percent quartz, 25 percent illite, 2 percent kaolinite, 2 percent plagioclase feldspars, 1 percent potassium feldspars.	18.4	52 percent montmorillonite, 18 percent kaolinite, 15 percent vermiculite, 12 percent illite, 2 percent quartz.
	S-63-Ark-19-21-5	Cg	38 to 72	5.4	80 percent quartz, 10 percent vermiculite, 5 percent illite; 2 percent kaolinite, 2 percent plagioclase feldspars, less than 1 percent potassium feldspars, less than 1 percent chlorite.	16.5	45 percent montmorillonite, 25 percent kaolinite, 15 percent vermiculite, 13 percent illite, 2 percent quartz.

See footnotes at end of table.

In fine clays, montmorillonite makes up more than 80 percent of the clay minerals in all the samples, and amorphous materials make up the rest. In medium clays, montmorillonite makes up about 50 to 80 percent of the clay minerals; amorphous materials, small amounts of interstratified silica clays, illite, vermiculite, and kaolinite make up the rest. The coarse clays contain several kinds of secondary minerals and traces of primary minerals.

Some properties of the three soils studied in Cross County are summarized in the following paragraphs, and the relationship of clay mineralogy to the engineering properties of each soil is briefly discussed.

Arkabutla silt loam.—Arkabutla soils have an abundance of kaolinite because they developed in sediments that were washed from older soils and had been weathered to some extent. The larger amount of montmorillonite in the C3g horizon is responsible for the higher plasticity index in this horizon, as compared with that in the C1g horizon. In engineering use, these soils commonly have to be drained or filled, but there are no unusual problems.

Foley silt loam.—In Foley soils, the weathering of primary minerals has released large amounts of sodium and magnesium, which may have been concentrated by the movement of ground water and the evaporation of surface water. The concentration of these minerals in the subsoil is the result of incomplete leaching.

The abundance of magnesium has favored the formation of the expanding clays—montmorillonite and vermiculite. The strong concentration of sodium has dispersed the clay particles. These dispersed and expanding clay particles have made the Foley soils very slowly permeable to water.

Because these soils contain both sodium and montmorillonite, they are difficult to use for engineering purposes. In actual engineering practice, however, the sodium can be replaced by calcium. This replacement favors the floc-

of selected soils

absence of data]

Medium clay (0.2 to 0.08 micron) [2,3]		Fine clay (less than 0.08 micron)		Total percentage of clay [4]	Calculated cation-exchange capacity of clay fraction	Percentage of free iron as Fe_2O_3
Percentage of sample	Mineralogy of sample	Percentage of sample	Mineralogy of sample			
					Meq./100 gm.	
--------	--------	--------	--------	--------	46	1.2
3.5	48 percent montmorillonite, 28 percent amorphous materials, 13 percent illite, 5 percent vermiculite, 5 percent interstratified minerals, 1 percent kaolinite.	1.0	92 percent montmorillonite, 8 percent amorphous materials.	12.8	45	1.6
3.6	78 percent montmorillonite, 10 percent interstratified minerals, 8 percent illite, 4 percent amorphous materials.	1.6	91 percent montmorillonite, 9 percent amorphous materials.	23.6	77	.7
6.5	68 percent montmorillonite, 23 percent amorphous materials, 9 percent illite.	1.6	89 percent montmorillonite, 11 percent amorphous materials.	26.0	68	.6
2.1	82 percent montmorillonite, 10 percent illite, 8 percent amorphous materials.	1.0	85 percent montmorillonite, 15 percent amorphous materials.	19.6	78	1.5

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TABLE 9.—*Clay mineralogy*

Soil	Sample number	Horizon	Depth from surface	Fine silt (5 to 2 microns) [1]		Coarse clay (2 microns to 0.2 micron) [2] [3]	
				Percentage of sample	Mineralogy of sample	Percentage of sample	Mineralogy of sample
			In.				
Henry silt loam	S-63-Ark-19-22-2	A2	4 to 17	6.9	75 percent quartz, 15 percent illite, 4 percent chlorite, 2 percent kaolinite, 2 percent plagioclase feldspars, 2 percent potassium feldspars.	10.2	39 percent kaolinite, 25 percent vermiculite, 11 percent illite, 10 percent quartz, 10 percent interstratified minerals, 3 percent potassium feldspars, 2 percent plagioclase feldspars.
	S-63-Ark-19-22-3	B21tg	17 to 24	6.8	70 percent quartz, 20 percent illite, 5 percent kaolinite, 3 percent plagioclase feldspars, 2 percent potassium feldspars.	12.6	35 percent kaolinite, 18 percent illite, 15 percent vermiculite, 10 percent montmorillonite, 10 percent interstratified minerals, 10 percent quartz, 1 percent potassium feldspars, 1 percent plagioclase feldspars.
	S-63-Ark-19-22-5	Bxg	31 to 72	6.4	60 percent quartz, 25 percent illite, 10 percent kaolinite, 3 percent vermiculite, 1 percent plagioclase feldspars, 1 percent potassium feldspars.	22.0	58 percent montmorillonite, 20 percent vermiculite, 15 percent illite, 5 percent kaolinite, 2 percent quartz.

[1] Biotite mica and muscovite mica are included with the illite.
[2] Percentage of illite is based on percentage of K_2O.
[3] Interstratified minerals consist largely of regular interstratification of illite and vermiculite and of illite and montmorillonite.

culation of clay particles, which modifies the plastic and liquid limits and drastically alters engineering behavior.

Henry silt loam.—Kaolinite is dominant in the upper horizons (A1 and B21), and the montmorillonite, which probably has been moved downward from the upper part of the profile, is dominant in the lowest horizon (Bxg), which is at a depth between 31 and 72 inches. This distribution explains why the AASHO classification of the upper horizons is A-4(8) and that of the lowest, or fragipan, horizon is A-7-6(11), as shown in table 6, page 36.

The fragipan has other physical characteristics that cannot ordinarily be determined by testing samples of disturbed material. For example, an undisturbed fragipan is brittle partly because of the arrangement of clay particles in relation to coarser particles and to voids. If the fragipan is examined under a microscope, the compactness appears to be caused chiefly by the concentration of illuvial clay on the walls facing the voids and by the concentration of iron oxide in the soil particles adjacent to the voids. Very slow permeability is caused by the high proportion of small, discontinuous voids. Mechanically breaking up a fragipan improves permeability because it rearranges the clay particles and creates many larger voids.

The strongly developed fragipan in Henry soils can impede drainage and cause seepage or a perched water table. This may lead to failure in subgrades and pavements. If the soil material is disturbed to a depth of 3 or 4 feet, however, the fragipan is generally broken up and drainage is improved. If the fragipan is at a depth great enough to permit good drainage of the subgrade material, failure is not likely.

Use of Soils for Building Sites, Recreational Facilities, and Trafficways

Physiographic position affects the use of the soils for nonfarm purposes. The soils on bottom lands are level or undulating. Some are limited mainly by a high water table or by flooding, others contain a large amount of clay and consequently have a high shrink-swell potential and slow percolation. On Crowley Ridge the main limitations are short, steep slopes, severe erodibility, and, in some soils, restricted percolation caused by a fragipan layer. The steep soils are in scenic areas that are ideal for recreation, and the soils that have slopes of less than 12 percent are well suited to residential and recreational development. On the broad, gently sloping loessal plains, wetness from accumulation of runoff and from flooding along the streams is the major limitation. In most of these soils restriction of percolation by a fragipan or claypan is also a limitation.

In table 10 the soils are rated according to their suitability for use in five categories—foundations, septic tank filter fields, recreation, light industry, and trafficways.

of selected soils—Continued

Medium clay (0.2 to 0.08 micron) [2,3]		Fine clay (less than 0.08 micron)		Total percentage of clay [4]	Calculated cation-exchange capacity of clay fraction	Percentage of free iron as Fe_2O_3
Percentage of sample	Mineralogy of sample	Percentage of sample	Mineralogy of sample			
					Meq./100 gm.	
8.4	80 percent montmorillonite, 10 percent amorphous materials, 5 percent illite, 5 percent kaolinite.	0.8	83 percent montmorillonite, 17 percent amorphous materials.	19.4	96	.4
8.5	58 percent montmorillonite, 27 percent amorphous materials, 10 percent kaolinite, 5 percent illite.	2.2	95 percent montmorillonite, 5 percent amorphous materials.	23.3	87	.5
6.7	51 percent montmorillonite, 21 percent amorphous materials, 15 percent kaolinite, 13 percent illite.	--------	--------------------------------	28.7	81	1.3

[4] Includes losses due to removal of free iron, salts, and some amorphous materials, and losses in handling. These losses were offset by gains due to dispersion and attrition of coarser particle and aggregates.

The degree of limitation for foundations depends upon slope, depth to the water table, shrink-swell potential, bearing strength, flood hazard, wetness, and erosion hazard.

The degree of limitation for septic tank filter fields depends mainly upon percolation rate, depth to the seasonal high water table, flood hazard, and slope.

The category of recreation covers three main kinds of facilities—campsites, picnic grounds, and intensive play areas. Trafficability and drainage are two of the main factors considered in the ratings. Others are topography, soil productivity, soil stability, accessibility, the hazard of flooding, and the feasibility of impounding water.

Light industrial use refers to sites for structures that have a load limit of less than three stories. Factors considered in the ratings are topography, bearing strength, permeability, shrink-swell potential, depth to water table, the hazard of flooding, and the potential for corrosion of underground metal conduits.

The ratings for trafficways are based on the suitability of the soils as sites for roads and highways. The factors considered are topography, traffic-supporting capacity, permeability, shrink-swell potential, depth to water table, the hazard of flooding, and the potential for corrosion of underground metal conduits.

The degree of limitation for each soil in table 10 is a composite rating that reflects all the features of that soil, to a depth of 5 feet, that affect a particular use. The rating is *slight* if the limitation is not serious and is easily overcome. It is *moderate* if the limitation generally can be overcome and corrected by practical means. It is *severe* if the limitation is difficult to overcome and the use of the soil may not be practical. A *very severe* rating indicates that the use of the soil generally is impractical.

Although the detailed soil map and table are guides for evaluating most of the soils, a detailed investigation at the site of the proposed construction is needed, because as much as 15 percent of an area designated on the map as a specific soil may consist of spots of other soils, too small to be shown on the published map.

Some of the factors considered in rating the soils are discussed in the following paragraphs.

Shrink-swell potential is the potential change in volume that will occur in a soil with change in moisture content; that is, the extent to which soil expands when wet and contracts when dry. This potential change is influenced by the amount and kind of clay in the soil.

The water table is the upper surface of free water in the soil. It may be perched, that is, separated from a lower water table by a dry zone. Both the depth to the water table and the length of time that it remains at that depth are considered.

TABLE 10.—*Degree and kind of limitation for*

Series and map symbol	Slope	Foundations	Septic tank filter fields	Recreation
				Campsites
Alligator (AaA, AaB, Ac, Ag, Am).	0 to 3	Severe: low bearing strength; high shrink-swell potential; wetness; high water table.	Severe: slow percolation; high water table.	Severe: poor trafficability; wetness.
Amagon (An)	0 to 1	Severe: low bearing strength; moderate shrink-swell potential; high water table; wetness.	Very severe: slow percolation; high water table.	Severe: poor trafficability
Arkabutla (Ar)	0 to 1	Moderate: high water table; moderate bearing strength.	Severe: high water table; marginal percolation.	Moderate: moderate trafficability.
Bowdre (BoA, BoB, BoC).	0 to 8	Severe: moderate shrink-swell potential; occasional high water table; moderate bearing strength.	Severe: occasional high water table; slow percolation.	Severe: poor trafficability
Calhoun (Ca)	0 to 1	Severe: wetness; high water table; moderate bearing strength.	Very severe: high water table; slow percolation.	Severe: wetness; poor trafficability.
Calloway (ClA, ClB, ClB2).	0 to 3	Moderate: high water table; moderate bearing strength.	Very severe: high water table; slow percolation.	Moderate: poor trafficability.
Collins (Co)	0 to 1	Very severe: flooding	Very severe: flooding	Moderate: moderate trafficability.
Crowley (CrA, CrB) (For Hillemann part of this unit, see Hillemann series).	0 to 3	Moderate: slow percolation; moderate shrink-swell potential; high water table.	Very severe: slow percolation; high water table.	Moderate: moderate trafficability; wetness.
Dubbs:				
(DbB)	0 to 3	Slight	Moderate: moderate percolation.	Slight
(DbC)	0 to 8	Slight	Moderate: moderate percolation.	Slight
Dundee (DdA, DdB, DuA, DuB).	0 to 3	Moderate: high water table; moderate shrink-swell potential.	Severe: slow percolation; high water table.	Moderate: moderate trafficability.
Earle (EcA, EcB, EcC, EsB).	0 to 8	Severe: low bearing strength; high shrink-swell potential; high water table.	Very severe: slow percolation; high water table.	Severe: poor trafficability
Foley (FgA) (For Grubbs part of this unit, see Grubbs series).	0 to 2	Severe: high water table; low bearing strength; moderate shrink-swell potential; low productivity.	Very severe: high water table; slow percolation.	Severe: wetness; poor trafficability.
Grenada (GrB, GrB2)	1 to 3	Slight	Very severe: slow percolation	Slight
Grubbs	0 to 2	Severe: low bearing strength; high shrink-swell potential; slow percolation; high water table; low productivity.	Very severe: slow percolation; high water table.	Severe: poor trafficability; wetness.
Gullied land (Gu)	(2)	(2)	(2)	(2)
Henry (He)	0 to 1	Severe: high water table; low bearing strength; wetness.	Very severe: high water table; slow percolation.	Severe: poor trafficability
Hillemann	0 to 3	Moderate: high water table; moderate shrink-swell potential; moderate bearing strength.	Very severe: high water table; slow percolation.	Moderate: moderate trafficability.
Iuka:				
(IuA, IuB, IvB)	0 to 3	Slight	Moderate: high water table	Slight
(IvC)	3 to 8	Slight	Moderate: slopes	Slight
Lexington (LeC2)	3 to 8	Slight	Slight	Slight

See footnotes at end of table.

building sites, recreational facilities, and trafficways

Recreation—Continued		Light industry [1]	Trafficways
Picnic grounds	Intensive play areas		
Severe: poor trafficability; wetness.	Severe: poor trafficability; wetness.	Severe: low bearing strength; high shrink-swell potential; wetness; high water table.	Severe: poor traffic-supporting capacity; high water table.
Severe: poor trafficability.	Severe: poor trafficability.	Severe: high water table; moderate shrink-swell potential; low bearing strength.	Severe: high water table; low traffic-supporting capacity.
Moderate: moderate trafficability.	Moderate: moderate trafficability.	Moderate: high water table; moderate bearing strength.	Moderate: high water table; moderate traffic-supporting capacity.
Severe: poor trafficability.	Severe: poor trafficability.	Moderate: moderate bearing strength; moderate shrink-swell potential; occasional high water table.	Severe: occasional high water table; moderate traffic-supporting capacity; moderate shrink-swell potential.
Severe: wetness; poor trafficability.	Very severe: wetness; poor trafficability.	Severe: high water table; moderate bearing strength; moderately corrosive.	Severe: high water table; low traffic-supporting capacity; moderately corrosive.
Moderate: poor trafficability.	Severe: poor trafficability.	Moderate: high water table; moderately corrosive; moderate bearing strength.	Moderate: high water table; low traffic-supporting capacity.
Moderate: moderate trafficability.	Moderate: moderate trafficability.	Severe: flooding; moderate bearing strength.	Severe: flooding; moderate traffic-supporting capacity.
Moderate: moderate trafficability; wetness.	Severe: moderate trafficability wetness.	Moderate: moderate bearing strength; moderate shrink-swell capacity; high water table; moderately corrosive.	Moderate: moderate traffic-supporting capacity; high water table; moderately corrosive.
Slight.	Slight.	Slight.	Slight.
Slight.	Moderate: moderate trafficability; some slopes greater than 5 percent.	Slight.	Slight.
Moderate: moderate trafficability.	Moderate: moderate trafficability.	Moderate: high water table; moderate bearing strength; moderate shrink-swell potential.	Moderate: high water table; moderate traffic-supporting capacity.
Severe: poor trafficability.	Severe: poor trafficability.	Severe: high water table; low bearing strength; high shrink-swell potential.	Severe: high water table; low traffic-supporting capacity.
Severe: wetness; poor trafficability.	Very severe: wetness; poor trafficability.	Severe: high water table; low bearing strength; corrosive; moderate shrink-swell potential.	Severe: high water table; low traffic-supporting capacity; moderate shrink-swell potential; corrosive.
Slight.	Slight.	Slight.	Slight.
Severe: poor trafficability; wetness.	Severe: poor trafficability; wetness.	Severe: low bearing strength; high shrink-swell potential; high water table; corrosive.	Severe: high shrink-swell potential; low traffic-supporting capacity; high water table.
[2]	[2]	[2]	[2].
Severe: poor trafficability.	Very severe: poor trafficability.	Severe: high water table; low bearing strength; moderately corrosive.	Severe: high water table; low traffic-supporting capacity.
Moderate: moderate trafficability.	Severe: moderate trafficability.	Moderate: high water table; corrosive; moderate bearing strength; moderate shrink-swell potential.	Moderate: high water table; moderate traffic-supporting capacity.
Slight.	Slight.	Moderate: moderate bearing strength.	Moderate: moderate traffic-supporting capacity.
Slight.	Moderate: slopes.	Moderate: moderate bearing strength; slopes.	Moderate: moderate traffic-supporting capacity; slopes.
Slight.	Moderate: gentle slopes.	Moderate: gentle slopes.	Slight.

TABLE 10.—*Degree and kind of limitation for building*

Series and map symbol	Slope	Foundations	Septic tank filter fields	Recreation
				Campsites
Loring: (For Memphis part of LmE, LmE2, LmE3, LmF, see Memphis series).				
(LgB, LgB2)	1 to 3	Slight	Moderate: slow percolation	Slight
(LgC, LgC2)	3 to 8	Slight	Moderate: slow percolation	Slight
(LgD2)	8 to 12	Slight	Moderate: slow percolation	Moderate: gentle slopes
(LmE, LmE2)	12 to 20	Moderate: slopes; erodibility	Severe: slopes	Severe: slopes
(LmE3)	12 to 20	Severe: slopes; erodibility	Severe: slopes	Severe: slopes; erodibility
(LmF)	20 to 45	Severe: steep slopes	Severe: steep slopes	Severe: steep slopes
Mantachie (Ma)	0 to 1	Severe: wetness; high water table; moderate bearing strength.	Severe: high water table	Severe: wetness; high water table.
Memphis:				
(LmE, LmE2)	12 to 20	Moderate: slopes; erodibility	Severe: slopes	Severe: slopes
(LmE3)	12 to 20	Severe: slopes; erodibility	Severe: slopes	Severe: slopes; erodibility
(LmF)	20 to 45	Severe: steep slopes	Very severe: steep slopes	Severe: steep slopes
Ochlockonee (Oc)	0 to 1	Slight	Slight	Slight
Providence:				
(PrB)	1 to 3	Slight	Severe: slow percolation	Slight
(PrC2)	3 to 8	Slight	Severe: slow percolation	Slight
Rough broken land (Rb)	20 to 60	(²)	(²)	(²)
Zachary (Za)	0 to 1	Very severe: frequent flooding; low bearing strength; high water table.	Very severe: frequent flooding; slow percolation; high water table.	Severe: frequent flooding; poor trafficability.

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

The percolation rate of the least permeable layer when moisture is at or near field capacity is important to the use of soils for septic tank filter fields. The limitation is only *slight* if the rate is faster than 45 minutes per inch, *moderate* if 45 to 75 minutes per inch, and *severe* if slower than 75 minutes per inch.

Trafficability in recreation areas depends on features of the soil that affect the movement of people on foot or on bicycles or other light vehicles. Loamy soils that are not subject to flooding and have a water table that remains below a depth of 30 inches during heavy use generally have only *slight* limitations. Clayey soils have *severe* limitations.

Traffic-supporting capacity is the ability of undisturbed soil to support moving loads. It indicates the suitability of the soil for use as subgrade.

Bearing strength is based on estimates of the maximum load that a soil can support when compacted. Engineers and others should not apply specific values to the ratings of bearing strength given in table 10.

Formation, Classification, and Morphology of the Soils

This section discusses the factors of soil formation, the classification of the soils in Cross County by higher categories, and the morphology of the soils.

Formation of the Soils

Soil is formed by the interaction of climate, living organisms, parent material, and relief over a period of time. Soils vary in their characteristics as a result of significant variations in one or more of these factors (*13*).

Climate and living organisms are the active factors of soil genesis. They act on parent material and gradually change it to a natural body that has genetically related horizons. 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 profile that can be formed and, in extreme cases, determines it almost entirely. Finally, time is needed for the changing of the parent material into a soil. Usually a long time is required for the development of distinct horizons.

The interaction of the factors is complex, and more complex for some soils than for others. In places, for example, the environment has changed and the character of a new soil has been superimposed on that of an older one.

Climate

The climate in Cross County is one of warm summers, mild winters, and generally abundant rainfall. It probably has not changed much during the period that the soils have been forming. Although its effect is modified locally by relief, the climate is uniform throughout the county and consequently does not account for significant differences among the soils.

sites, recreational facilities, and trafficways—Continued

Recreation—Continued		Light industry [1]	Trafficways
Picnic grounds	Intensive play areas		
Slight	Slight	Slight	Slight.
Slight	Moderate: gentle slopes	Moderate: gentle slopes	Slight.
Slight	Moderate: gentle slopes	Moderate: gentle slopes	Moderate: erodibility.
Moderate: slopes	Severe: slopes	Severe: slopes	Severe: slopes.
Severe: slopes; erodibility	Very severe: slopes; erodibility.	Very severe: slopes; erodibility	Severe: slopes.
Severe: steep slopes	Very severe: steep slopes	Very severe: steep slopes	Severe: steep slopes.
Severe: wetness; high water table.	Severe: wetness; high water table.	Severe: high water table; moderate bearing strength.	Severe: high water table; moderate traffic-supporting capacity.
Moderate: slopes	Severe: slopes	Severe: slopes	Moderate: slopes; erodibility.
Severe: slopes; erodibility	Very severe: slopes; erodibility.	Severe: slopes	Severe: slopes; erodibility.
Severe: steep slopes	Very severe: steep slopes	Severe: steep slopes	Severe: steep slopes.
Slight	Slight	Moderate: moderate bearing strength.	Moderate: moderate traffic-supporting capacity.
Slight	Slight	Slight	Slight.
Slight	Moderate: gentle slopes	Moderate: gentle slopes	Slight.
([2])	([2])	([2])	([2]).
Severe: frequent flooding; poor trafficability.	Very severe: frequent flooding; poor trafficability.	Very severe: frequent flooding; low bearing strength; high water table.	Severe: high water table; low traffic-supporting capacity; frequent flooding.

[2] Degree and kind of limitation not determined. Onsite investigation required.

The warm, moist climate permits rapid chemical reactions. Abundant rainfall makes a large amount of water available for moving dissolved or suspended material downward in the profile. As a result the remains of plants decompose rapidly, and the organic acids thus produced hasten the development of clay minerals and the removal of carbonates. Because the soil is frozen only for short periods, these soil-forming processes can continue almost the year round.

Living organisms

Among the living organisms important in the formation of soils in Cross Country are bacteria, fungi, insects, and the more highly developed plants and animals. These organisms help to increase the content of organic matter, to increase the supply of nitrogen, to diminish or increase the supply of other plant nutrients, and to change the structure and porosity of the soils.

Native vegetation has had more influence than animals have had on soil formation in the county. Differences in native vegetation seem to be associated mainly with differences in drainage, and only the major differences are reflected in soil characteristics to any extent.

Pine and hardwood trees orginally covered most of the uplands. The most common trees were red oak, white oak, post oak, willow oak, water oak, black walnut, magnolia, yellow-popular, hickory, sweetgum, black gum, ash, and on Crowley Ridge, shortleaf pine. Loring and Memphis soils formed in the steeper, better drained areas, and such soils as Calloway, Calhoun, and Henry formed in the more nearly level areas. In the small scattered areas of prairie in the western part of the county, the soils were covered by scattered hardwood trees and dense stands of little bluestem, indiangrass, eastern gamagrass, and other tall bunch grasses.

On bottom lands the cover was dense forest and a few canebreaks. Heavy stands of baldcypress grew in swampy areas. In swales and other low and wet but not swampy places, where Alligator, Earle, and some of the Dundee soils formed, the principal trees were tupelo-gum, sweetgum, soft elm, green ash, hackberry, cottonwood, overcup oak, and willow oak. Canebreaks covered many of the border flats among the swamps and sloughs and bayous where the Bowdre and the more nearly level Dundee soils formed. Stands of hardwoods covered most of the better drained areas and many of the wetter areas. Amagon soils formed in the low, wet depressions, and Dundee soils on the better drained places. On low ridges the trees were chiefly hickory, pecan, white oak, red oak, black gum, and winged elm.

Through practice of agriculture in the county, man is influencing soil formation. By clearing forests, cultivating soils, introducing new kinds of plants, controlling floods, and improving drainage, he is drastically changing the complex community of organisms affecting soil formation.

Only a few results of these activities can be seen now; some will probably not be evident for many centuries.

Parent material

The parent material of the soils in the eastern part of the county is chiefly alluvium deposited on the flood plains of the Mississippi and Ohio Rivers when they meandered in separate channels across this area (*5*). This alluvium, 100 to 180 feet thick, is a mixture of minerals derived from many kinds of soil, rock, and unconsolidated material, including glacial drift and loess. It washed downstream from the upper reaches of the Mississippi River Basin, which extends from Montana to Pennsylvania, and it has been reworked, in part, by the St. Francis River. The sandy material that was deposited parallel to and near the stream channel makes up the natural levees, on which Dubbs and Dundee soils formed. The clayey material that settled out some distance away from the channel on the lowest parts of the flood plains is the material in which Alligator and Earle soils formed.

In this same area of clayey material are mounds, generally circular, that are believed to be "sand blows," the result of sand filling fractures caused by earthquakes (*6*). These "sand blows" are the material in which the loamy sand part of the Alligator complex formed.

The parent material of a small acreage of soils on the western edge of the bottom lands consists of sediments washed down from loessal uplands by minor streams.

The parent material of soils on Crowley Ridge and on the plains to the west consists of loess. This material was originally part of the glacial drift in the northern part of the Mississippi River Basin. These drift materials were first washed downstream, and then, during dry periods, the wind blew the silt-size materials out of the streambeds and deposited them at higher elevations (*21*). Generally, the mantle of loess was thick enough that the solum of the various soils formed almost entirely within it.

On Crowley Ridge the mantle of loess is 5 to more than 20 feet thick over the sandy and gravelly material that makes up the core of the Ridge. This sandy and gravelly material is exposed on the east face of the Ridge and in the bottoms of the deeper gullies and in gravel pits elsewhere. The exposure on the east face is mapped as Rough broken land.

On the plains west of Crowley Ridge, the loess is underlain by alluvium deposited in channels and on terraces by the Mississippi River before the river migrated east of the Ridge. Loring soils developed in the thick mantle of loess on some of the older terraces in this area. The mantle thins to less than 3 feet in small areas near the western margin of the county. In some of these areas near Hickory Ridge, the Providence and Lexington soils formed.

Relief

On the flood plains in the eastern half of Cross County, relief is characterized by flat areas and successions of very gently undulating ridges and swales. Local differences in elevation are commonly less than 8 feet. The slope gradient is generally less than 3 percent but may be as much as 15 percent on a few streambanks.

Crowley Ridge, which occupies about 13 percent of the county, is 4½ miles wide at the northern boundary of the county and 6 miles wide at the southern boundary. It is made up of narrow ridges that have steep, short slopes between the ridgetops and the valley streams. The relief ranges from nearly level to steep.

West of Crowley Ridge are wide loessal plains, which make up about 37 percent of the county. These plains consist of wide, poorly drained, level areas and low, gently sloping ridges.

Elevation ranges from 175 feet above sea level on the flood plains at the southern boundary of the county to 215 feet along the northern boundary, from 280 to 453 feet on Crowley Ridge, and from 200 to 280 feet on the plains.

Time

The length of time required for formation of a soil depends largely upon other factors of soil formation. Less time generally is required if the parent material is coarse textured, the climate is warm and humid, and the vegetation is luxuriant. It seems probable that the sediments now forming most of the land surface in Cross County were deposited during and after the advances of the Wisconsin glaciers, the last of which was retreating from the North Central States about eleven thousand years ago.

The ages of the soils in the county vary widely. In the smoother parts of the uplands, the soils are nearly mature, but on the stronger slopes where geologic erosion has more nearly kept pace with soil formation, the soils have less thick and less strongly developed horizons. On first bottoms and in areas of local alluvium, the soil material has been in place too short a time to allow the soils to develop to maturity. Some areas receive fresh sediments at frequent intervals. In these areas are such soils as the Collins, Iuka, and Ochlockonee.

Classification of the Soils

Soils are classified so that we can more easily remember their significant characteristics, assemble knowledge about them, see their relationships, and understand their behavior and their response to the whole environment. 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.

The classification of soils into series and lower categories has been discussed in the section "How This Survey Was Made." Two systems of classifying soils above the series level have been used in the United States in recent years. The older system was adopted in 1938 (*2*) and revised later (*11*). The system currently used by the National Cooperative Soil Survey was adopted in 1965 and is under continual study. Readers interested in the development of the system should refer to the latest literature available (*9, 17*).

The current system consists of six categories. Beginning with the most inclusive, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. The criteria for classification are soil properties that are measurable or observable, but the properties are selected so that soils of similar genesis are grouped together. Placement of some soil series in the current system of classification, particularly in families, may change as more precise information becomes available.

Table 11 shows the classification of the soils series of Cross County according to both systems. The categories of the current system are defined briefly in the following paragraphs.

TABLE 11.—*Soil series in Cross County classified into higher categories*

Series	Current classification			Great soil group, 1938 classification
	Family	Subgroup	Order	
Alligator	Fine, montmorillonitic, acid, thermic.	Vertic Haplaquepts	Inceptisols	Low-Humic Gley soils.
Amagon	Fine-silty, mixed, thermic	Typic Ochraqualfs	Alfisols	Low-Humic Gley soils.
Arkabutla	Fine-silty, mixed, acid, thermic	Aeric Fluventic Haplaquepts	Inceptisols	Alluvial soils.
Bowdre	Clayey over loamy, mixed, thermic	Aquic Fluventic Hapludolls	Mollisols	Alluvial soils.
Calhoun	Fine-silty, mixed, thermic	Typic Glossaqualfs	Alfisols	Planosols.
Calloway	Fine-silty, mixed, thermic	Aqueptic Fragiudalfs	Alfisols	Planosols.
Collins	Coarse-silty, mixed, acid, thermic	Aquic Udifluvents	Entisols	Alluvial soils.
Crowley	Fine, montmorillonitic, thermic	Vertic Albaqualfs	Alfisols	Planosols.
Dubbs	Fine-silty, mixed, thermic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Dundee	Fine-silty, mixed, thermic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils.
Earle	Clayey over loamy, montmorillonitic, acid, thermic.	Vertic Haplaquepts	Inceptisols	Alluvial soils.
Foley	Fine-silty, mixed, thermic	Albic Glossic Natraqualfs	Alfisols	Solodized-Solonetz soils.
Grenada	Fine-silty, mixed, thermic	Ochreptic Fragiudalfs	Alfisols	Planosols.
Grubbs	Fine, mixed, thermic	Vertic Natrudalfs	Alfisols	Planosols.
Henry	Coarse-silty, mixed, thermic	Typic Fragiaqualfs	Alfisols	Planosols.
Hillemann	Fine-silty, mixed, thermic	Aeric Ochraqualfs	Alfisols	Planosols.
Iuka	Coarse-loamy, siliceous, acid, thermic.	Aquic Udifluvents	Entisols	Alluvial soils.
Lexington	Fine-silty, mixed, thermic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Loring	Fine-silty, mixed, thermic	Typic Fragiudalfs	Alfisols	Gray-Brown Podzolic soils.
Mantachie	Fine-loamy, siliceous, acid, thermic	Aeric Fluventic Haplaquepts	Inceptisols	Alluvial soils.
Memphis	Fine-silty, mixed, thermic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Ochlockonee	Coarse-loamy, siliceous, acid, thermic.	Typic Udifluvents	Entisols	Alluvial soils.
Providence	Fine-silty, mixed, thermic	Typic Fragiudalfs	Alfisols	Planosols.
Zachary	Fine-silty, mixed, thermic	Typic Albaqualfs	Alfisols	Low-Humic Gley soils.

ORDER.—Soils are grouped into orders according to properties that seem to have resulted from the same processes acting to about the same degree on the parent material. Ten soil orders are recognized in the current system. Of these, the Entisols, Inceptisols, Mollisols, and Alfisols are represented in Cross County.

Entisols are recent soils in which there has been little, if any, horizon development.

Inceptisols occur mostly on young, but not recent, land surfaces.

Mollisols have a thick, dark-colored surface layer, moderate to strong structure, and base saturation of more than 50 percent.

Alfisols contain accumulated aluminum and iron, have argillic or natric horizons, and have a base saturation of more 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 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 have 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.

Morphology of the Soils

Most soil profiles contain three major horizons—A, B, and C. The A horizon is the surface layer. It can be the A1, which is the horizon of maximum content of organic matter, or the A2, which is the horizon of maximum leaching of dissolved or suspended materials. The B horizon is immediately beneath the A horizon. It contains the maximum accumulation of dissolved or suspended materials, such as iron or clay. The B horizon generally is firmer than horizons immediately above and below it and commonly has blocky structure (*23*). Beneath the B is the C horizon. The C horizon generally has been little affected by soil-forming processes, but it can consist of material that has been modified by weathering. In some young soils, there is no B horizon, and the C horizon is immediately below the A and has been slightly modified by living organisms as well as weathering.

The soils in Cross County have horizons that developed through one or more of the following processes: (1) the accumulation of organic matter, (2) the leaching of calcium carbonates and bases, (3) the reduction and transfer of iron, and (4) the translocation of silicate clay minerals. Most of the soils formed by more than one of these processes.

Accumulation of organic matter in the uppermost part of the profile to form an A1 horizon has been an important process of horizon development. The soils range from medium to very low in content of organic matter.

Leaching of carbonates and bases has occurred in nearly all the soils. Generally, the leaching of bases precedes the translocation of silicate clay minerals. Most of the soils are moderately to strongly leached.

Reduction and transfer of iron, a process called gleying, is evident in the poorly drained and very poorly drained soils. The gray color in the subsurface horizons indicates the reduction and loss of iron, and the reddish-brown color of the mottles and concretions in some horizons indicates segregation of iron. Amagon, Henry, and Zachary soils clearly show the results of gleying.

Translocation, or downward movement, of clay minerals has contributed to horizon development in most of the soils. Even though carbonates and other soluble salts had probably been leached from the soils to a considerable extent before translocation of clay minerals took place, the soils still contain a large amount of bases. In most of the soils the eluviated A2 horizon has been destroyed by plowing, but in soils where an A2 is present, it contains less clay and generally is lighter colored than the B horizon and has weak blocky to platy structure. Generally, clay has accumulated in the B horizon in the form of clay films in pores and on ped surfaces.

The distribution of clay in the profiles of Dubbs and Collins soils, which are of different age, is shown in figure 11, and that in the profiles of Calloway and Loring soils, which are about the same age, is shown in figure 12. Collins soils are younger than Dubbs soils and have had little translocation of clay. Calloway and Loring soils are about the same age and must have had parent material with about the same particle-size distribution, but the curves showing the distribution of clay are distinctive for each profile. The curve for Loring soils is gentle and smooth; it suggests a slower rate of clay translocation than that for Calloway soils. Because Loring soils are steeper, more water runs off and less water percolates to move clay downward in the profile. Loring soils also are brown, are moderately well drained, and have a weakly developed fragipan. The curve for Calloway soils shows more advanced clay translocation. Because these soils are level to very gently sloping, water runs off much more slowly than on Loring soils and more water moves through the profile to carry clay particles downward. Fragipan development also is more advanced in Calloway soils.

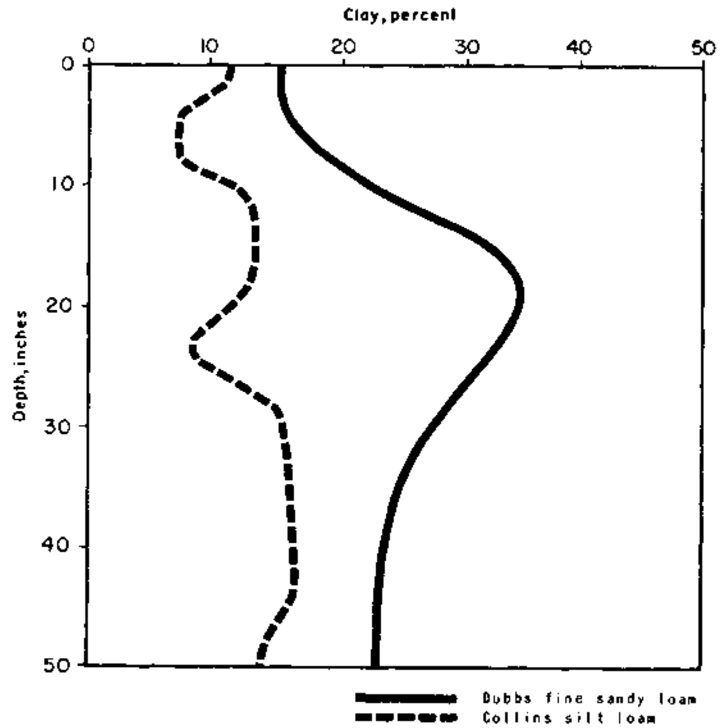

Figure 11.—**Distribution of clay in profiles of Dubbs fine sandy loam and Collins silt loam. Both soils formed in alluvium, but Collins soil is younger.**

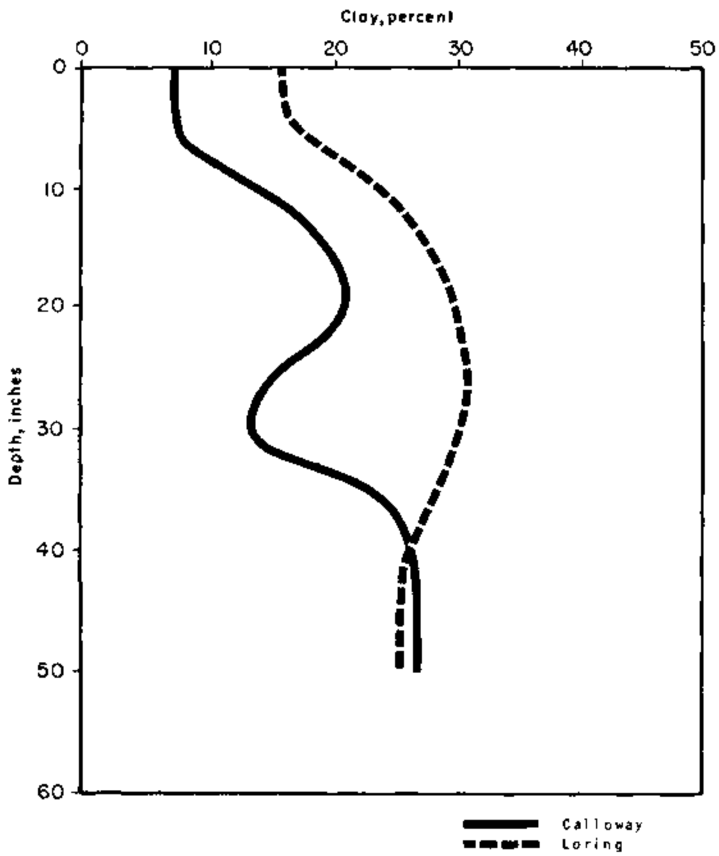

Figure 12.—**Distribution of clay in profiles of Calloway and Loring soils. Both soils formed in loess and are about the same age.**

General Nature of the County

The early economy of Cross County was based on the plantation system, and cotton and rice were the main crops. Allotments were placed on cotton in 1933 and on rice in 1950. Since then cotton and rice have declined in importance, and soybeans and small grains have increased. The county is still mainly agricultural, but farming is diversified.

According to the 1959 Census of Agriculture, the land area of the county is 400,640 acres, of which about 80 percent is in farms and the rest is mostly large woodland tracts.

Between 1954 and 1959, the number of farms decreased from 2,454 to 1,447, but the size of the farms increased. The number of farms less than 100 acres in size decreased from 1,815 in 1954 to 813 in 1959; and the number of farms 100 to 499 acres in size decreased from 514 to 468. In 1954 the average size was 124 acres, and 54 farms were more than 500 acres in size; in 1959 the average size was 221 acres, and 100 farms were more than 500 acres in size. Of the farm operators in 1959, 426 were full owners, 310 were part owners, 7 were managers, and 704 were tenants. Most farms are small enough that the family, with only occasional outside help, can do most of the work. The larger farms are operated by tenants or day laborers under the supervision of the owner or manager. Tenants pay a fixed rent or a percentage of the crop for the use of the land, but the trend in recent years is toward increased use of day laborers.

Most of the farms are of the general type. Cotton, soybeans, corn, and small grain are grown, and some fairly large herds of cattle are raised. Rice is grown on many farms west of Crowley Ridge and on a few in the bottom lands east of the Ridge. According to the U.S. Census of Agriculture the acreage of principal crops and of pasture in 1954 and 1959 were as follows:

Crop:	*Acres in 1954*	*Acres in 1959*
Soybeans	28, 262	109, 540
Cotton	47, 325	36, 211
Rice	58, 857	34, 339
Corn	10, 392	4, 279
Peaches	[1] 1, 158	[1] 1, 038
Wheat	2, 385	2, 883
Hay (excluding soybeans, cowpeas, peanuts, and sorghum hay)	3, 206	2, 771
Pasture:		
Cropland used only for pasture	16, 725	17, 700
Other pasture (not cropland and not woodland)	11, 613	4, 785

[1] The number of peach trees of all ages was 84,638 in 1954 and 97,288 in 1959; this figure based on average number of trees per acre.

Livestock, except hogs, have been decreasing in number for several years. From 1954 to 1959, the number of cattle and calves decreased from 13,260 to 11,399, and that of milk cows from 1,508 to 632. Dairy cattle are kept principally for home use. The number of horses and mules decreased from 1,396 to 644. In this same period, the number of hogs increased from 3,876 to 6,618.

The industrial enterprises are mainly related to agriculture. They include rice milling, grain storage, meat processing, fruit processing, cotton ginning, lumber milling, and gravel processing. Some industrial products are manufactured.

Climate [6]

Cross County has hot humid summers, mild winters, and generally abundant rainfall. Table 12 shows data on precipitation and temperature from the U.S. Weather Bureau Station in Wynne. These data are representative of Cross County.

[6] ROBERT REINHOLD, meteorologist, U.S. Weather Bureau Station, Little Rock, Ark., helped prepare this section.

Summer is characterized by bright sunshine and high temperatures, broken by short periods when thunderstorms are followed by cloudy, rainy, and cooler weather. In winter, cool, cloudy, rainy weather alternates with clear, cold weather. Snowfall is negligible, periods of intense cold are of short duration, and sleet occurs only occasionally.

Precipitation generally is adequate for the needs of a farming area. It averages almost 49 inches a year, of which only about 1 percent is snow. It is well distributed throughout the year; roughly 60 percent falls in winter and spring, and heavy rain is most likely in spring. Table 12 shows that in March and April there is a 90-percent probability of considerably more than 2 inches of rain a month and a 10-percent probability of more than 8 inches a month. Summer rainfall associated with thunderheads is erratic and unpredictable.

Short periods of drought affecting small parts of the county are frequent, and late-summer droughts of a month or more have occurred. In some years droughts severe enough to injure seedlings and shallow-rooted crops occur in April, May, and June. 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.

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 well-drained soils have little or no available moisture in the uppermost 12 inches) are most common in August, September, and October. Some can be expected in July.

Thunderstorms occur on 50 to 55 days a year, but they are not ordinarily accompanied by damaging winds. Thirty-five tornadoes were observed in the area from 1916 through 1961.

In spring, wetness is common. In most years it does not interfere greatly with spring planting, but in low-lying areas planting may have to be delayed from one week to several weeks in a wet season. Late frost may damage such crops as cotton, strawberries, peaches, and pecans, and cotton may have to be replanted. The normally dry weather late in summer and in fall is favorable for harvesting but not for fall seeding and for the growth of pasture plants. Early frost may damage the quality or reduce the yield of cotton, rice, and late-planted soybeans. Fall-sown small grain remains vigorous enough for grazing throughout the winter.

Records from the U.S. Weather Bureau Station in Wynne show that the average length of the growing season is 210 days. The average date of the last freezing temperature (32° F.) in spring is April 3, and the average date of the first in fall is October 30. The latest that a temperature of 32° has been recorded is April 30 (in 1938), and the earliest is September 27 (in 1942). The average date of the last 28° reading in spring is March 20, and that of the first in fall is November 5. The latest that a temperature of 28° has been recorded is April 19 (in 1953), and the earliest is October 7 (in 1935).

Physiography, Relief, and Drainage

The three main physiographic areas in Cross County are bottom lands in the eastern part of the county, Crowley Ridge extending across the county from north to south,

TABLE 12.—*Temperature and precipitation*

[All data from Wynne, elevation 167 feet, for the period 1931 through 1963]

Month	Temperature				Precipitation		
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 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.	In.	In.	In.
January	51	30	74	3	4.68	1.54	7.94
February	55	34	78	8	4.59	1.83	8.47
March	63	40	82	16	5.46	2.16	8.17
April	73	50	87	30	4.87	2.32	8.16
May	81	58	93	40	4.49	1.30	8.54
June	89	66	101	48	4.00	.99	7.03
July	92	69	104	56	3.64	1.21	6.82
August	92	68	105	53	3.10	1.10	4.99
September	86	61	101	39	2.84	.66	4.96
October	76	50	92	27	2.60	.65	5.46
November	62	38	82	16	4.23	1.50	7.28
December	53	32	75	6	4.39	1.80	9.43
Year	--------	--------	--------	--------	48.89	34.50	56.07

and the plains west of Crowley Ridge. The bottom lands are part of the abandoned flood plain of the Mississippi River, which has since meandered eastward and out of the county. They consist of broad flats and successions of gently sloping ridges and swales. The slope gradient is predominantly less than 3 percent but is as much as 15 percent on a few streambanks. The total area of steep slopes is small. Crowley Ridge is 4½ miles wide at the northern edge of the county and about 6 miles wide at the southern edge. It is characterized by long, narrow ridgetops; short, dissected, steep slopes; and valley streams. The plain consists mostly of level to nearly level areas separated by low ridges. Elevations range from 175 to 215 feet above sea level on the bottom lands, from 280 to 453 feet on Crowley Ridge, and from 200 to 280 feet on the plains.

Generally, relief in the county is level to undulating on bottom lands, nearly level to steep on Crowley Ridge, and level to gently sloping on the plains.

The northwestern part of the county is drained by Bayou DeView; the far western part by First Creek, Second Creek, and Brushy Creek; the middle part that is west of the divide on Crowley Ridge by the L'Anguille River; and the rest of the county east of the divide on the ridge by the St. Francis River and its tributary, the Tyronza River. These major natural drainageways are tributaries of the Mississippi River.

Water

The supply of surface water in Cross County is good, even though some streams are dry part of the year. Among the principal streams are such drainageways as Prairie Creek, Caney Creek, Copperas Creek, St. Francis Bay Straight Slough, and Wolf Slough. Among the main lakes are Swan Lake, Barnes Lake, Rainbow Lake, and Shaver Lake. There are many other lakes, and many of the lakes are oxbows of the St. Francis River.

Except on Crowley Ridge the supply of ground water is abundant. Wells drilled to a depth of 110 feet supply about 1,700 gallons of water a minute. The water is poor to good in quality and is used for irrigation. On Crowley Ridge shallow wells supply enough water for household use and for livestock. A few springs on the east slope of Crowley Ridge also are sources of water.

In the county 261 ponds have been built for watering livestock and 72 reservoirs for holding irrigation water.

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Glossary

Acidity. See Reaction, soil.

Aggregate, soil. Many fine particles held in a single mass or cluster, such as a clod, crumb, block, or prism.

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

Available water capacity. The capacity of a soil to hold water in a form available to plants. Amount of moisture held in soil between field capacity, or about one-third atmosphere of tension, and the wilting coefficient, or about 15 atmospheres of tension.

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.

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

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; will 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.

Contour farming. Plowing, cultivating, planting, and harvesting in rows that are at right angles to the natural direction of the slope or that are parallel to terrace grades.

Dispersion, soil. Deflocculation of the soil and its suspension in water.

Eluviation. The movement of material from one place to another within the soil, in either true solution or colloidal suspension. Soil horizons that have lost material through eluviation are said to be eluvial; those that have received material are illuvial.

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

Fertility. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors, such as light, moisture, temperature, and the physical condition (or tilth) of the soil, are favorable.

Field moisture capacity. The moisture content of a soil expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has been allowed to drain away; the field moisture content 2 or 3 days after a soaking rain.

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, has a hard or very hard consistence, 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.

Green-manure (agronomy). A crop grown for the purpose of being turned under in an early stage of maturity or soon after maturity for soil improvement.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rains. The distinction between gully and rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by normal tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

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

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Internal soil drainage. The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil profile and underlying layers, and by the height of the water table, either permanent or perched. Relative terms for expressing internal drainage are *none, very slow, slow, medium, rapid,* and *very rapid.*

Leaching. The removal of soluble materials from soils or other material by percolating water.

Loess. A fine-grained eolian deposit consisting dominantly of silt-sized particles.

Mapping unit. Areas of soil of the same kind outlined on the soil map and identified by a symbol.

Mottled. 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 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 drainage. Drainage 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 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. If podzolic, they commonly have mottling 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.

Nutrient, plant. Any element taken in by a plant, essential to its growth and used by it in the production of food and tissue. Nitrogen, phosphorous, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil and carbon, hydrogen, and oxygen obtained largely from the air and water, are plant nutrients.

Parent material. The 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.

Percolation. See Infiltration.

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

Phase, soil. A subdivision of a soil type, series, or other unit in the soil classification system made because of differences that affect its management but do not affect its classification in the natural landscape. A soil type, for example, may be divided into phases because of differences in slope, stoniness, thickness, or some other characteristic that affects management.

Plowpan. A compacted layer formed in the soil immediately below the plowed layer.

Poorly graded. A soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles in poorly graded soil material, density can be increased only slightly by compaction.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Puddled soil. A soil that is dense, massive, and without regular structure because it has been artificially compacted when wet. Commonly, a puddled soil is a clayey soil that has been tilled when wet.

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 degree 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.

Rill. See Gully.

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

Series, soil. A group of soils developed from a particular type of parent material and having genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile.

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

Slope classes. The slope classes used in this report are as follows:

	Percent of slope		Percent of slope
Level	0 to 1	Moderately sloping	8 to 12
Nearly level	1 to 3	Moderately steep	12 to 20
Gently sloping	3 to 8	Steep	More than 20

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 upon parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles, less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *Very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.5 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Solodized soil. A soil that has been subjected to the processes responsible for the development of a Soloth and having at least some of the characteristics of a Soloth.

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 characteristic 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 profile below plow depth.

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

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surplus runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

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.

Type, soil. A subdivision of the soil series that is made on the basis of differences in the texture of the surface layer.

Water table. The highest part of the soil or underlying rock material 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.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which plants (specifically sunflower) wilt so much that they do not recover when placed in a dark, humid atmosphere.

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GUIDE TO MAPPING UNITS

[For a full description of a mapping unit, read both the description of the mapping unit and the description of the soil series to which the mapping unit belongs.

[See table 1, page 7, for approximate acreage and proportionate extent of the soils. See table 2, page 29, for predicted yields of the principal crops. See table 3, pages 32 and 33, for descriptions of woodland groups. See page 31 for descriptions of wildlife groups. See the section beginning on page 35 for facts about the engineering properties of the soils. See the section beginning on page 48 for facts about other nonfarm uses of soils]

Map symbol	Mapping unit	Described on page	Capability unit		Woodland group	Wildlife group
			Symbol	Page	Number	Number
AaA	Alligator clay, 0 to 1 percent slopes	7	IIIw-4	28	6	4
AaB	Alligator clay, gently undulating	7	IIIw-4	28	6	4
Ac	Alligator complex	8	IIIw-4	28	6	4
Ag	Alligator silt loam	8	IIIw-4	28	6	4
Am	Alligator silty clay loam	8	IIIw-4	28	6	4
An	Amagon silt loam	8	IIIw-2	27	4	3
Ar	Arkabutla silt loam	9	IIw-2	26	3	5
BoA	Bowdre silty clay loam, 0 to 1 percent slopes	9	IIw-3	26	2	4
BoB	Bowdre silty clay loam, gently undulating	9	IIIw-1	27	2	4
BoC	Bowdre silty clay loam, undulating	9	IIIw-1	27	2	4
Ca	Calhoun silt loam	10	IIIw-3	28	9	1
ClA	Calloway silt loam, 0 to 1 percent slopes	11	IIw-1	26	8	1
ClB	Calloway silt loam, 1 to 3 percent slopes	11	IIw-1	26	8	1
ClB2	Calloway silt loam, 1 to 3 percent slopes, eroded	11	IIw-1	26	8	1
Co	Collins silt loam	11	I-1	25	1	5
CrA	Crowley and Hillemann silt loams, 0 to 1 percent slopes	12				
	Crowley	--	IIIw-3	28	4	1
	Hillemann	--	IIw-4	27	4	1
CrB	Crowley and Hillemann silt loams, 1 to 3 percent slopes	12				
	Crowley	--	IIIw-3	28	4	1
	Hillemann	--	IIw-4	27	4	1
DbB	Dubbs fine sandy loam, gently undulating	13	IIe-1	25	2	3
DbC	Dubbs fine sandy loam, undulating	13	IIIe-1	27	2	3
DdA	Dundee fine sandy loam, 0 to 1 percent slopes	13	I-1	25	2	3
DdB	Dundee fine sandy loam, gently undulating	13	IIw-2	26	2	3
DuA	Dundee silt loam, 0 to 1 percent slopes	14	I-1	25	2	3
DuB	Dundee silt loam, gently undulating	14	IIw-2	26	2	3
EcA	Earle clay, 0 to 1 percent slopes	14	IIIw-4	28	6	4
EcB	Earle clay, gently undulating	14	IIIw-4	28	6	4
EcC	Earle clay, undulating	14	IIIw-4	28	6	4
EsB	Earle silty clay loam, gently undulating	15	IIIw-1	27	6	4
FgA	Foley and Grubbs silt loams, 0 to 2 percent slopes	15	IIIw-5	28	10	1
GrB	Grenada silt loam, 1 to 3 percent slopes	16	IIe-2	26	8	2
GrB2	Grenada silt loam, 1 to 3 percent slopes, eroded	16	IIe-2	26	8	2
Gu	Gullied land	17	VIIe-1	29	11	2
He	Henry silt loam	17	IIIw-3	28	9	1
IuA	Iuka loam, 0 to 1 percent slopes	18	I-1	25	1	3
IuB	Iuka loam, gently undulating	18	IIe-1	25	1	3
IvB	Iuka soils, local alluvium, 1 to 3 percent slopes	19	IIe-1	25	1	3
IvC	Iuka soils, local alluvium, 3 to 8 percent slopes	19	IIIe-1	27	1	3
LeC2	Lexington silt loam, 3 to 8 percent slopes, eroded	19	IIIe-2	27	5	2
LgB	Loring silt loam, 1 to 3 percent slopes	20	IIe-2	26	8	2
LgB2	Loring silt loam, 1 to 3 percent slopes, eroded	20	IIe-2	26	8	2
LgC	Loring silt loam, 3 to 8 percent slopes	21	IIIe-2	27	5	2
LgC2	Loring silt loam, 3 to 8 percent slopes, eroded	21	IIIe-2	27	5	2
LgD2	Loring silt loam, 8 to 12 percent slopes, eroded	21	IVe-1	28	5	2
LmE	Loring and Memphis silt loams, 12 to 20 percent slopes	21	VIe-1	28	7	2
LmE2	Loring and Memphis silt loams, 12 to 20 percent slopes, eroded	21	VIe-1	28	7	2
LmE3	Loring and Memphis silt loams, 12 to 20 percent slopes, severely eroded	21	VIe-1	28	11	2
LmF	Loring and Memphis silt loams, 20 to 45 percent slopes	22	VIIe-1	29	7	2
Ma	Mantachie loam	22	IIw-2	26	3	3
Oc	Ochlockonee loam	23	I-1	25	1	3
PrB	Providence silt loam, 1 to 3 percent slopes	23	IIe-2	26	8	2
PrC2	Providence silt loam, 3 to 8 percent slopes, eroded	24	IIIe-2	27	8	2
Rb	Rough broken land	24	VIIe-1	29	11	2
Za	Zachary silt loam	24	VIw-1	29	6	5

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