SOIL SURVEY

St. Francis County Arkansas

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

Issued November 1966

Major fieldwork for this soil survey was done in the period 1957–61. Soil names and descriptions were approved in 1964. Unless otherwise indicated, statements in the publication refer to conditions in the county during the time of fieldwork. 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 St. Francis County Soil and Water Conservation District

HOW TO USE THIS SOIL SURVEY REPORT

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

Locating Soils

All the soils of St. Francis County are shown on the detailed map at the back of this report. 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 report. 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, or any other group in which the soil has been placed.

Individual colored maps showing the relative suitability or limitations of soils for many specific purposes can be developed by using the soil map and information in the text. Interpretations not included in the text can be developed by grouping the soils according to their suitability or limitations for a particular use. 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 discussions of the soil groupings that have been made for farming and other purposes.

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

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

Community planners and others concerned with suburban development can read about the soil properties that affect the choice of homesites, industrial sites, schools, and parks in the section "Nonfarm Uses of the Soils."

Engineers and builders will 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 "Genesis, Classification, and Morphology of Soils."

Students, teachers, and others will find information about soils and their management in various parts of the text.

Newcomers in St. Francis 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.

U.S. GOVERNMENT PRINTING OFFICE: 1966

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Contents

NOTICE TO LIBRARIANS

Series year and series number are no longer shown on soil surveys. See explanation on the next page.

Issued November 1966

EXPLANATION

Series Year and Series Number

Series year and number were dropped from all soil surveys sent to the printer after December 31, 1965. Many surveys, however, were then at such advanced stage of printing that it was not feasible to remove series year and number. Consequently, the last issues bearing series year and number will be as follows:

Series 1957, No. 23, Las Vegas-Eldorado Area, Nev.
Series 1958, No. 34, Grand Traverse County, Mich.
Series 1959, No. 42, Judith Basin Area, Mont.
Series 1960, No. 31, Elbert County, Colo. (Eastern part)
Series 1961, No. 42, Camden County, N.J.
Series 1962, No. 13, Chicot County, Ark.
Series 1963, No. 1, Tippah County, Miss.

Series numbers will be consecutive in each series year, up to and including the numbers shown in the foregoing list. The soil survey for Tippah County, Miss., will be the last to have a series year and series number.

SOIL SURVEY OF ST. FRANCIS COUNTY, ARKANSAS

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

UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH
ARKANSAS AGRICULTURAL EXPERIMENT STATION

ST. FRANCIS COUNTY is in east-central Arkansas (fig. 1). It is rectangular and about 40 miles long and 16 miles wide. The total area is 408,320 acres, or 638 square miles.

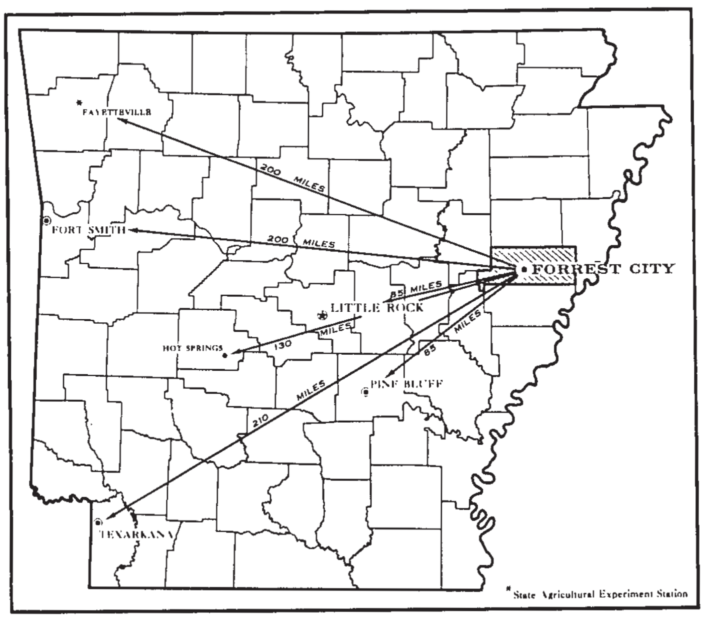

***Figure 1.*—Location of St. Francis County in Arkansas.**

The soils of the county have formed in alluvium and loess. About 44 percent of the county consists of nearly level alluvial soil that has been flooded by backwater from the Mississippi River and its tributary, the St. Francis. This hazard has been reduced by construction of levees and floodways, however, and this part of the county has become more productive agriculturally. The rest of the county consists of loessal soils on a nearly level to sloping plain in the western part and on Crowley Ridge, which extends north and south in the central part.

Most of the soils contain a moderate to large amount of plant nutrients, and there is a large supply of ground water for agriculture and industry. Extensive deposits of sand and gravel underlie parts of Crowley Ridge.

The total rainfall is greater than that needed for most crops, but it is not distributed for best use by plants. Drainage is needed in winter and spring on many soils. In summer, water for plant use often is limited, and supplemental irrigation benefits most crops.

Cotton, rice, and soybeans are the principal crops. A small acreage is in permanent pasture and peach orchards. Acreage controls on cotton and rice, the increasing cost of producing these crops, and shortage of labor have encouraged farmers to grow more soybeans. The migration of farm labor to industry has been partly offset by mechanization and by chemical weed control.

General Soil Map

The general soil map at the back of this report shows, in color, the soil associations in St. Francis County. A soil association is a group of soils that occur on the landscape in a distinctive proportional pattern. 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.

The general soil map showing broad patterns of soils 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, stoniness, drainage, and other characteristics that affect management.

The soil associations of St. Francis County are in three main topographic areas, as shown in figure 2. These areas are the broad loess plain in the western part of the county, Crowley Ridge in the central part, and the Mississippi River bottom lands east of Crowley Ridge. In the southwestern part of the loess plain is a small area of gray or brown soils in thin loess over an acid claypan. The rest of the plain consists of large areas of gray or brown soils in thick loess and small areas of alluvial soils along streams. On Crowley Ridge are brown soils in thick deposits of silty, sandy, and gravelly material. On the Mississippi River bottom lands are gray or brown soils in alluvium.

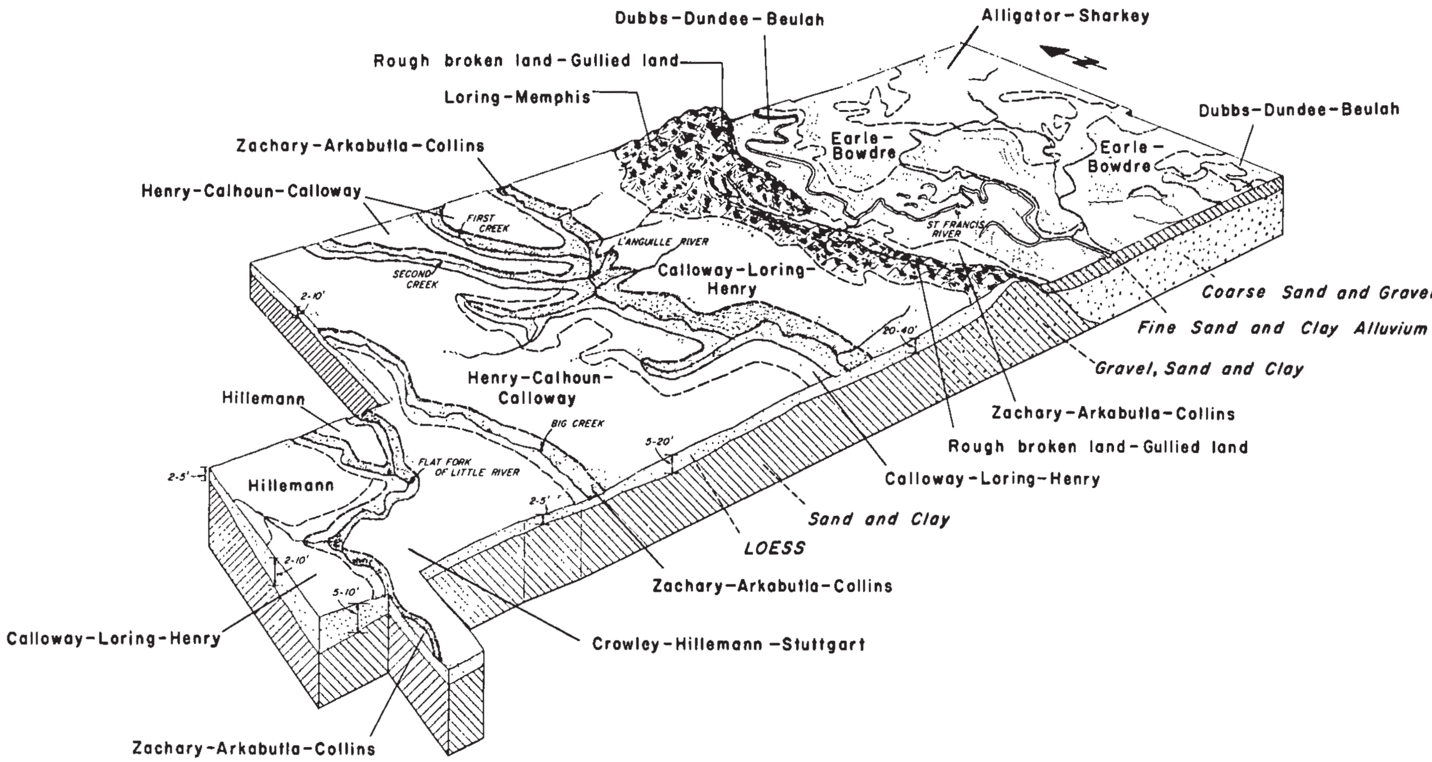

Figure 2.—**Pattern of soils in St. Francis County.**

Gray or brown soils in thin deposits of silty wind-laid materials (loess) covering old river terraces

These soils are in one soil association, the Crowley-Stuttgart, which is in the southwestern part of the county.

1. Crowley-Stuttgart association: Poorly drained to moderately well drained, level or nearly level soils that have an acid, clayey subsoil (claypan)

This association is in an area of broad flats separated by long, narrow ridges only 1 to 3 feet higher than the flats. Slow-flowing intermittent streams drain the flats. The association occupies about 2 percent of the county.

These soils developed in a thin layer of loess deposited over old clayey terraces. They have a silty, dark grayish-brown surface layer and a claypan subsoil derived from clayey river sediments.

The Crowley soils make up 75 percent of the association, the Stuttgart soils 15 percent, and a few areas of Calloway, Henry, and Hillemann soils the rest.

The Crowley soils are on the broad flats. These soils are poorly drained, and their subsoil is mottled gray and red silty clay. The Stuttgart soils, on the low ridges, are somewhat poorly drained to moderately well drained and have a red silty clay subsoil mottled with yellow and gray.

The soils of this association are productive and physically well suited to the agriculture of the county. They are in that part of the county where most of the rice is grown, and more than 95 percent of the association is cultivated. Hardwood trees grow in small patches throughout the area and along streams.

The farm buildings and the many irrigation systems indicate that the farms in this association are among the most prosperous in the county. The average farm is about 500 acres in size, is operated by the owner, and is mechanized. A few farms are operated under rental agreements. Rice is the major crop, but the agriculture is diversified. Commonly grown crops other than rice are cotton, soybeans, corn, grain sorghum, small grain, and annual lespedeza. All rice is irrigated, and most row crops receive supplemental irrigation. Most farmers have a few cattle.

Gray or brown soils in thick deposits of silty windlaid materials (loess) covering old river terraces

These soils occur in soil associations 2, 3, and 4 and occupy most of the loess plain west of Crowley Ridge.

2. Hillemann association: Somewhat poorly drained, level or nearly level soils that have a high content of salts (sodium and magnesium) in the lower subsoil

This association is made up of broad flats and long, narrow ridges only 1 to 3 feet higher than the flats. The flats are drained by slow-flowing intermittent streams. This association is in the southwestern part of the county and occupies about 2 percent of the county.

The Hillemann soils make up about 85 percent of the area, and the Crowley, Henry, and Stuttgart soils the rest.

The Hillemann soils developed in thick loess. They have a dark-gray surface layer. The upper part of the subsoil is yellowish-brown, mottled silt loam that grades to red and gray, mottled silty clay. The material below is grayish-brown silty clay loam or silt loam and contains salts of sodium and magnesium.

Soils of this association are productive and physically well suited to the agriculture of the county. They are in the part of the county where most of the rice is grown. More than 95 percent of the association is cultivated. Small patches of hardwood trees grow along the streams.

The farm buildings and the many irrigation systems indicate that the farms in this association are among the most prosperous in the county. The average farm is about 500 acres in size, is owner operated, and is mechanized. A few farms are operated under rental agreements. Although rice is the major crop, the agriculture is diversified. Other crops grown are cotton, soybeans, corn, grain sorghum, small grain, and annual lespedeza. All rice is irrigated, and most row crops receive supplemental irrigation. Most farmers raise a few cattle.

3. Calloway-Loring-Henry association: Moderately well drained to poorly drained, level to sloping soils that have a compact, brittle subsoil (fragipan)

This association consists of broad flats and long, gently sloping and sloping, narrow ridges that rise 3 to 8 feet above the flats. Slow-flowing intermittent streams drain the flats. The association occupies about 18 percent of the county.

These soils developed in thick loess, are silty, and have a dark grayish-brown surface layer. They have a compact, brittle fragipan in the subsoil.

The Calloway soils make up 60 percent of the association, the Henry soils 20 percent, the Loring soil 15 percent, and the Calhoun and Zachary soils 5 percent.

The Calloway soils, which are on the flats, are somewhat poorly drained, and their subsoil is mottled gray, yellow, and brown silty clay loam. The Henry soils are on the lower part of the flats, are poorly drained, and have a subsoil of gray silty clay loam mottled with yellowish brown. The moderately well drained Loring soils are on the ridges; they have a yellowish-brown silty clay loam subsoil that, in the lower part, has a thin, brittle fragipan mottled with gray and brown.

The soils of this association are productive and well suited to agriculture. About 85 percent of the association is cultivated, mainly for general field crops. Hardwood trees grow in small areas.

The size of the average farm is about 120 acres. Most farms are owner operated, but a few are operated under rental agreements. The agriculture is diversified. Cotton, soybeans, and rice are the chief cash crops.

4. Henry-Calhoun-Calloway association: Poorly drained or somewhat poorly drained, level or nearly level soils that have a compact, brittle subsoil (fragipan)

In this association are broad flats separated by long, narrow ridges that rise only 1 to 3 feet above the flats. Shallow, slow-flowing intermittent streams drain the flats. The association occupies about 16 percent of the county.

These soils developed in thick loess (fig. 3). They are silty and have a brown or grayish-brown surface layer. Their subsoil contains a compact, brittle layer.

The Henry soils make up 60 percent of the association, the Calloway soils 15 percent, the Calhoun soils 10 percent, and the Loring, Lafe, and Zachary soils 15 percent.

The Henry soils are on the lower parts of the broad flats and are poorly drained. The upper part of their subsoil is gray silt loam, and the lower part is gray silty clay loam mottled with yellowish brown. The Calloway soils are on the flats and low ridges. These soils are somewhat poorly drained, and their subsoil is mottled yellow, brown, and gray silty clay loam. The poorly drained Calhoun soils are on the tops of the low ridges and have a subsoil of light-gray silty clay loam mottled with yellow.

The soils of this association are well suited to the agriculture of the county, and most of the rice in the county is grown on them. About 60 percent of the association is cultivated and the rest is in hardwood trees.

The farm buildings and the many irrigation and drainage systems indicate that the farms in this area are among the most prosperous in the county. The average farm is about 400 acres in size, is mechanized, and is owner operated. A few farms are operated under rental agreements. The major crops are rice, cotton, and soybeans. Other crops are grain sorghum, corn, small grain, and annual lespedeza. All rice is irrigated, and some row crops re-

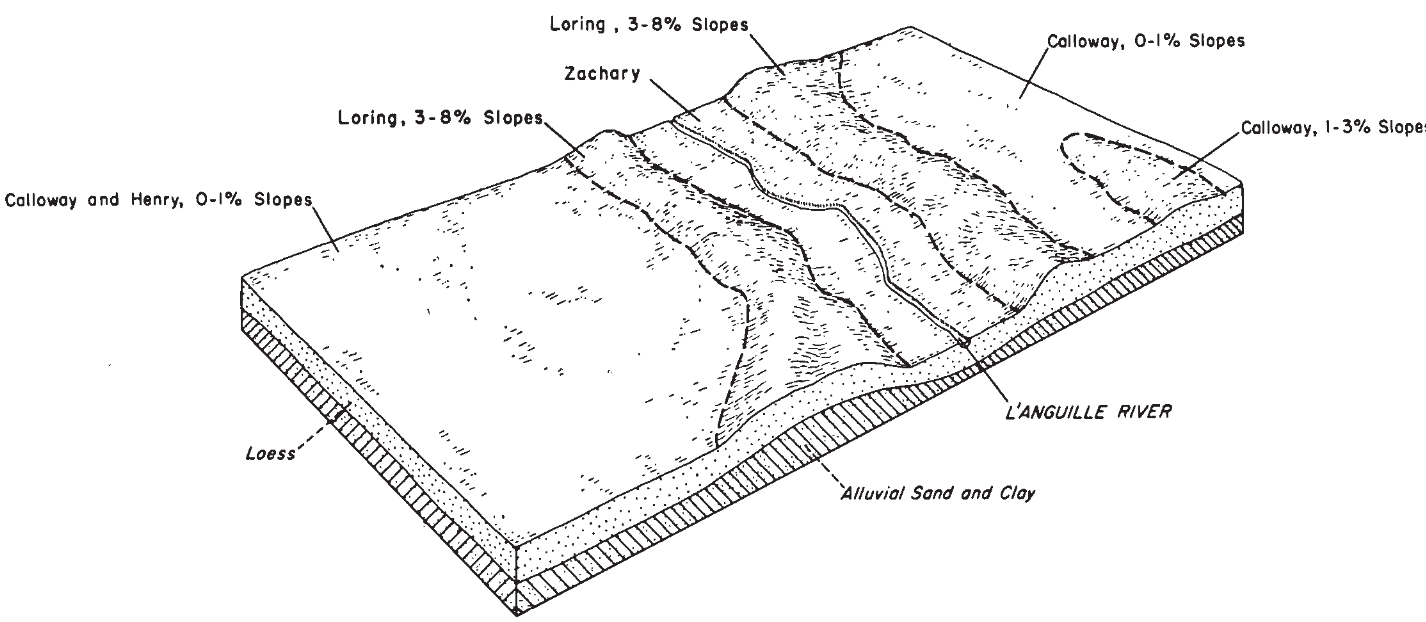

Figure 3.—**Generalized section of loess plain west of Crowley Ridge, showing relation of soils to parent material and topography.**

ceive supplemental irrigation. Most of the farmers raise some cattle and have seeded the slopes bordering the bottom lands to annual lespedeza or permanent pasture.

Brown soils in thick deposits of silty, sandy, and gravelly materials on hills and ridges

These soils are in soil associations 5 and 6 and occupy all of Crowley Ridge. Most of the area is wooded.

5. Loring-Memphis association: Moderately well drained or well drained, nearly level to steep silty soils that have a brittle (fragipan) or firm subsoil

This association occupies most of Crowley Ridge and makes up about 8 percent of the county. The narrow, crooked ridgetops are nearly level to sloping, but the sides are irregular, strongly dissected, and gently sloping to steep.

These soils developed in thick deposits of loess (fig. 4). They are silty and have a dark grayish-brown or dark-brown surface layer.

About 88 percent of this association consists of Loring and Memphis soils. The rest is Rough broken land and a few small areas of Gullied land. The Rough broken land includes many outcrops of sand and gravel.

The Loring soils are on the ridgetops and the less steep sides of the ridges. These soils are moderately well drained to well drained. Their subsoil is brown silty clay loam, which in the lower part has a thin, brittle fragipan mottled with gray and brown. The Memphis soils are on the ridgetops and the sides of the ridges. They are well drained, and their subsoil is yellowish-brown silty clay loam.

These soils are productive, but because of the slopes and the severe erosion hazard, most areas are only fairly well suited to intensive cultivation. About 85 percent of the association is in hardwood trees; the rest is cultivated or pastured. The more nearly level areas are cultivated. The steep slopes and severely eroded areas are pastured, are idle, or are wooded.

The average farm is about 80 acres in size. Most farms are owner operated, and about one-fourth of the farmers are part-time farmers. The agriculture is diversified. Cotton, corn, peaches, and annual lespedeza are the commonly grown crops. Most farms have enough pasture to support a few cattle. Cotton, cattle, and peaches are the chief products sold.

This association is well suited to peach growing and livestock farming. The choice of enterprises is limited, however, by droughtiness and a severe erosion hazard. The present level of management is not adequate for obtaining high production or for maintaining the soils, but there is a trend toward more intensive management. Generally, a much higher level of management would be practical.

6. Rough broken land-Gullied land association: Well-drained to excessively drained, steep to gently sloping sandy, silty, and gravelly soil material that is severely eroded in many places

This association is on nearly level to steep slopes along the east escarpment of Crowley Ridge. Most of the area is steep; slopes range up to 60 percent in the strongly dissected areas. This association occupies about 2 percent of the county.

About 70 percent of the association is Rough broken land, 20 percent Gullied land, and 10 percent Memphis and Loring soils.

The Rough broken land consists of sandy and silty soil materials. This well-drained to excessively drained land type occupies the steepest areas on the ridges. It is a mixture of soil materials that are of loess and Gulf Coastal Plain origin. The surface layer is silt loam or sandy loam.

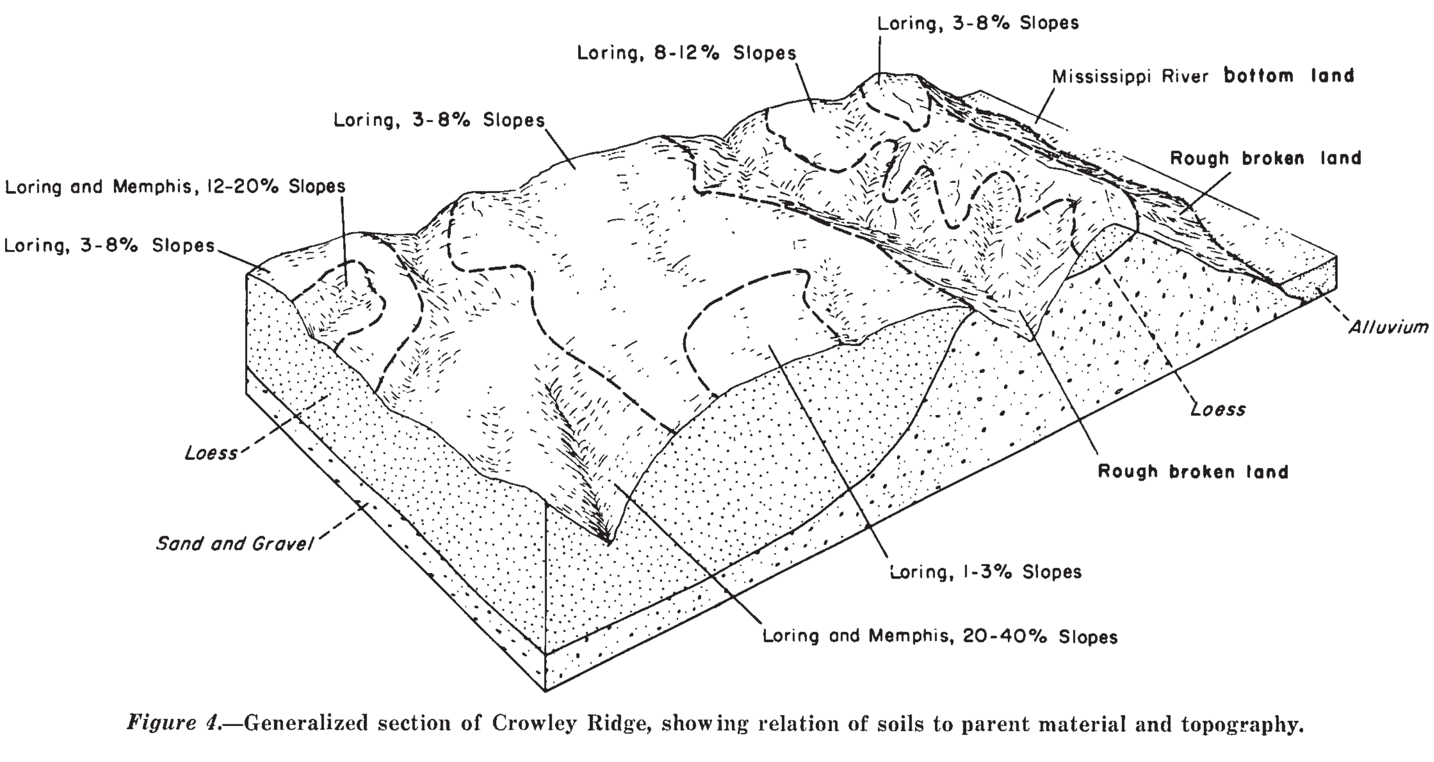

Figure 4.—Generalized section of Crowley Ridge, showing relation of soils to parent material and topography.

The subsoil is sandy and, in some places, contains large amounts of gravel.

Gullied land is nearly level to steep. This land type consists of severely eroded areas of loess soil material like that in the Loring-Memphis association. In these severely eroded areas, most of the surface soil has been removed, and the surface is a network of gullies a few feet to many feet deep. The exposed soil material is silt loam, silty clay loam, or sandy loam.

More than 85 percent of the association is in hardwood forest. The rest is in pasture, is idle, or is in brushland. This association is best suited to trees. Some areas are suitable for carefully managed pasture, but the soil material is droughty, and the hazard of erosion is severe.

Gray or brown soils in alluvial sediments on bottom lands of rivers

These alluvial soils are in soil associations 7, 8, 9, and 10, which occupy the entire part of the county east of Crowley Ridge and some areas along streams in the western part of the county.

7. Zachary-Arkabutla-Collins association: Poorly drained to moderately well drained, level soils formed in thick, silty materials washed from uplands

This association is on level bottom lands along local streams that drain soils developed in loess. It occupies about 8 percent of the county. The largest areas are along L'Anguille River, along the foot of Crowley Ridge south of Madison, and along the Flat Fork of the Little River. Most areas are frequently flooded, and along some streams the floods last several weeks during winter and spring.

The soils of this association were derived from silty alluvium and, except for the Zachary soils, have little profile development.

The Zachary soils make up about 70 percent of the association, the Arkabutla soils 20 percent, and the Collins soils 10 percent.

The Zachary soils are poorly drained. Their surface layer is grayish-brown silt loam about 4 inches thick, and their subsoil is gray silty clay loam mottled with yellow and brown. Most areas of the Zachary soils are on the bottom lands of L'Anguille River. The Arkabutla soils are somewhat poorly drained and have a surface layer of grayish-brown silt loam about 15 inches thick. Their subsoil is gray and brown mottled silt loam. The Collins soils are on young natural levees bordering the streams and are moderately well drained. Their surface layer is brown silt loam. The upper part of their subsoil is yellowish brown, but the lower part is mottled gray and brown below a depth of about 25 inches.

More than 65 percent of this association is in hardwood forest, mostly on Zachary soils. There are few farms entirely within this association, because the soils are on long, narrow bottom lands along with soils in other associations. The crops commonly grown are soybeans, grain sorghum, and corn. Cotton and rice are grown in a few places.

Areas of this association that are not subject to frequent flooding are well suited to row crops and pasture and are productive under good management. Unless the soils are artificially drained, however, yields in most areas are moderate to low. Because of flooding, most of this association is best suited to woodland or to wildlife habitats.

8. Dubbs-Dundee-Beulah association: Somewhat poorly drained to somewhat excessively drained, level or undulating soils formed in sandy or silty sediments on natural levees

This association is on old natural levees along bayous and oxbow lakes of the St. Francis River, and along abandoned channels of the Mississippi River. The levees are long, low ridges that rise gradually to a height of 3 to 10 feet above the long, narrow, shallow depressions formed by the stream channels. This association occupies about 10 percent of the county.

The sandy, better drained soils are on the crests of the natural levees. As the elevation decreases, the soils are more silty and more poorly drained (fig. 5).

The Dubbs soils make up 40 percent of the association, the Dundee soils 35 percent, the Beulah soils 20 percent, and the Bosket and Bruno soils 5 percent.

The Dubbs soils are at intermediate elevations between the Dundee and Beulah soils and are moderately well drained. Their surface layer is brown fine sandy loam. Their subsoil is yellowish-brown sandy clay loam mottled with grayish brown in the lower part. The Dundee soils are at the lower elevations and are somewhat poorly drained. Their surface layer is dark grayish-brown fine sandy loam or silt loam. They have a subsoil of dark-brown silty clay loam mottled with gray and yellowish brown. The Beulah soils are at the higher elevations on the natural levees. They are somewhat excessively drained and are sandy loam throughout. Their surface layer is dark brown, and their subsoil is brown or yellowish brown.

The soils of this association are productive and well suited to agriculture. They are in the area where most of the cotton in the county is grown and are more than 95 percent cultivated. Hardwood trees grow in small patches throughout the area and along streams and bayous.

Most farms in this association have a cluster of large buildings as headquarters, and scattered over the farms are houses for farm workers. The average farm is about 400 acres in size and is mechanized. About half of the farms are operated under rental agreements. The agriculture is diversified. Cotton, soybeans, corn, and small grain are the commonly grown crops.

9. Earle-Bowdre association: Somewhat poorly drained, level or undulating soils formed in thin deposits of clayey materials over stratified sandy and clayey sediments

This association consists of large areas of slack-water deposits on bottom lands. Some parts of it are broad flats; other parts are undulating and are on low, narrow ridges that rise 3 to 8 feet above the flats and depressions. This association occupies about 22 percent of the county.

The soils were derived from thin beds of clayey sediments deposited over coarser textured soil material by still or slowly moving floodwater.

The Earle soils make up about 60 percent of the association, the Bowdre soils 30 percent, and the Dundee, Sharkey, and Alligator soils 10 percent.

The Earle soils are somewhat poorly drained. Their surface layer is dark grayish-brown clay. Their subsoil is dark-gray clay mottled with brown and is underlain at a depth of about 30 inches by coarser textured material. The Bowdre soils also are somewhat poorly drained.

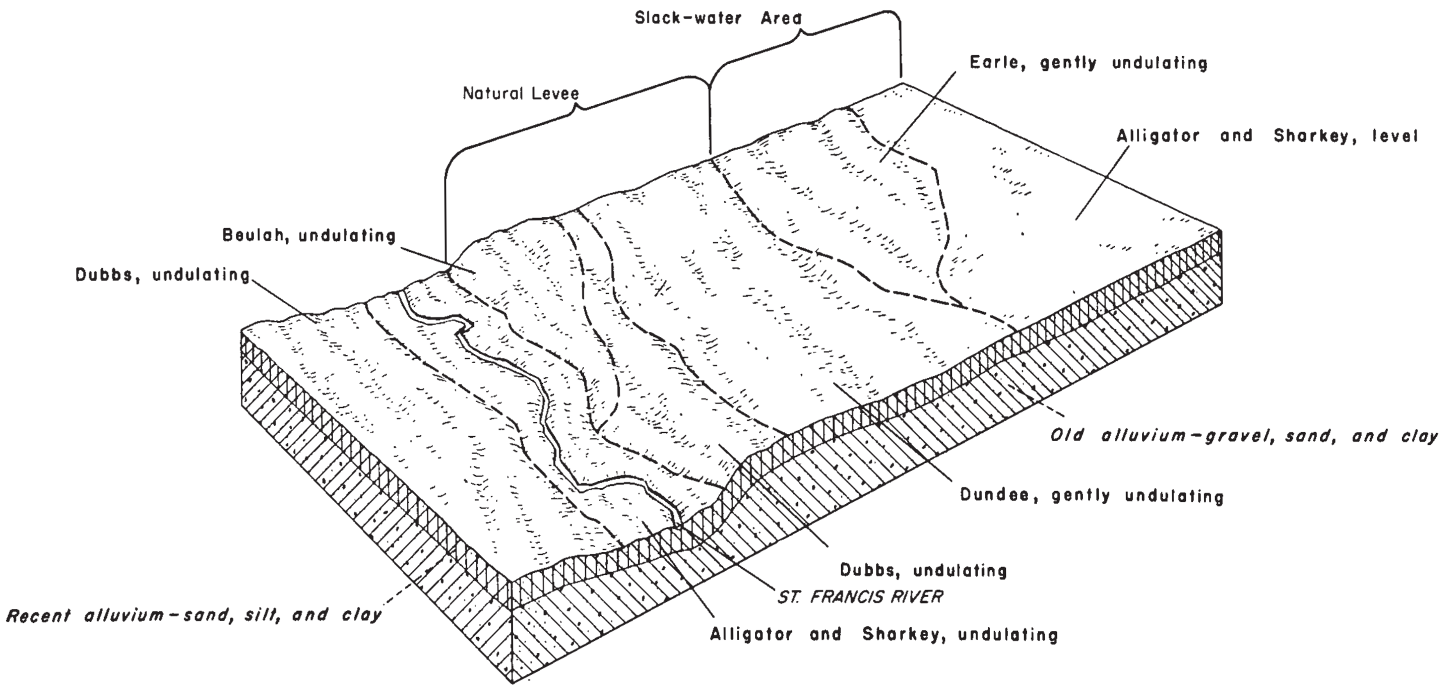

Figure 5.—**Generalized cross section, showing the soils formed in alluvium on the Mississippi River bottom lands.**

Their surface layer is dark grayish-brown silty clay. Their subsoil is dark-brown silty clay mottled with yellow and gray and is underlain at a depth of about 15 inches by coarser textured material.

The soils of this association are productive and physically suited to the agriculture of the county. More than 95 percent of the area is cultivated. These soils are in the area where most of the cotton in the county is grown. Hardwood trees grow in small patches throughout the area and along streams and bayous.

Most of the farms have a cluster of large buildings as headquarters, and scattered, small houses for laborers. The average farm is about 400 acres in size and is mechanized. About half of the farms are owner operated; the rest are operated under rental agreements. Cotton is the major crop. Other crops grown are soybeans, corn, small grain, grain sorghum, and alfalfa.

10. Alligator-Sharkey association: Poorly drained, level to undulating soils in thick deposits of clayey sediments

This association consists of large areas of slack-water deposits on bottom lands. Some parts of the association are broad flats; other parts are undulating and have low, narrow ridges that rise 3 to 8 feet above the flats and depressions. The association occupies about 12 percent of the county.

The Alligator and Sharkey soils make up about 90 percent of the association; the Earle soils make up the rest.

The Alligator and Sharkey soils are poorly drained and were derived from thick beds of clayey sediments deposited by still or slowly moving floodwater. On the broad flats these soils are dark-gray or gray plastic clay throughout. On the low ridges in undulating areas, however, the surface layer is dark grayish-brown clay over a gray plastic clay subsoil.

These soils are productive and physically suited to agriculture. About 85 percent of the area is cultivated. In wooded areas hardwood trees grow in small patches to large areas.

Most of the farms have a cluster of large buildings as headquarters, and scattered houses for laborers. The average farm is about 500 acres in size and is mechanized. About 40 percent of the farms are owner operated; the others are operated under rental agreements. The major crop is soybeans. Cotton, grain sorghum, rice, and alfalfa are also grown.

Soils of the County

In this section the procedures for making a soil survey are explained and the soil series and mapping units in the county are described.

How This Soil Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in St. Francis 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 and crops; and many facts about the soils. They dug or bored many holes to expose and study 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 uniform procedures and a national scheme of soil classification. For successful use of this report, 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 the different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Dundee and Memphis, for example, are the names of two soils series. All the soils in the United States having the same series name are essentially alike in natural characteristics. 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 layer is apparent from their names.

Some soil types vary so much in slope, degree of erosion, 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, Loring silt loam, 1 to 3 percent slopes, eroded, is one of several phases of Loring silt loam, a soil type that ranges from level to moderately steep.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew boundaries of individual soils on aerial photographs. They used photographs for their base map because they show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries. The soil map in the back of this report 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 phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or phase.

Five kinds of mapping units are used in this survey. In addition to the soil type and phase, which have been defined, there are the soil complex, the undifferentiated mapping unit, and the land type.

A soil complex consists of soils of two or more series so intricately mixed and so small in size that it is not practical to show them separately on the map. A soil complex has a definite pattern and proportion of the dominant soils, and these soils occur in all the delineated areas. A complex is named for the dominant series, and the names are separated by hyphens; for example, Bosket-Dubbs fine sandy loams, 0 to 1 percent slopes.

An undifferentiated mapping unit consists of two or more soils, usually from two or more series, that occur together without regularity in pattern and proportion. At least one of the soils of the unit occurs in every delineated area. All of the soils may occur in some delineated areas, and more than one, but not all, in others. The individual areas of the soils may be large enough to be mapped separately. Generally, however, the soils of an undifferentiated unit are so similar in their use and management that their separation is not important to the survey. An undifferentiated unit is named for the dominant series, and the names are separated by the word "and"; for example, Loring and Memphis silt loams, 12 to 20 percent slopes.

Areas are mapped as land types if they consist of unweathered soil material, or are so shallow or severely eroded that they cannot be called soils. These areas are given descriptive names, such as Gullied land or Rough broken land.

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.

Only a part of the 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 presented in different ways for different groups of users, among them farmers, ranchers, 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 the soil survey reports. The soil scientists set up trial groups, based on the yield and practice tables and other data, and test them by further study and by consultation with farmers, agronomists, engineers, and others. Then, the scientists adjust the groups according to the results of their studies and consultations. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils under present methods of use and management. Such groupings are the capability units, the woodland suitability groups, and the wildlife groups.

Descriptions of the Soils

In this subsection the soils of St. Francis County are described and their use and suitability for use are discussed. First, each soil series is described, then the mapping units, or soils, in that series. Thus, to get full information about any one mapping unit, it is necessary to read the description of that unit and also the description of the series.

More detailed information about the series can be found in the section, "Genesis, Classification, and Morphology of Soils." The approximate acreage and proportionate extent of each mapping unit are given in table 1. Some of the terms used are defined in the Glossary. At the back of the report is a page index to the mapping units and to the capability unit and woodland suitability group in which each has been placed.

799-305—66——2

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

Soil	Area	Extent	Soil	Area	Extent
	Acres	*Percent*		*Acres*	*Percent*
Alligator and Sharkey clays, 0 to 1 percent slopes	86, 272	21. 2	Hillemann silt loam, 1 to 3 percent slopes	768	0. 2
Alligator and Sharkey clays, gently undulating	8, 411	2. 1	Iuka soils	585	. 1
Alligator and Sharkey clays, undulating	1, 431	. 4	Lafe silt loam, acid	539	. 1
Alligator and Sharkey silty clay loams, overwash	1, 533	. 4	Loring silt loam, 0 to 1 percent slopes	1, 474	. 4
Arkabutla silt loam	19, 837	4. 9	Loring silt loam, 1 to 3 percent slopes	15, 752	3. 9
Beulah fine sandy loam, gently undulating	931	. 2	Loring silt loam, 1 to 3 percent slopes, eroded	1, 836	. 4
Beulah fine sandy loam, undulating	2, 892	. 7	Loring silt loam, 3 to 8 percent slopes	6, 109	1. 5
Bosket-Dubbs fine sandy loams, 0 to 1 percent slopes	294	(1)	Loring silt loam, 3 to 8 percent slopes, eroded	9, 181	2. 2
Bosket-Dubbs fine sandy loams, gently undulating	2, 088	. 5	Loring silt loam, 3 to 8 percent slopes, severely eroded	155	(1)
Bosket-Dubbs fine sandy loams, undulating	1, 811	. 4	Loring silt loam, 8 to 12 percent slopes	415	. 1
Bowdre silty clay, 0 to 1 percent slopes	237	(1)	Loring silt loam, 8 to 12 percent slopes, eroded	2, 847	. 7
Bowdre silty clay, gently undulating	678	. 2	Loring silt loam, 8 to 12 percent slopes, severely eroded	611	. 1
Bowdre silty clay, undulating	1, 397	. 3	Loring and Memphis silt loams, 12 to 20 percent slopes	6, 030	1. 5
Bruno loamy sand, undulating	1, 364	. 3	Loring and Memphis silt loams, 12 to 20 percent slopes, eroded	3, 265	. 8
Calhoun silt loam	4, 653	1. 1	Loring and Memphis silt loams, 12 to 40 percent slopes, severely eroded	881	. 2
Calloway silt loam, 0 to 1 percent slopes	35, 178	8. 6	Loring and Memphis silt loams, 20 to 40 percent slopes	5, 104	1. 2
Calloway silt loam, 1 to 3 percent slopes	9, 527	2. 3	Loring and Memphis silt loams, 20 to 40 percent slopes, eroded	733	. 2
Collins silt loam	1, 083	. 3	Memphis silt loam, 1 to 3 percent slopes	454	. 1
Crowley silt loam, 0 to 1 percent slopes	5, 545	1. 5	Memphis silt loam, 3 to 8 percent slopes, eroded	203	(1)
Crowley silt loam, 1 to 3 percent slopes	511	. 1	Memphis silt loam, 8 to 12 percent slopes, eroded	107	(1)
Dubbs fine sandy loam, gently undulating	2, 072	. 5	Rough broken land	2, 713	. 7
Dubbs fine sandy loam, undulating	2, 451	. 6	Stuttgart silt loam, 1 to 3 percent slopes	1, 634	. 4
Dundee fine sandy loam, 0 to 1 percent slopes	1, 415	. 3	Zachary silt loam	26, 417	6. 5
Dundee fine sandy loam, gently undulating	5, 444	1. 3	Total acreage of soils	403, 904	98. 9
Dundee fine sandy loam, undulating	737	. 2	Acreage of water	4, 315	1. 1
Dundee silt loam, 0 to 1 percent slopes	2, 125	. 7	Gravel pits	101	(1)
Dundee silt loam, gently undulating	1, 996	. 5			
Dundee silt loam, undulating	100	(1)	Total acreage	408, 320	100. 0
Earle clay, 0 to 1 percent slopes	5, 780	1. 4			
Earle clay, gently undulating	22, 821	5. 6			
Earle clay, undulating	19, 327	4. 7			
Gullied land	3, 367	. 8			
Henry silt loam	53, 500	13. 1			
Hillemann silt loam, 0 to 1 percent slopes	8, 483	2. 1			

[1] Less than 0.1 of 1 percent.

Alligator series

The Alligator series is made up of level to undulating, acid, poorly drained soils that formed in thick beds of fine-textured alluvium. Locally, they are called "buckshot soils." Their surface layer is dark grayish-brown or dark-gray clay or silty clay loam that is difficult to keep in good tilth. The subsoil is gray, mottled clay.

The Alligator soils occur with the Sharkey soils in slackwater areas throughout the Mississippi River bottom land in the county. Most areas adjoin the somewhat poorly drained Earle soils and the moderately well drained Bowdre soils. In St. Francis County, the Alligator soils are mapped in undifferentiated units with the poorly drained Sharkey soils.

The native vegetation consists of mixed hardwood trees, mainly water oak, hickory, sweetgum, cypress, ash, and hackberry, and an understory of briers and canes. Most of the acreage is in cotton, soybeans, rice, sorghum, alfalfa, and pasture.

Alligator and Sharkey clays, 0 to 1 percent slopes (AcA).—These soils are mapped as one unit because they are similar, except for acidity, and are much alike in the kind of management they need. The soils are poorly drained. They have a dark-gray surface layer about 6 inches thick and a gray, mottled clay subsoil. The Alligator soils are more acid throughout than the Sharkey soils. A few spots of Earle soils and a few spots of sandy overwash were included in some mapped areas.

These soils contract and crack extensively when dry, and they expand and seal when wet. Water moves into them very slowly, except when they are cracked; it then enters very rapidly until the cracks seal. The available water capacity is very high (*14*).[1] Water also moves slowly from these soils, and planting may be delayed in spring unless surface drains are provided. Because of the kind and the large amount of clay in these soils, a seedbed is difficult to prepare. The soils are suited to most of the crops grown in the county. (Capability unit IIIw-5; woodland suitability group 5; wildlife suitability group 6)

Alligator and Sharkey clays, gently undulating (AcB).—These soils are mapped as one unit because they are similar, except for acidity, and are much alike in the kind of management they need. They are in undulating areas that have narrow depressions between short slopes. The steepest slopes are less than 3 percent. The soils are poorly drained. They have a dark grayish-brown clay surface layer about 6 inches thick. The subsoil is gray, mottled

[1] Italic numbers in parentheses refer to Literature Cited, p. 79.

clay. The Alligator soils are more acid throughout than the Sharkey soils. A few spots of Earle soils and a few spots of sandy overwash were included in some mapped areas.

These soils contract and crack extensively when dry, and they expand and seal when wet. Water moves into them very slowly, except when they are cracked; it then enters rapidly until the cracks seal. The available water capacity is very high. Water also collects in swales and moves slowly from these soils. Thus, planting may be delayed in spring unless surface drains are provided. Because of the kind and the large amount of clay in these soils, a seedbed is difficult to prepare. These soils are suited to most of the crops grown in the county. (Capability unit IIIw–5; woodland suitability group 5; wildlife suitability group 6)

Alligator and Sharkey clays, undulating (AcC).—These soils are mapped as one unit because they are similar, except for acidity, and are much alike in the kind of management they need. The soils are poorly drained. They have a dark grayish-brown clay surface layer about 6 inches thick. Their subsoil is gray, mottled clay. The Alligator soils are more acid throughout than the Sharkey soils. A few spots of Earle soils and a few spots of sandy overwash were included in some mapped areas.

These soils contract and crack extensively when dry, and they expand and seal when wet. Water moves into them very slowly, except when they are cracked; it then enters rapidly until the cracks are sealed. The available water capacity is very high. Water also collects in swales and moves slowly from these soils. Consequently, planting may be delayed in spring unless surface drains are provided. Because of the kind and large amount of clay in these soils, a seedbed is difficult to prepare. The soils are suited to most of the crops grown in the county. (Capability unit IIIw–5; woodland suitability group 5; wildlife suitability group 6)

Alligator and Sharkey silty clay loams, overwash (Ad).—These soils are mapped as one unit because they are similar, except for acidity, and are much alike in the kind of management they need. They are level, poorly drained soils that have a dark grayish-brown silty clay loam surface layer about 6 inches thick and a dark-gray, mottled clay subsoil. The Alligator soils are more acid throughout than the Sharkey soils. A few spots of Earle and Dundee soils were included in some mapped areas.

These soils contract and crack extensively when dry and expand and seal when wet. Water moves into them very slowly, except when they are cracked; it then enters very rapidly until the cracks seal. The available water capacity is very high. Water also moves slowly from these soils, and planting may be delayed in spring unless surface drains are provided. Because of the kind and the large amount of clay in these soils, a seedbed is difficult to prepare. The soils are well suited to most of the crops grown in the county. (Capability unit IIIw–5; woodland suitability group 5; wildlife suitability group 6)

Arkabutla series

The Arkabutla series consists of level, somewhat poorly drained soils that formed in alluvium washed from loess soils. The surface layer of the Arkabutla soils is grayish-brown or dark grayish-brown silt loam. The subsoil is brown, light brownish-gray, or light-gray, mottled silt loam or silty clay loam.

These soils occur on bottom lands throughout the loess area of the county. Most of the acreage is along streams in Crowley Ridge and along L'Anguille River west of Crowley Ridge. The Arkabutla soils adjoin the moderately well drained Collins and Iuka soils and the poorly drained Zachary soils.

The native vegetation consists of hardwood trees, mainly white oak, red oak, post oak, water oak, maple, blackgum, cypress, and ash. Most of the acreage is in cotton, soybeans, corn, sorghum, and pasture.

Arkabutla silt loam (Ak).—This somewhat poorly drained soil on bottom lands has a dark grayish-brown silt loam surface layer about 6 inches thick. The subsoil is brown and gray, mottled silt loam. A few small spots of Collins and Zachary soils were included in some mapped areas.

The available water capacity is moderate. This soil is occasionally flooded, but flooding does not seriously affect productivity or the choice of plants. The soil is well suited to most of the crops grown in the county. (Capability unit IIw–2; woodland suitability group 4; wildlife suitability group 7)

Beulah series

The Beulah series is made up of level to undulating, somewhat excessively drained soils that formed in alluvial material. The surface layer is dark-brown, very friable fine sandy loam. The subsoil is yellowish-brown fine sandy loam.

Beulah soils are on old natural levees that border stream channels throughout the Mississippi River bottom land. Most areas of the Beulah soils adjoin the excessively drained Bruno, the moderately well drained Dubbs, the moderately well drained to well drained Bosket-Dubbs, and the somewhat poorly drained Dundee soils.

The native vegetation consists of mixed hardwoods, mainly oak, hickory, and cottonwood, and a dense undergrowth of vines. Most of the acreage is in cotton, soybeans, corn, small grain, sorghum, and pasture.

Beulah fine sandy loam, gently undulating (BaB).—This somewhat excessively drained soil has a dark-brown fine sandy loam surface layer about 6 inches thick. The subsoil is yellowish-brown fine sandy loam. This soil is in undulating areas that have narrow depressions and short slopes. The steepest slopes are less than 3 percent. A few small spots of Dubbs, Bosket, and Bruno soils were included in the mapping.

Except where there is a plowsole, water moves into and through this soil at a moderately rapid to rapid rate. The available water capacity is low, and crops wilt after short droughts. This soil warms early in spring, and early planting is possible. It is susceptible to erosion but is easy to keep in good tilth. This soil is well suited to most of the crops grown in the county. (Capability unit IIe–1; woodland suitability group 6; wildlife suitability group 5)

Beulah fine sandy loam, undulating (BaC).—This somewhat excessively drained soil has a dark-brown fine sandy loam surface layer about 6 inches thick. The subsoil is yellowish-brown fine sandy loam. This soil is in undulating areas that have narrow depressions between short slopes. The steepest slopes are less than 8 percent. A few small spots of Dubbs, Bosket, and Bruno soils were included in the mapping.

Except where there is a plowsole, the movement of water into and through this soil is moderately rapid to rapid. The available water capacity is low, and crops wilt after short droughts. The soil warms early in spring; thus, early planting is possible. It is susceptible to erosion but is easy to keep in good tilth. This soil is well suited to most of the crops grown in the county. (Capability unit IIIe-1; woodland suitability group 6; wildlife suitability group 5)

Bosket series

The Bosket series is made up of level to undulating, well-drained soils that formed in alluvium along natural levees bordering old stream channels. The surface layer is dark-brown, very friable fine sandy loam. The subsoil is dark-brown to yellowish-brown sandy clay loam.

These soils occur in the southeastern part of the county. In St. Francis County, the Bosket soils are mapped with the Dubbs soils as the Bosket-Dubbs complex. Most areas of the Bosket soils adjoin the somewhat excessively drained Beulah and the somewhat poorly drained Dundee soils, as well as the moderately well drained Dubbs soils.

The native vegetation consists of hardwoods and a thick undergrowth of vines. Most of the acreage is in cotton, soybeans, corn, small grain, and pasture.

Bosket-Dubbs fine sandy loams, 0 to 1 percent slopes (BdA).—These soils are so intermingled that it was not practical to map them separately. They are moderately well drained to well drained. They have a brown to dark-brown fine sandy loam surface layer about 6 inches thick. The subsoil is dark-brown to yellowish-brown sandy clay loam. In the Dubbs soils, this layer is mottled with gray at a depth of about 25 inches. A few small areas of Beulah and Dundee soils were included in some mapped areas.

These soils have a moderate to high available water capacity. In some places a plowsole has formed below plow depth. This layer restricts root penetration and movement of water. These soils warm early in spring, and early planting is possible. Good tilth is easy to maintain. These soils are well suited to most of the crops grown in the county. (Capability unit I-1; woodland suitability group 6; wildlife suitability group 5)

Bosket-Dubbs fine sandy loams, gently undulating (BdB).—These soils are so intermingled that it was not practical to map them separately. They are well drained to moderately well drained. They have a brown to dark-brown fine sandy loam surface layer about 6 inches thick. The subsoil is dark-brown or yellowish-brown sandy clay loam. In the Dubbs soils the subsoil is mottled with gray at a depth of about 25 inches. The soils of this complex are in undulating areas where narrow depressions are between short slopes. The steepest slopes are less than 3 percent.

These soils have a moderate to high available water capacity. In some places a plowsole has formed below plow depth. This layer restricts the penetration of roots and the movement of water. Early planting is possible because the soils warm early in spring. The soils are susceptible to erosion but are well suited to crops commonly grown in the county. (Capability unit IIe-1; woodland suitability group 6; wildlife suitability group 5)

Bosket-Dubbs fine sandy loams, undulating (BdC).—These soils are so intermingled that it was not practical to map them separately. They are moderately well drained to well drained. Their surface layer is brown to dark-brown fine sandy loam about 6 inches thick, and their subsoil is dark-brown or yellowish-brown sandy clay loam. The Dubbs soils have gray mottling in the subsoil at a depth of about 25 inches. The soils of this complex are in undulating areas where there are narrow depressions between short slopes. The steepest slopes are less than 8 percent.

The available water capacity is moderate. In some places a plowsole has formed below plow depth. This layer restricts penetration of roots and movement of water through the soil. The soils warm early in spring, and early planting is possible. Good tilth is easy to maintain. These soils are susceptible to erosion but are well suited to most crops grown in the county. (Capability unit IIIe-1; woodland suitability group 6; wildlife suitability group 5)

Bowdre series

The Bowdre series is made up of level to undulating, somewhat poorly drained soils that formed in alluvial material. The surface layer is dark-brown or very dark grayish-brown firm silty clay. The subsoil is dark-brown silty clay mottled with yellow and grayish brown. These soils are underlain at a depth of about 15 inches by material that ranges in texture from silt loam to sandy loam.

The Bowdre soils are normally on wide slopes at the base of natural levees throughout the Mississippi River bottom land. They are in a transitional zone between soils on natural levees and soils in slack-water areas. Most areas adjoin the poorly drained Alligator and Sharkey soils and the somewhat poorly drained Earle soils.

The native vegetation is red oak, post oak, white oak, and ash. Most of the acreage is in cotton, soybeans, corn, small grain, sorghum, and pasture.

Bowdre silty clay, 0 to 1 percent slopes (BeA).—This somewhat poorly drained soil has a very dark grayish-brown silty clay surface layer about 6 inches thick. The subsoil is dark-brown silty clay mottled with yellow and grayish brown. This soil is underlain at a depth of about 15 inches by material that ranges in texture from silt loam to sandy loam. A few small areas of Earle and Dundee soils and a few spots of sandy overwash were included in the mapping.

When the clayey surface layer is wet, water moves very slowly into this soil; when dry, the soil cracks. This does not seriously affect productivity or the choice of plants. Runoff is slow, and planting may be delayed in spring unless surface drains are provided. The available water capacity is moderate. Because of the clayey surface layer, preparing a seedbed and maintaining good tilth are difficult. This soil is suited to most crops grown in the county. (Capability unit IIw-4; woodland suitability group 6; wildlife suitability group 6)

Bowdre silty clay, gently undulating (BeB).—This somewhat poorly drained soil has a very dark grayish-brown silty clay surface layer about 6 inches thick. This clayey layer is thinnest at the top of slopes. The subsoil is dark-brown silty clay mottled with yellow and grayish brown and is underlain at a depth of about 12 to 15 inches by material that ranges from silt loam to sandy loam. The soil is in undulating areas where narrow depressions lie between short slopes. The steepest slopes are less than 3 percent. A few small spots of Earle and Dundee soils and a few spots of sandy overwash were included in the mapping.

When the clayey surface layer is wet, water moves very slowly into this soil; when dry, the soil cracks. This does not seriously affect productivity or the choice of plants. Water collects in swales and moves slowly from this soil. Consequently, planting may be delayed in spring unless surface drains are provided. The available water capacity is moderate. Because of the clayey surface layer, preparing a seedbed and maintaining good tilth are difficult. This soil is suited to most crops grown in the county. (Capability unit IIw-4; woodland suitability group 6; wildlife suitability group 6)

Bowdre silty clay, undulating (BeC).—This somewhat poorly drained soil has a dark grayish-brown silty clay surface layer about 6 inches thick. This clayey layer is thinnest at the top of slopes. The subsoil is dark-brown silty clay mottled with yellow and grayish brown and is underlain at a depth of about 10 to 15 inches by material that ranges in texture from silt loam to sandy loam. The soil is in undulating areas where narrow depressions occur between short slopes. The steepest slopes are less than 8 percent. A few small areas of Dundee and Earle soils and a few spots of sandy overwash were included in the mapping.

When the clayey surface layer is wet, water moves very slowly into this soil; when it is dry, the soil cracks. The slow movement of water and cracking do not seriously affect productivity or the choice of plants. Water collects in swales and moves slowly from this soil. Consequently, planting may be delayed in spring unless surface drains are provided. The available water capacity is moderate. Because of the clayey surface layer, preparing a seedbed is difficult. This soil is suited to most crops grown in the county. (Capability unit IIw-4; woodland suitability group 6; wildlife suitability group 6)

Bruno series

The Bruno series is made up of undulating, excessively drained soils that formed in alluvial material. The surface layer is dark grayish-brown to light brownish-gray, loose loamy sand. The subsoil is brown or light yellowish-brown loamy sand or sand.

Bruno soils occur throughout the Mississippi River bottom land of the county. They are most common on the natural levee bordering the St. Francis River. Most areas adjoin the somewhat excessively drained Beulah and moderately well drained Dubbs soils.

The native vegetation consists mainly of cottonwood, sycamore, and willow.

Bruno loamy sand, undulating (Br).—This excessively drained soil has a dark grayish-brown to light brownish-gray loamy sand surface layer about 6 inches thick. The subsoil is brown or light yellowish-brown loamy sand or sand. This soil is in undulating areas where narrow depressions occur between short slopes. The steepest slopes are less than 8 percent. A few small areas of Beulah and Bosket soils were included in the mapping.

Water moves rapidly into and through this soil. The available water capacity is low, and droughtiness limits the use of this soil for crops. Good tilth is easy to maintain. (Capability unit IIIs-1; woodland suitability group 6; wildlife suitability group 5)

Calhoun series

The Calhoun series is made up of level, poorly drained soils that developed in thick loess. Their surface layer is mottled yellowish-brown, very friable silt loam that is easy to keep in good tilth. The subsoil is light brownish-gray, dark grayish-brown, and grayish-brown silt loam and silty clay loam mottled with yellowish brown and olive brown.

Calhoun soils occur throughout the thick loess area of the county. Most areas adjoin the moderately well drained to well drained Loring and the somewhat poorly drained Calloway soils.

The native vegetation is mixed hardwoods, mainly water oak, red oak, willow oak, hickory, elm, maple, sweetgum, and blackgum. About three-fourths of the acreage is in rice, soybeans, sorghum, cotton, corn, and pasture.

Calhoun silt loam (Ca).—This poorly drained soil has a grayish-brown, friable silt loam surface layer about 6 inches thick. The subsoil is grayish-brown silt loam and silty clay loam mottled with yellowish brown and olive brown. A few spots of Calloway soils were included in the mapping.

Runoff is very slow, and planting may be delayed in spring unless surface drains are provided. The available water capacity is moderate. The soil is suited to most crops grown in the county. (Capability unit IIIw-4; woodland suitability group 3; wildlife suitability group 2)

Calloway series

The Calloway series is made up of level or nearly level, somewhat poorly drained soils that developed in thick loess. The surface layer is brown to very dark grayish-brown, very friable silt loam. Good tilth is easy to maintain. The subsoil is dark-brown and grayish-brown silt loam or silty clay loam. At a depth of about 20 inches, the subsoil has a gray fragipan mottled with yellowish brown. This layer restricts the penetration of water and roots.

The Calloway soils occur throughout the thick loess area of the county. They are most common in level to rolling areas west of Crowley Ridge. Most areas of the Calloway soils adjoin the moderately well drained to well drained Loring and the poorly drained Henry soils.

The native vegetation consists of mixed hardwoods, mainly elm, post oak, water oak, maple, sweetgum, blackgum, and hickory. Most of the acreage is in cotton, soybeans, rice, corn, small grain, sorghum, and pasture.

Calloway silt loam, 0 to 1 percent slopes (ClA).—This somewhat poorly drained soil has a very dark grayish-brown silt loam surface layer about 6 inches thick. The subsoil is dark-brown and grayish-brown silt loam or silty clay loam. This layer has a gray fragipan mottled with yellowish brown at a depth of about 20 inches. A few small areas of Henry and Calhoun soils were included in the mapping.

The fragipan in this soil restricts roots and water but does not seriously affect productivity or choice of plants. Runoff is slow, and planting may be delayed in spring unless surface drains are provided. The available water capacity is moderate. This soil is well suited to most of the crops grown in the county (fig. 6). (Capability unit IIw-1; woodland suitability group 3; wildlife suitability group 2)

Figure 6.—**Cotton growing on Calloway silt loam, 0 to 1 percent slopes; aerial application of defoliant before mechanical picking.**

Calloway silt loam, 1 to 3 percent slopes (ClB).—This somewhat poorly drained soil has a brown silt loam surface layer about 6 inches thick. The subsoil is dark-brown and grayish-brown silt loam or silty clay loam. This layer contains a gray fragipan mottled with yellowish brown at a depth of about 20 inches. A few small areas of Henry, Calhoun, and Loring soils were included in the mapping.

The fragipan restricts the penetration of roots and the movement of water but does not seriously affect productivity or the choice of plants. Runoff is slow, but this soil is susceptible to erosion. The available water capacity is moderate. This soil is well suited to most of the crops grown in the county. (Capability unit IIw-1; woodland suitability group 3; wildlife suitability group 2)

Collins series

The Collins series is made up of level, moderately well drained soils that formed in alluvial material washed from loessal soils. The surface layer is dark-brown or dark grayish-brown silt loam. The subsoil is brown silt loam that grades to light brownish gray mottled with gray and yellowish brown below a depth of about 20 inches.

Collins soils occur on bottom lands throughout the thick loess area of the county. Most areas adjoin the somewhat poorly drained Arkabutla and poorly drained Zachary soils along streams on Crowley Ridge.

The native vegetation consists of hardwoods, mainly water oak, pin oak, hickory, ash, elm, maple, river birch, blackgum, and sweetgum. Most of the acreage is in cotton, soybeans, corn, small grain, sorghum, and pasture.

Collins silt loam (Co).—This moderately well drained, level soil on bottom land has a dark-brown silt loam surface layer about 6 inches thick. The subsoil is brown silt loam underlain at a depth of about 20 inches by brown silt loam mottled with gray and yellowish brown. A few small areas of Arkabutla soils were included in the mapping.

This soil is occasionally flooded, but this does not seriously affect the productivity of the soil or the choice of plants. The available water capacity is moderate. Good tilth is easy to maintain. This soil is well suited to most of the crops grown in the county. (Capability unit I-1; woodland suitability group 4; wildlife suitability group 7)

Crowley series

The Crowley series is made up of level or nearly level, poorly drained soils developed in thin loessal material over clayey alluvial deposits. These soils were developed under a cover of tall grasses. The surface layer is dark grayish-brown or very dark grayish-brown friable silt loam. Good tilth is easy to maintain. The upper part of the subsoil is light brownish-gray, mottled silt loam. Below this layer at a depth of about 17 inches is a claypan that restricts the penetration of roots and water.

The Crowley soils are in the "prairie section" of the western part of the county. They occur in broad level areas and are referred to locally as "rice soils" (fig. 7). The Crowley soils adjoin the somewhat poorly drained to moderately well drained Stuttgart soils.

The native vegetation is big bluestem, switchgrass, and other tall bunch grasses. Almost all of the acreage is in rice, soybeans, cotton, corn, small grain, sorghum, and pasture.

Crowley silt loam, 0 to 1 percent slopes (CwA).—This poorly drained soil has a dark grayish-brown silt loam surface layer about 6 inches thick. The upper part of the subsoil is light brownish-gray, mottled silt loam. Below this is a mottled gray, red, and yellowish-brown claypan at a depth of about 17 inches. A few small spots of Hillemann and Henry soils were included in mapping.

The claypan restricts the penetration of roots and water, but it does not seriously affect the productivity of the soil and the choice of plants. Runoff is slow, and planting may be delayed in the spring unless surface drains are provided. The available water capacity is moderate. This soil is well suited to most crops grown in the county. (Capability unit IIIw-2; woodland suitability group 6; wildlife suitability group 1)

Crowley silt loam, 1 to 3 percent slopes (CwB).—This poorly drained soil has a dark grayish-brown silt loam surface layer about 6 inches thick. The upper part of the

Figure 7.—Rice growing on Crowley silt loam.

subsoil is light brownish-gray, mottled silt loam. Below this is a mottled gray, red, and yellowish-brown claypan at about 17 inches. A few small spots of Hillemann and Henry soils were included in mapping.

The claypan restricts root penetration and water movement but does not seriously affect the productivity of the soil and the choice of plants. Runoff is slow, and planting may be delayed in spring unless surface drains are provided. The available water capacity is moderate. This soil is well suited to most crops grown in the county. (Capability unit IIIw–2; woodland suitability group 6; wildlife suitability group 1)

Dubbs series

The Dubbs series is made up of undulating, moderately well drained soils that formed in alluvial material. The surface layer is brown to dark-brown, very friable fine sandy loam that is easy to keep in good tilth. The subsoil is yellowish-brown sandy clay loam mottled with gray at a depth of about 25 inches.

The Dubbs soils occur along stream channels throughout the Mississippi River bottom land in the county. They are most common along the St. Francis River. Most areas adjoin the excessively drained Bruno, the somewhat excessively drained Beulah, the well-drained Bosket, and the somewhat poorly drained Dundee soils.

The native vegetation consists of mixed hardwood trees, mainly oak, hickory, and cottonwood, and a dense undergrowth of vines and canes. Almost all of the acreage is in cotton, soybeans, corn, small grain, sorghum, and pasture.

Dubbs fine sandy loam, gently undulating (DbB).—This moderately well drained soil has a brown to dark-brown fine sandy loam surface layer about 6 inches thick. The subsoil is yellowish-brown, friable sandy clay loam mottled with gray in the lower part. This soil is in undulating areas of alternating narrow depressions and short slopes. The steepest slopes are less than 3 percent. A few small spots of Bosket and Dundee soils were included in some mapped areas.

Except where there is a plowsole, water moves into and through this soil at a moderate to moderately slow rate. The available water capacity is high. Runoff is medium, and the soil is susceptible to erosion. The soil warms early in spring, and early planting is possible. It is well suited to most of the crops grown in the county. (Capability unit IIe–1; woodland suitability group 6; wildlife suitability group 5)

Dubbs fine sandy loam, undulating (DbC).—This moderately well drained soil has a brown to dark-brown fine sandy loam surface layer about 6 inches thick. The subsoil is yellowish-brown, friable sandy clay loam mottled with gray in the lower part. This soil is in undulating areas of alternating narrow depressions and short slopes. The steepest slopes are less than 8 percent. A few small spots of Bosket and Dundee soils were included in some mapped areas.

Except where there is a plowsole, water moves into and through this soil at a moderate to moderately slow rate. The available water capacity is high. Runoff is medium, and the soil is susceptible to erosion. It warms early in spring, and early planting is possible. This soil is well suited to most of the crops grown in the county. (Capability unit IIIe–1; woodland suitability group 6; wildlife suitability group 5)

Dundee series

The Dundee series consists of level to undulating, somewhat poorly drained soils that formed in alluvial material. The surface layer is dark-brown or brown friable fine sandy loam or silt loam. Good tilth is easy to maintain. The subsoil is light brownish-gray to dark grayish-brown silty clay loam mottled with gray and yellow.

The Dundee soils occur throughout the Mississippi River bottom land of the county. These soils are generally on the lower part of old natural levees. Most areas adjoin the somewhat excessively drained Beulah, the well-drained Bosket, and the moderately well drained Dubbs soils.

The native vegetation consists of mixed hardwoods, mainly red oak, white oak, hickory, blackgum, and sweetgum and a dense undergrowth of shrubs and vines. Almost all the acreage is in cotton, soybeans, corn, small grain, sorghum, and pasture.

Dundee fine sandy loam, 0 to 1 percent slopes (DdA).—This somewhat poorly drained soil has a dark-brown or dark grayish-brown fine sandy loam surface layer about 6 inches thick. The subsoil is light brownish-gray to dark grayish-brown, mottled silty clay loam. A few spots of Dubbs soils were included in mapping.

Except where there is a plowsole, water moves into and through this soil at a moderate to moderately slow rate. The available water capacity is moderate. Runoff is slow, and planting may be delayed in spring unless surface drains are provided. This soil is well suited to cultivation of most common crops. (Capability unit IIw–2; woodland suitability group 6; wildlife suitability group 5)

Dundee fine sandy loam, gently undulating (DdB).—This somewhat poorly drained soil has a dark-brown or dark grayish-brown fine sandy loam surface layer about 6 inches thick. The subsoil is dark grayish brown or dark brown, mottled silty clay loam. This soil is in undulating areas of alternating narrow depressions and short slopes. The steepest part is less than 3 percent. A few spots of Dubbs soils are included in some delineations.

Except where there is a plowsole, water moves into and through this soil at moderate to moderately slow rates. Water collects in swales, and runoff is slow. The available water capacity is moderate. Planting may be delayed in spring unless surface drains are provided. This soil is well suited to cultivation of most crops. (Capability unit IIIw–3; woodland suitability group 6; wildlife suitability group 5)

Dundee fine sandy loam, undulating (DdC).—This somewhat poorly drained soil has a dark-brown or dark grayish-brown fine sandy loam surface layer about 6 inches thick. The subsoil is light brownish-gray to dark grayish-brown, mottled silty clay loam. This soil is in undulating areas where narrow depressions occur between short slopes. The steepest slopes are less than 8 percent. A few small spots of Dubbs soils were included in mapping.

Except where there is a plowsole, water moves into and through this soil at a moderate to moderately slow rate. The available water capacity is moderate. Runoff is medium, and water collects in swales. Consequently, planting may be delayed in spring unless surface drains are provided. This soil is well suited to most of the crops grown in the county. (Capability unit IIIw–3; woodland suitability group 6; wildlife suitability group 5)

Dundee silt loam, 0 to 1 percent slopes (DuA).—This somewhat poorly drained soil has a dark grayish-brown

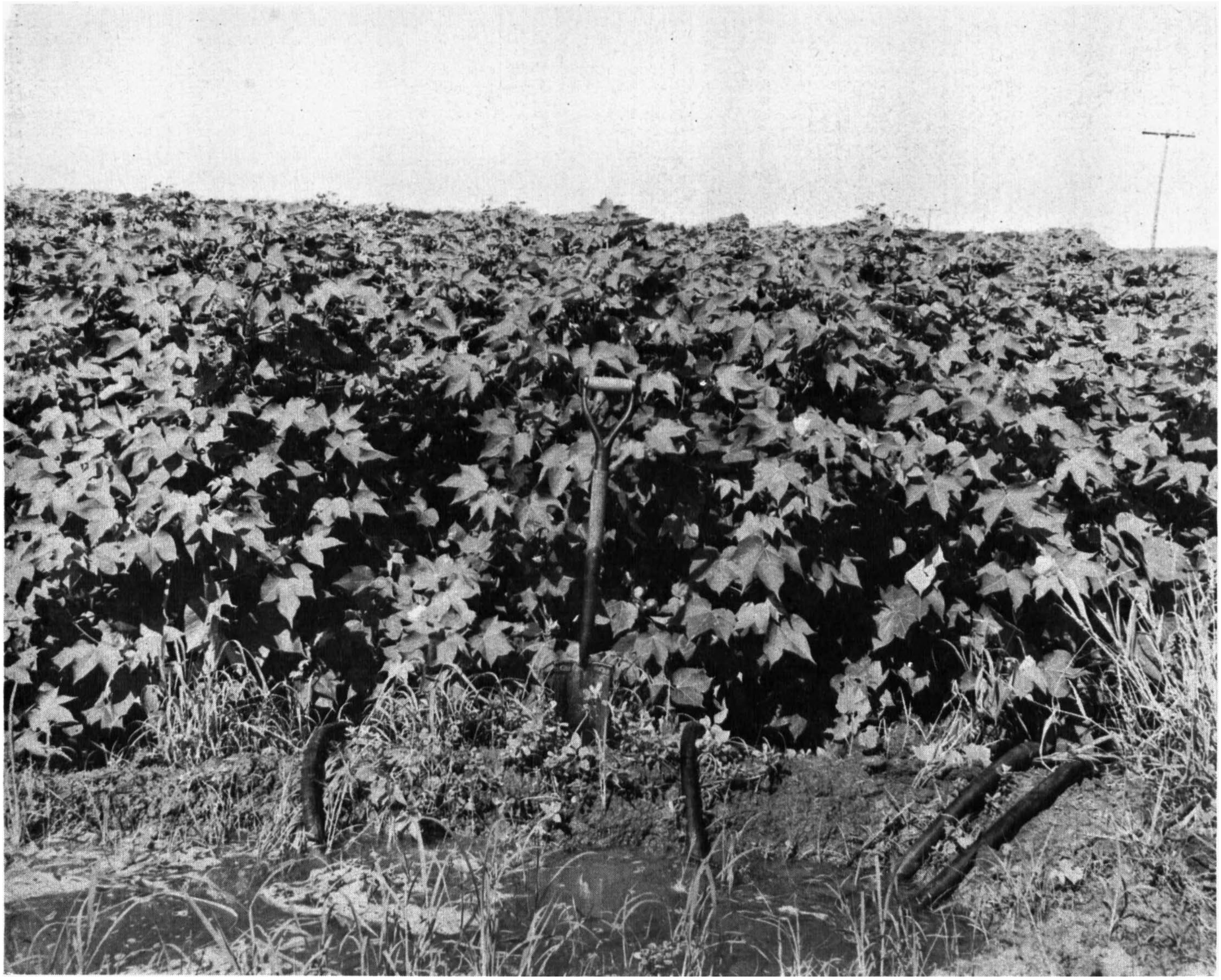

***Figure 8.*—Furrow irrigation of cotton growing on Dundee silt loam, 0 to 1 percent slopes.**

silt loam surface layer about 6 inches thick. The subsoil is light brownish-gray to dark grayish-brown, mottled silty clay loam. A few spots of Dubbs soils were included in mapping.

Except where there is a plowsole, water moves into and through this soil at a moderately slow rate. The available water capacity is moderate. Runoff is slow, and planting may be delayed in spring unless surface drains are provided. This soil is well suited to crops commonly grown in the county (fig. 8). (Capability unit IIw–2; woodland suitability group 6; wildlife suitability group 5)

Dundee silt loam, gently undulating (DuB).—This somewhat poorly drained soil has a dark grayish-brown silt loam surface layer about 6 inches thick. The subsoil is dark grayish-brown, mottled silty clay loam. This soil is in undulating areas where narrow depressions occur between short slopes. The steepest slopes are less than 3 percent. A few spots of Dubbs soils were included in mapping.

Except where there is a plowsole, the movement of water into and through this soil is at a moderately slow rate. The available water capacity is moderate. Runoff is slow, and water collects in swales. Thus, planting may be delayed in spring unless surface drains are provided. This soil is well suited to crops commonly grown in the county. (Capability unit IIIw–3; woodland suitability group 6; wildlife suitability group 5)

Dundee silt loam, undulating (DuC).—This somewhat poorly drained soil has a dark grayish-brown silt loam surface layer about 6 inches thick. The subsoil is dark grayish-brown, mottled silty clay loam. This soil is in undulating areas where narrow depressions alternate with short slopes. The steepest slopes are less than 8 percent. A few small spots of Dubbs soils were included in mapping.

Except where there is a plowsole, the movement of water into and through this soil is at a moderately slow rate. The available water capacity is moderate. Runoff is medium, and water collects in swales. Planting may be delayed in spring unless surface drains are provided. This soil is well suited to crops commonly grown in the county. (Capability unit IIIw-3; woodland suitability group 6; wildlife suitability group 5)

Earle series

The Earle series is made up of level to undulating, somewhat poorly drained soils that formed in moderately thick beds of fine-textured alluvium. Locally, they are called "buckshot" soils. The surface layer is grayish-brown to very dark grayish-brown clay. The subsoil is gray or dark-gray, mottled clay and is underlain by coarser textured sediments at a depth of 20 to 36 inches.

Earle soils are on the higher elevations in slack-water areas. They occur throughout the Mississippi River bottom land area of the county. Most areas adjoin the poorly drained Alligator and Sharkey soils and the moderately well drained Bowdre soils.

The native vegetation consists of hardwoods, mainly water oak, elm, sweetgum, ash, pecan, and water hickory. Almost all of the acreage is in cotton, corn, small grain, sorghum, alfalfa, and pasture.

Earle clay, 0 to 1 percent slopes (EcA).—This somewhat poorly drained soil on bottom land has a very dark grayish-brown clay surface layer about 6 inches thick. The subsoil is dark-gray, mottled clay and is underlain by coarser textured material. A few spots of Alligator, Sharkey, and Bowdre soils were included in mapping, as well as a few spots of sandy overwash.

This soil contracts and cracks extensively when dry and expands and seals when wet. Water moves into the soil very slowly, except when it cracks; then water enters very rapidly until the cracks seal. The available water capacity is high. Runoff is slow, and planting may be delayed in spring unless surface drains are provided. Because of the amount and kind of clay, tilth is poor and a seedbed is difficult to prepare. This soil is suited to most of the crops grown in the county. (Capability unit IIIw-1; woodland suitability group 5; wildlife suitability group 6)

Earle clay, gently undulating (EcB).—This somewhat poorly drained soil on the bottom land has a grayish-brown to very dark grayish-brown clay surface layer about 6 inches thick. The subsoil is dark-gray, mottled clay, underlain by coarser textured sediments at a depth of 20 to 36 inches. This soil is in undulating areas where narrow depressions lie between short slopes. The steepest slopes are less than 3 percent. A few spots of Alligator, Sharkey, and Bowdre soils were included in mapping, as well as a few spots of sandy overwash.

This soil contracts and cracks extensively when dry and expands and seals when wet. Water moves into it very slowly, except when it cracks; then water enters very rapidly until the cracks seal. The available water capacity is high. Water collects in swales and moves slowly from this soil. Consequently, planting may be delayed in spring unless surface drains are provided. Because of the amount and kind of clay, tilth is poor and a seedbed is difficult to prepare. This soil is suited to most of the crops grown in the county. (Capability unit IIIw-1; woodland suitability group 5; wildlife suitability group 6)

Earle clay, undulating (EcC).—This somewhat poorly drained soil on bottom land has a grayish-brown to very dark grayish-brown clay surface layer about 6 inches thick. The subsoil is dark-gray, mottled clay that is underlain by coarser textured sediments at a depth of 20 to 36 inches. A few spots of Alligator, Sharkey, and Bowdre soils were included in mapping, and also a few spots of sandy overwash. This soil is in undulating areas where narrow depressions occur between short slopes. The steepest slopes are less than 8 percent.

This soil contracts and cracks extensively when dry, and it expands and seals when wet. Water moves into it very slowly, except when it is cracked; then water enters very rapidly until the cracks seal. The available water capacity is high. Water collects in swales and moves slowly from this soil. Thus, planting may be delayed in spring unless surface drains are provided. Because of the amount and kind of clay in this soil, tilth is poor and a seedbed is difficult to prepare. This soil is suited to most of the crops grown in the county. (Capability unit IIIw-1; woodland suitability group 5; wildlife suitability group 6)

Gullied land

Gullied land (Gu) is a miscellaneous land type so severely eroded that the surface is a network of gullies a few feet to many feet deep. Between the gullies, most of the surface layer has been removed and the brown silt loam or silty clay loam subsoil is exposed.

Gullied land occurs throughout the thick loess areas of the county and is most common on slopes of 3 to 25 percent on Crowley Ridge. The native vegetation was mixed hardwoods, but almost all of this land type is now idle, in pasture, or in brush. Runoff is very rapid, and the hazard of further erosion is very severe. The present surface soil material has poor structure and puddles readily. Before this land was severely eroded, it was cultivated for many years, but erosion has destroyed its usefulness as cropland. The surface is too irregular for the use of farm machinery. Gullied land is most suitable for use as woodland or as wildlife shelter. (Capability unit VIIe-2; woodland suitability group 6; wildlife suitability group 3)

Henry series

The Henry series is made up of level, poorly drained soils that developed in thick loess. The surface layer is gray, very friable silt loam that is easy to keep in good tilth. The subsoil is gray silt loam mottled with yellowish brown. At a depth of 20 to 36 inches, the subsoil has a fragipan that restricts the penetration of roots.

The Henry soils occur throughout the thick loess area of the county. They are most common in wide, level areas west of L'Anguille River. Most areas adjoin the well-drained Loring and the somewhat poorly drained Calloway soils.

The native vegetation is mixed hardwoods, mainly water oak, red oak, willow oak, hickory, elm, maple, sweetgum, and blackgum. About three-fourths of the acreage is in rice, soybeans, sorghum, cotton, corn, and pasture.

Henry silt loam (He).—This level, poorly drained soil has a gray, friable silt loam surface layer about 6 inches thick. The subsoil is mottled gray silt loam. It has a gray, mottled silty clay loam fragipan beginning at a depth of about 20 to 36 inches. A few spots of Calloway soils were included in mapping.

The fragipan restricts roots and water but does not seriously affect the productivity of the soil and the choice of plants. Runoff moves very slowly from this soil, and the planting may be delayed in spring unless surface drains are provided. The available water capacity is moderate. The soil is suited to most of the crops grown in the county. (Capability unit IIIw-4; woodland suitability group 3; wildlife suitability group 2)

Hillemann series

The Hillemann series is made up of level to nearly level, somewhat poorly drained soils that developed in loess. Locally, they are called rice soils. The surface layer is dark-gray friable silt loam that is easily kept in good tilth. The subsoil is mottled light yellowish-brown silt loam in the upper part. Below this is red silty clay mottled with gray. The lower part is gray silty clay loam or silt loam mottled with yellowish brown. This lower part of the subsoil contains a moderately high concentration of sodium and magnesium.

The Hillemann soils are in the "prairie section" in the western part of the county. They are in broad, level to nearly level areas. The Hillemann soils adjoin the poorly drained Crowley soils. The native vegetation is scattered hardwood trees and an understory of bluestem, switchgrass, and other tall bunch grasses. Almost all of the acreage is in rice, soybeans, cotton, corn, small grain, sorghum, and pasture.

Hillemann silt loam, 0 to 1 percent slopes (HmA).—This somewhat poorly drained soil has a dark-gray silt loam surface layer about 5 inches thick. The subsoil is mottled with light yellowish-brown silt loam that grades with increasing depth to red silty clay mottled with gray. Below this is gray silty clay loam or silt loam mottled with yellowish brown. A few small spots of Crowley and Henry soils were included in mapping.

The silty clay layer restricts water movement but does not seriously affect soil productivity and choice of plants. Runoff moves slowly from this soil, and planting may be delayed in spring unless surface drains are provided. The available water capacity is low. The soil is well suited to most crops grown in the county. (Capability unit IIw-3; woodland suitability group 6; wildlife suitability group 2)

Hillemann silt loam, 1 to 3 percent slopes (HmB).—This somewhat poorly drained soil has a dark-gray silt loam surface layer about 5 inches thick. The subsoil is mottled light yellowish-brown silt loam in the upper part that grades with increasing depth to red silty clay mottled with gray. Below this is a gray silty clay loam or silt loam mottled with yellowish brown. A few small spots of Crowley soils were included in mapping.

The silty clay subsoil restricts water movement but does not seriously affect soil productivity and choice of plants. Runoff is slow, and planting may be delayed in spring unless surface drains are provided. The available water capacity is moderate. The soil is well suited to most of the crops grown in the county. (Capability unit IIw-3; woodland suitability group 6; wildlife suitability group 2)

Iuka series

The Iuka series consists of nearly level, moderately well drained, young soils on bottom land. These soils are a mixture of sandy and silty material washed from Crowley Ridge. They are variable in texture throughout. The surface layer is brown, very friable silt loam, fine sandy loam, or sandy loam. This layer is easy to keep in good tilth. The subsoil is brown and grayish-brown loam, silt loam, or loamy sand mottled with yellowish brown.

The Iuka soils are in a narrow area between Crowley Ridge and the St. Francis River. Most areas adjoin the somewhat poorly drained Arkabutla soils.

The native vegetation is post oak, black oak, hickory, elm, and maple. Almost all of the acreage is in cotton, soybeans, corn, small grain, sorghum, and pasture.

Iuka soils (Ik).—These nearly level, moderately well drained soils have a brown silt loam, fine sandy loam, or sandy loam surface layer about 6 inches thick. The subsoil is brown and grayish-brown loam, silt loam, or loamy sand mottled with yellowish brown. A few areas of Arkabutla soils were included in mapping.

Water moves into and through these soils at a moderate to moderately slow rate. The available water capacity is moderate. These soils are well suited to most of the crops grown in the county. (Capability unit IIe-1; woodland suitability group 6; wildlife suitability group 5)

Lafe series

The Lafe series is made up of nearly level, poorly drained to somewhat poorly drained soils that developed in thick loess. The surface layer is very dark grayish-brown or grayish-brown, very friable silt loam. It has weak structure and tends to crust. Good tilth is difficult to maintain. The subsoil is mottled light brownish-gray, extremely firm silty clay loam that has a high content of sodium and magnesium.

The Lafe soils are in small areas in the northwestern part of the county. They are on nearly level, low, wide ridges. Most areas of these soils adjoin the moderately well drained Loring and the somewhat poorly drained Calloway soils.

The native vegetation is mainly scrub post oak and three-awn grasses. Almost all of the acreage is savannah-type woodland. Lafe soils are not suitable for cultivation. Probably because the soils contain a large amount of sodium and magnesium, most plants do not grow well, and the available water capacity is very low. Consequently, yields of most crops are very low.

Lafe silt loam, acid (La).—This nearly level, poorly drained to somewhat poorly drained soil has a very dark grayish-brown silt loam surface layer about 6 inches thick. The subsoil is mottled light brownish-gray, extremely firm silty clay loam.

Because of the very poor physical condition of the subsoil, probably caused by the high content of sodium and magnesium at levels toxic to most plants, this soil is not desirable for cultivated crops. The subsoil is highly dispersed, and the available water capacity is low, even during months of abundant rainfall. The use of this soil is limited to pasture or to wildlife food and cover. (Capability unit VIs-1; woodland suitability group 6; wildlife suitability group 4)

Loring series

The Loring series is made up of nearly level to moderately steep, moderately well drained to well drained soils that developed in thick loess. The surface layer is dark-brown, brown, or yellowish-brown, very friable silt loam. The tilth of this layer is easy to maintain except in severely eroded areas. The subsoil is dark-brown, brown, or yellowish-brown silt loam or silty clay loam and has a weakly developed, mottled fragipan at a depth of about 22 to 33 inches that restricts root penetration.

The Loring soils occur throughout the thick loess area of the county. They are most common on Crowley Ridge. Most areas adjoin the well-drained Memphis and somewhat poorly drained Calloway soils. Some areas of Loring soils are mapped with the Memphis soils as undifferentiated units.

The native vegetation consists of mixed hardwoods, mainly white oak, red oak, beech, elm, hickory, and yellow-poplar. About half the acreage is in woodland, and the rest is in cotton, soybeans, corn, small grain, sorghum, and pasture.

Loring silt loam, 0 to 1 percent slopes (LgA).—This moderately well drained to well drained soil has a dark-brown, very friable silt loam surface layer about 6 inches thick. The subsoil is brown, dark-brown, or yellowish-brown silty clay loam. At a depth of about 27 to 33 inches, it has a weakly developed, light brownish-gray fragipan that is mottled with shades of brown and gray. A few small spots of Calloway soils were included in mapping.

The fragipan restricts the penetration of roots and the movement of water but does not seriously affect soil productivity or the choice of plants. The available water capacity is moderate. Runoff is slow. The soil is well suited to most of the crops grown in the county. (Capability unit I–2; woodland suitability groups 1 and 2; wildlife suitability group 3)

Loring silt loam, 1 to 3 percent slopes (LgB).—This moderately well drained to well drained soil has a dark-brown, very friable, silt loam surface layer about 6 inches thick. The subsoil is dark-brown, brown, or yellowish-brown silty clay loam. At a depth of about 27 to 33 inches, it has a weakly developed, light brownish-gray fragipan that is mottled with shades of brown and gray. A few spots of Memphis and Calloway soils were included in mapping.

The fragipan restricts the penetration of roots and the movement of water but does not seriously affect soil productivity or the choice of plants. The available water capacity is moderate. This soil is susceptible to erosion, but it is well suited to most of the crops grown in the county. (Capability unit IIe–2; woodland suitability groups 1 and 2; wildlife suitability group 3)

Loring silt loam, 1 to 3 percent slopes, eroded (LgB2).—This soil is moderately well drained to well drained. Erosion has removed some of the dark silt loam surface layer, and small rills are common after a rain. In most places the surface layer has been mixed with the subsoil by plowing. The plow layer is brown or yellowish-brown very friable silt loam. The subsoil is brown, dark-brown, or yellowish-brown silty clay loam. At a depth of about 24 to 30 inches, it has a weakly developed, light brownish-gray fragipan that is mottled with shades of brown and gray. A few spots of Memphis and Calloway soils were included in mapping.

The fragipan restricts the penetration of roots and the movement of water but does not seriously affect soil productivity and the choice of plants. The available water capacity is moderate. Runoff is medium. The soil tends to puddle readily because of the low content of organic matter and the weak structure. Also, it is susceptible to erosion, but it is well suited to most crops grown in the county. (Capability unit IIe–2; woodland suitability groups 1 and 2; wildlife suitability group 3)

Loring silt loam, 3 to 8 percent slopes (LgC).—This moderately well drained to well drained soil has a dark-brown, very friable silt loam surface layer about 6 inches thick. The subsoil is dark-brown, brown, or yellowish-brown silty clay loam. At a depth of about 24 to 30 inches, it has a weakly developed, light brownish-gray fragipan that is mottled with shades of brown and gray. A few spots of Memphis soils were included in mapping.

The fragipan restricts the penetration of roots and the movement of water. The available water capacity is moderate. The soil is well suited to most crops grown in the county. (Capability unit IIIe–2; woodland suitability groups 1 and 2; wildlife suitability group 3)

Loring silt loam, 3 to 8 percent slopes, eroded (LgC2).—This is a moderately well drained to well drained soil. Erosion has removed some of the dark-brown silt loam surface layer, and small rills are common after rains. In some places the surface layer has been mixed with the subsoil in plowing, and the plow layer is brown or yellowish brown. The subsoil is dark-brown, brown, or yellowish-brown silty clay loam. At a depth of about 24 to 30 inches, the subsoil has a weakly developed, light brownish-gray fragipan that is mottled with shades of brown and gray. A few spots of Memphis soils were included in mapping.

The fragipan restricts the penetration of roots and the movement of water but does not affect soil productivity and choice of plants. The available water capacity is moderate. The soil puddles readily because of a low content of organic matter and weak structure. Runoff is rapid, and the hazard of erosion is severe, but most cultivated crops can be grown with careful management. This soil is well suited to orchards if the trees are planted on contour terrace ridges. (Capability unit IIIe–2; woodland suitability groups 1 and 2; wildlife suitability group 3)

Loring silt loam, 3 to 8 percent slopes, severely eroded (LgC3).—This moderately well drained to well drained soil has a dark-brown, very friable silt loam plow layer. Most of the original surface layer has been removed by erosion, and the plow layer is a mixture of the original surface layer and the subsoil. In many places most of the plow layer is subsoil. Rills and shallow gullies are common. The subsoil is brown, dark-brown, or yellowish-brown silty clay loam. At a depth of about 22 to 28 inches, the subsoil has a weakly developed, light brownish-gray fragipan that is mottled with shades of brown and gray. A few spots of Memphis soils and Gullied land were included in mapping.

The fragipan restricts the penetration of roots and water but does not seriously affect soil productivity or the choice of plants. The available water capacity is moderate. This soil puddles readily because of the low content of organic matter and the weak structure. Runoff is rapid, and the hazard of erosion is severe. This soil is not well suited to cultivated crops, but it is suited to peach orchards if the trees are planted on contour terrace ridges. The soil is well suited to pasture and trees. (Capability unit IIIe–2; woodland suitability groups 1 and 2; wildlife suitability group 3)

Loring silt loam, 8 to 12 percent slopes (LgD).—This moderately well drained to well drained soil has a dark-brown, very friable silt loam surface layer about 6 inches thick. The subsoil is dark-brown, brown, or yellowish-brown silty clay loam. At a depth of about 27 to 33 inches, it has a weakly developed, light brownish-gray fragipan that is mottled with shades of brown and gray. A few spots of Memphis soils were included in mapping.

The fragipan restricts the penetration of roots and the movement of water but does not seriously affect soil productivity or the choice of plants. Runoff is rapid, and erosion is a severe hazard. The available water capacity is moderate. Because of the erosion hazard, this soil is not suited to continuous cultivation, but it is suited to pasture and trees. It is also suited to peach orchards if the trees are planted on contour terrace ridges. (Capability unit IVe–1; woodland suitability groups 1 and 2; wildlife suitability group 3)

Loring silt loam, 8 to 12 percent slopes, eroded (LgD2).—This is a moderately well drained to well drained soil. Erosion has removed some of the dark silt loam surface layer, and small rills are common after rains. In some places the surface layer has been mixed with the subsoil by plowing. The subsoil is dark-brown, brown, or yellowish-brown silty clay loam. At a depth of about 24 to 30 inches, it has a weakly developed, light brownish-gray fragipan that is mottled with shades of brown and gray. A few spots of Memphis soils were included in mapping.

The fragipan restricts the penetration of roots and the water movement but does not seriously affect soil productivity and choice of plants. The available water capacity is moderate. Runoff is rapid, and erosion is a severe hazard. This soil is not well suited to cultivated crops, because of the erosion hazard, but is suited to pasture and trees. It is also suited to peach orchards if the trees are planted on contour terrace ridges. (Capability unit IVe–1; woodland suitability groups 1 and 2; wildlife suitability group 3)

Loring silt loam, 8 to 12 percent slopes, severely eroded (LgD3).—This moderately well drained to well drained soil has a yellowish-brown silt loam plow layer. Most of the original surface layer has been removed by erosion, and the plow layer is a mixture of the original surface layer and the subsoil. In many places most of the plow layer is subsoil. Rills and shallow gullies are common. The subsoil is brown or yellowish-brown silty clay loam. At a depth of about 22 to 28 inches, it has a weakly developed, light brownish-gray fragipan that is mottled with shades of brown and gray. Some spots of Memphis soils and Gullied land were included in mapping.

The fragipan restricts the penetration of roots and the movement of water but does not seriously affect soil productivity or the choice of plants. The available water capacity is moderate. This soil puddles readily because of the low content of organic matter and the weak structure. Runoff is rapid, and erosion is a very severe hazard. This soil is not suited to continuous cultivation but is suited to pasture and trees. It is also suited to peach orchards if the trees are planted on contour terrace ridges. (Capability unit IVe–1; woodland suitability groups 1 and 2; wildlife suitability group 3)

Loring and Memphis silt loams, 12 to 20 percent slopes (LmE).—These soils are mapped as an undifferentiated unit because they are similar and are much alike in the kind of management they need. The Loring soils predominate. The soils of this unit are moderately well drained to well drained. They have a dark-brown very friable silt loam surface layer about 6 inches thick. Their subsoil is dark-brown, brown, or yellowish-brown silty clay loam. At a depth of 22 to 33 inches, the Loring soils have a weakly developed, light brownish-gray fragipan that is mottled with brown and gray. This layer restricts the penetration of roots. The Memphis soils do not have a fragipan.

These soils are susceptible to erosion. Their available water capacity is moderate. They are not suited to cultivated crops but are well suited to pasture and to woodland crops. (Capability unit VIe–1; woodland suitability group 2; wildlife suitability group 3)

Loring and Memphis silt loams, 12 to 20 percent slopes, eroded (LmE2).—These soils are mapped as an undifferentiated unit because they are similar and are much alike in the kind of management they need. The Loring soils predominate. Erosion has removed some of the surface layer from the soils of this unit. In most places this layer has been mixed with the subsoil by plowing. Small rills and shallow gullies are common after rains. The surface layer is brown or dark-brown silt loam. The subsoil is dark-brown, brown, or yellowish-brown silty clay loam. At a depth of 22 to 33 inches, the Loring soils have a weakly developed, light brownish-gray fragipan that is mottled with brown and gray. This layer restricts the penetration of roots. The Memphis soils do not have a fragipan. A few spots of Gullied land were included in mapping.

These soils are susceptible to erosion. The surface layer puddles readily because of the low content of organic matter and the weak structure. Runoff is rapid, and the hazard of erosion is very severe. The available water capacity is moderate. These soils are not suited to cultivation. They are well suited to pasture and trees. (Capability unit VIe–1; woodland suitability group 2; wildlife suitability group 3)

Loring and Memphis silt loams, 20 to 40 percent slopes, eroded (LmF2).—These soils are mapped as an undifferentiated unit because they are similar and are much alike in the management they need. The Loring soils predominate. The soils of this unit are moderately well drained to well drained. Erosion has removed some of the surface layer, and small rills and shallow gullies are common. The surface layer is brown or dark-brown silt loam, and the subsoil is dark-brown, brown, or yellowish-brown silty clay loam. At a depth of 22 to 33 inches, the Loring soils have a weakly developed, light brownish-gray fragipan that is mottled with gray and brown. This layer restricts root penetration. The Memphis soils do not have a fragipan. A few spots of Gullied land were included in mapping.

The surface layer puddles readily because of the low content of organic matter and the weak structure. Runoff is very rapid, and the hazard of erosion is very severe. The available water capacity is moderate. These soils are not suited to cultivation, because of the erosion hazard, but they are suited to trees and wildlife habitats. (Capability unit VIIe–1; woodland suitability group 2; wildlife suitability group 3)

Loring and Memphis silt loams, 12 to 40 percent slopes, severely eroded (LmF3).—These soils are mapped as one unit because they are similar and are much alike in the management they need. The Loring soils predominate. The soils of this unit are moderately well drained to well drained. They have a brown silt loam surface layer. Most of the original surface layer has been removed by erosion, and the present layer is a mixture of surface soil and subsoil. In many places the surface layer consists mostly of subsoil material. The subsoil is dark-brown or brown silty clay loam. At a depth of 22 to 33 inches, the Loring soils have a weakly developed, light brownish-gray fragipan that is mottled with brown and gray. This layer restricts roots. The Memphis soils do not have a fragipan. Rills and a few shallow gullies are common. A few spots of Gullied land were included in mapping.

The surface layer of these soils puddles readily because of the low content of organic matter and the weak structure. Runoff is rapid, and the hazard of erosion is severe. The available water capacity is moderate. These soils are not suitable for cultivation. They are well suited for use as woodland or wildlife habitats. (Capability unit VIIe-1; woodland suitability group 2; wildlife suitability group 3)

Loring and Memphis silt loams, 20 to 40 percent slopes (LmF).—These soils are mapped as one unit because they are similar and are much alike in the management they need. The Loring soils predominate. The soils of this unit are moderately well drained to well drained. They have a dark-brown silt loam surface layer about 6 inches thick. Their subsoil is dark-brown or brown silty clay loam. At a depth of 22 to 33 inches, the Loring soils have a weakly developed, light brownish-gray fragipan that is mottled brown and gray. This layer restricts roots. The Memphis soils do not have a fragipan.

Runoff is very rapid, and these soils are susceptible to erosion. Their available water capacity is moderate. They are not suitable for cultivation but are well suited for use as woodland and wildlife habitats. (Capability unit VIIe-1; woodland suitability group 2; wildlife suitability group 3)

Memphis series

The Memphis series consists of nearly level to moderately sloping, well-drained soils that developed in thick loess. The surface layer is dark grayish-brown, dark-brown, or brown very friable silt loam. Good tilth is easy to maintain in this layer except where it is eroded. The subsoil is brown to dark yellowish-brown silty clay loam.

The Memphis soils occur throughout the thick loess area of the county and are most common on Crowley Ridge. Most areas adjoin the moderately well drained to well drained Loring soils, and some areas are mapped with those soils in undifferentiated units.

The native vegetation consists of mixed hardwoods, mainly white oak, red oak, yellow-poplar, black walnut, maple, hickory, beech, and elm. Almost all of the acreage is in orchards, cotton, corn, soybeans, small grain, sorghum, and pasture.

Memphis silt loam, 1 to 3 percent slopes (MeB).—This well-drained soil has a brown or dark grayish-brown silt loam surface layer about 6 inches thick. The subsoil is brown silty clay loam. A few spots of Loring soils were included in mapping.

This soil is susceptible to erosion, but it has a moderate available water capacity and is well suited to most crops grown in the county. (Capability unit IIe-2; woodland suitability groups 1 and 2; wildlife suitability group 3)

Memphis silt loam, 3 to 8 percent slopes, eroded (MeC2).—This is a well-drained soil. Erosion has removed some of the surface layer, and small rills are common. In most places the surface layer has been mixed with the subsoil by plowing. The plow layer is brown silt loam, and the subsoil is brown or yellowish-brown silty clay loam. A few spots of Loring soils were included in mapping.

The soil puddles readily because of its low content of organic matter and weak structure. The available water capacity is moderate. Runoff is rapid, and the hazard of erosion is severe, but most cultivated crops can be grown with careful management. This soil is well suited to orchards if the trees are planted on contour terrace ridges. (Capability unit IIIe-2; woodland suitability groups 1 and 2; wildlife suitability group 3)

Memphis silt loam, 8 to 12 percent slopes, eroded (MeD2).—This is a well-drained soil. Erosion has removed some of the surface layer, and small rills and shallow gullies are common. The plow layer is brown silt loam, and the subsoil is brown or yellowish-brown silty clay loam. A few spots of Loring soils were included in mapping. In most places the surface layer has been mixed with the subsoil by plowing.

The soil puddles readily because of its low content of organic matter and weak structure. Runoff is high, and the erosion hazard is very severe. The available water capacity is moderate. This soil is not suited to continuous cultivation, because of the erosion hazard, but it is suited to orchards if the trees are planted on contour terrace ridges. (Capability unit IVe-1; woodland suitability groups 1 and 2; wildlife suitability group 3)

Rough broken land

Rough broken land (Rb) is a miscellaneous land type that consists of well-drained sandy and silty soil material on steep, irregular, strongly dissected slopes. It is a mixture of loess and sandy and clayey Coastal Plain material. There are small outcrops of gravel and marl. The surface layer ranges from dark grayish brown to brown in color and from silt loam to gravelly sandy loam in texture. The subsoil is brown silt loam, sandy loam, or gravelly sandy clay loam.

This land type is along the steep, eastern slopes of Crowley Ridge. Most areas adjoin the well drained Memphis and the well drained to moderately well drained Loring soils.

The native vegetation consists of mixed hardwoods, mainly white oak, red oak, elm, hickory, and beech. Erosion is a very severe hazard, and cultivation should not be attempted. The best use for this land is woodland or wildlife habitats. (Capability unit VIIe-2; woodland suitability group 2; wildlife suitability group 3)

Sharkey series

The Sharkey series consists of level to undulating, slightly acid to alkaline, poorly drained soils derived from thick beds of fine-textured alluvium. Locally, they are called "buckshot soils." The surface layer is dark-gray or dark grayish-brown clay. The tilth of this layer is difficult to maintain. The subsoil is mottled gray or dark-gray clay.

Sharkey soils occur with the Alligator soils in slack-water areas throughout the Mississippi River bottom land. Most areas also adjoin the somewhat poorly drained Earle and the moderately well drained Bowdre soils. In St. Francis County, Sharkey soils are mapped with the poorly drained Alligator soils in undifferentiated units.

The native vegetation consists of mixed hardwoods, mainly water oak, hickory, sweetgum, cypress, ash, and hackberry, with an understory of briers and canes. Most of the acreage is in cotton, soybeans, rice, sorghum, alfalfa, and pasture.

Stuttgart series

The Stuttgart series is made up of nearly level, somewhat poorly drained to moderately well drained soils that developed in thin loess material over clayey alluvial deposits. These soils developed under a native cover of tall grasses. The surface layer is dark grayish-brown or very dark grayish-brown friable silt loam. Good tilth is easy to maintain in this layer. The upper part of the subsoil is mottled brown, yellowish-brown, and grayish-brown silty clay loam or silt loam. The lower part, at a depth of 14 to 20 inches, is a claypan mottled with red, yellow, and gray, and it restricts the penetration of roots and water.

The Stuttgart soils are in the "prairie section" of the western part of the county. They are in broad, nearly level areas and locally are called "rice soils." They adjoin the poorly drained Crowley soils.

The native vegetation is big bluestem, switchgrass, and other tall bunch grasses. Almost all of the acreage is in rice, soybeans, cotton, corn, small grain, sorghum, and pasture.

Stuttgart silt loam, 1 to 3 percent slopes (StB).—This somewhat poorly drained to moderately well drained soil has a dark-brown or dark grayish-brown silt loam surface layer about 6 inches thick. The subsoil is mottled yellowish-brown, grayish-brown, and brown silt loam or silty clay loam, and it has a red, yellow, and gray mottled claypan at a depth of about 17 inches. A few spots of Hillemann and Crowley soils were included in mapping.

The claypan restricts roots and water but does not seriously affect soil productivity or the choice of plants. This soil is susceptible to erosion. The available water capacity is moderate. The soil is well suited to rice and to most other crops grown in the county. (Capability unit IIe-3; woodland suitability group 6; wildlife suitability group 1)

Zachary series

The Zachary series consists of level, poorly drained soils that formed in alluvial material washed from loess soils. The surface layer is gray to dark grayish-brown, friable silt loam that is easily kept in good tilth. The subsoil is gray, mottled silt loam and silty clay.

The Zachary soils are on bottom lands throughout the loess area of the county, but most of the acreage is along L'Anguille River. They adjoin the moderately well drained Collins and the somewhat poorly drained Arkabutla soils.

The native vegetation consists of hardwoods, mainly post oak, overcup oak, water oak, blackgum, sweetgum, ash, and hickory. Because of the flood hazard, most areas of these soils are not suitable for cultivation.

Zachary silt loam (Za).—This level, poorly drained soil is on bottom land. It has a gray to dark grayish-brown silt loam surface layer about 6 inches thick. The subsoil is gray, mottled silt loam and silty clay loam. A few spots of Collins and Arkabutla soils were included in mapping.

Because of frequent flooding, this soil is not suited to cultivation, but it is well suited to hardwood forest and to wildlife habitats. (Capability unit VIw-1; woodland suitability group 5; wildlife suitability group 7)

Use and Management of Soils

After soils have been surveyed, classified, and described, the basic characteristics are studied to determine how the soils can be used for different purposes. This section presents information about the use of soils for crops and pasture, woodland, wildlife habitats, and engineering, and for such nonfarm purposes as urban development and recreation.

Use of Soils for Crops and Pasture

This section provides information about general management of soils, capability groups of soils, management by capability units, and predicted yields of crops and pasture.

General management

Cropland.—Some principles of good management apply to all the tillable soils in St. Francis County. These include use of a suitable cropping system, return of crop residue to the soil, application of adequate amounts of fertilizer and lime, and use of good tillage practices. Sloping fields used for clean-tilled crops should be cultivated on the contour, terraced, and drained by vegetated waterways. If wetlands are used, row direction and suitable drainage should be considered. Irrigation is required for rice and is often profitable for many other local crops.

A suitable cropping system is one that controls erosion, maintains or increases the content of organic matter, and improves the physical condition of the soil. A cover crop in the system protects the soil and adds organic matter. A legume in the system adds nitrogen to the soil.

Leaving crop residue on or near the soil surface provides a protective cover. When turned under, the residue improves tilth and water-holding capacity and increases the content of organic matter. Residue should be shredded and spread evenly.

Terraces, sodded waterways, and row arrangement are important means of improving drainage and controlling erosion on many upland farms. Cross-slope or contour cultivation helps to control erosion on sloping bottom land. Drainage is necessary in many level or undulating areas.

Nitrogen is needed for all nonlegume crops, and phosphate and potash are needed for crops grown on most soils in the loess area. At present, phosphate and potash have little effect on most of the soils on the Mississippi River bottom land. In time, as large applications of nitrogen are used, the response to phosphate and potash may increase. From 1946 to 1962, soils in the three main topographic areas of the county were sampled. The samples were from 2,949 fields comprising 98,796 acres. Table 2 shows, for each topographic area, the percentage of samples that indicated need for organic matter, nitrogen, phosphate, potash, and lime.

TABLE 2.—*Percentage of soil samples tested that show need for organic matter, fertilizer, and lime* [1]

	Mississippi River bottom land	Loess ridge (Crowley Ridge)	Loess plain (west of Crowley Ridge)
	Percent	*Percent*	*Percent*
Organic matter	55	60	82
Nitrogen	100	100	100
Phosphate	34	58	80
Potash	20	55	75
Lime	32	49	35

[1] Information compiled by Arkansas Agricultural Extension Service.

Pasture.—Most long-range pasture programs are based on the use of perennial grasses and legumes. The combination usually includes a summer or winter perennial grass grown with a suitable legume. Examples of summer perennial grasses are bahiagrass, bermudagrass, dallisgrass, and johnsongrass. Legumes can be grown with these grasses to enhance the value of pasture. Fescue is an adapted perennial cool-season grass that has proven suitable. White clover is suitable for growing with fescue. Oats, wheat, and ryegrass can be grown to supplement the perennial pastures and to provide cool-season forage.

Capability groups of soils

The capability classification is a grouping of soils that shows, in a general way, how suitable soils are for most kinds of farming. It is a practical grouping based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment.

In this system all the kinds of soil are grouped at three levels, the capability class, subclass, and unit. The eight capability classes in the broadest grouping are designated by Roman numerals I through VIII. In class I are the soils that have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, forage, or wood products.

The subclasses indicate major kinds of limitations within the classes. Within most of the classes there can be up to four subclasses. The subclass is indicated 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 controlled by close-growing plant cover or other means; *w* means that water in or on the soil will interfere 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 droughty; *c*, used in only some parts of the country, indicates that the chief limitation is climate that is too cold or too dry. There are no subclass *c* soils in St. Francis county.

In class I there are no subclasses, because the soils of this class have few or no limitations. Class V can contain, at the most, only subclasses *w*, *s*, and *c*, because the soils in it are subject to little or no erosion but have other limitations that limit their use largely to pasture, range, woodland, or wildlife.

Within the subclasses are the capability units, groups of soils enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally identified by numbers assigned locally, for example, IIe-1 or IIIe-2.

Soils are classified in capability classes, subclasses, and units in accordance with the degree and kind of their permanent limitations but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soil; and without consideration of possible but unlikely major reclamation projects.

The eight classes in the capability system, and the subclasses and units in this county, are described in the list that follows.

Class I.—Soils that have few limitations that restrict their use.
- (No subclasses.)
  - Unit I-1.—Moderately well drained to well drained, level soils that have a fine sandy loam or silt loam surface layer and a silt loam, silty clay loam, or sandy clay loam subsoil.
  - Unit I-2.—Moderately well drained to well drained, level soils that are in uplands and have a silt loam surface layer and a silty clay loam subsoil.

Class II.—Soils that have some limitations that reduce the choice of plants or require moderate conservation practices.
- Subclass IIe. Soils subject to moderate erosion if they are not protected.
  - Unit IIe-1.—Moderately well drained to somewhat excessively drained, gently undulating soils that have a fine sandy loam surface layer and a fine sandy loam or sandy clay loam subsoil.
  - Unit IIe-2.—Nearly level, moderately well drained to well drained soils that have a silt loam surface layer and a silty clay loam subsoil.
  - Unit IIe-3.—Nearly level, somewhat poorly drained to moderately well drained soils that have a silt loam surface layer and a silty clay loam subsoil underlain by a clay substratum.
- Subclass IIw. Soils that have moderate limitations because of excess water.
  - Unit IIw-1.—Somewhat poorly drained, level and nearly level soils that have a silt loam surface layer and a silty clay loam subsoil that has a fragipan.
  - Unit IIw-2.—Somewhat poorly drained, level soils that have a fine sandy loam or silt loam surface layer and a silt loam, silty clay loam, or sandy clay loam subsoil.
  - Unit IIw-3.—Somewhat poorly drained, level to nearly level soils that have a silt loam surface layer and a silt loam and silty clay loam subsoil.

Unit IIw-4.—Somewhat poorly drained, level to undulating soils that have a silty clay surface layer underlain at a depth of 10 to 20 inches by coarser textured material.

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

Subclass IIIe. Soils subject to severe erosion if they are cultivated and not protected.

Unit IIIe-1.—Well-drained to somewhat excessively drained, undulating soils that have a fine sandy loam surface layer and a fine sandy loam or sandy clay loam subsoil.

Unit IIIe-2.—Moderately well drained to well drained, gently sloping soils that have a silt loam surface layer and a silt loam or silty clay loam subsoil.

Subclass IIIw. Soils that have severe limitations because of excess water.

Unit IIIw-1.—Somewhat poorly drained, level to undulating clayey soils underlain at a depth of 20 to 36 inches by coarser textured material.

Unit IIIw-2.—Somewhat poorly drained, level to nearly level soils that have a silt loam surface layer and a clayey subsoil.

Unit IIIw-3.—Somewhat poorly drained to moderately well drained, gently undulating to undulating soils that have a fine sandy loam, sandy loam, loam, or silt loam surface layer and a silt loam, sandy loam, or silty clay loam subsoil.

Unit IIIw-4.—Poorly drained, level soils that have a silt loam surface layer and a silty clay loam subsoil.

Unit IIIw-5.—Poorly drained, level to undulating clay soils in slack-water areas.

Subclass IIIs. Soils that have severe limitations of water capacity or tilth.

Unit IIIs-1.—Excessively drained, undulating soils on natural levees.

Class IV.—Soils that have very severe limitations that restrict the choice of plants, require very careful management, or both.

Subclass IVe. Soils subject to very severe erosion if they are cultivated and not protected.

Unit IVe-1.—Moderately sloping, moderately well drained to well drained, slightly to severely eroded soils that have a silt loam surface layer and a silty clay loam subsoil.

Class V.—Soils that are not likely to erode but that have other limitations, impractical to remove without major reclamation, that limit their use largely to pasture, woodland, or wildlife food and cover. There are no class V soils in St. Francis County.

Class VI.—Soils that have severe limitations that make them generally unsuitable for cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.

Subclass VIe. Soils severely limited, chiefly by risk of erosion if protective cover is not maintained.

Unit VIe-1.—Moderately steep, moderately well drained to well drained, slightly eroded to eroded soils that have a silt loam surface layer and a silty clay loam subsoil.

Subclass VIw. Soils too wet for cultivation and generally unsuitable for drainage or protection from flooding.

Unit VIw-1.—Poorly drained, level soils that are on bottom land and are frequently flooded.

Subclass VIs. Soils generally unsuitable for cultivation and limited for other uses by their low available water capacity and toxic chemical content.

Unit VIs-1.—Poorly to somewhat poorly drained, nearly level soils that have a silt loam surface layer and a silty clay loam subsoil that contains much sodium and magnesium.

Class VII.—Soils that have very severe limitations that make them unsuitable for cultivation without major reclamation and that restrict their use largely to grazing, woodland, or wildlife.

Subclass VIIe. Soils very severely limited, chiefly by risk of erosion if protective cover is not maintained.

Unit VIIe-1.—Moderately steep to steep, moderately well drained to well drained, eroded and severely eroded soils that have a silt loam surface layer and a silty clay loam subsoil.

Unit VIIe-2.—Gently sloping to steep, gullied land and steep, rough broken land that have a surface layer of silt loam, silty clay loam, or sandy loam and a subsoil of silt loam, silty clay loam, or sandy loam.

Class VIII.—Soils and landforms that, without major reclamation, have limitations that preclude their use for commercial production of plants and restrict their use to recreation, wildlife, water supply, or esthetic purposes. There are no class VIII soils in St. Francis County.

Management by capability units

In the following pages each capability unit is described, the soils in each are listed, and the use and management of each unit are discussed.

CAPABILITY UNIT I-1

This capability unit consists of deep, moderately well drained to well drained, level soils on bottom lands. The surface layer is friable fine sandy loam or silt loam 6 to 8 inches thick. The subsoil is silt loam, silty clay loam, or sandy clay loam. The soils are—

Bosket-Dubbs fine sandy loams, 0 to 1 percent slopes.
Collins silt loam.

These soils have moderate infiltration, permeability, and available water capacity. They contain a moderate amount of organic matter and have moderate natural fertility. They are medium to strongly acid.

The soils of this unit occupy about 0.4 percent of the county. They are suitable for a variety of crops. Cotton, soybeans, corn, and small grain grow well under good management. Well-suited grasses are bahiagrass, bermudagrass, dallisgrass, and tall fescue. Austrian winter peas, crimson clover, lespedeza, red clover, vetch, and white clover are suitable legumes. Many truck crops and nursery crops also grow well on these soils. Suitable trees are pecan, cottonwood, oak, hickory, and sweetgum.

If properly fertilized and tilled, these soils can be used continuously for cultivated crops that produce large amounts of residue.

Fertilization is necessary to obtain favorable yields of crops and pasture. Apply fertilizer according to the results of soil tests, the needs of the crops, and local experience.

Good tilth is easily maintained under good management. The operation of heavy farm equipment may cause a plowsole to form directly below the plow layer. Varying the depth of tillage and growing deep-rooted legumes help to correct this condition. Keep tillage to the minimum needed to control weeds.

Row arrangement is needed to direct excess water to proper outlets. Irrigation is feasible on these soils.

CAPABILITY UNIT I-2

The only soil in this unit is Loring silt loam, 0 to 1 percent slopes. This soil is moderately well drained to well drained and nearly level. It developed in thick loess. The surface layer is friable silt loam. The subsoil is silty clay loam; it has a thin fragipan at a depth of about 30 inches.

The soil has moderate permeability and infiltration, except where there is a plowsole, and has moderate available water capacity. It has a small amount of organic matter, but its natural fertility is moderate. The soil is medium to very strongly acid.

The soil occupies 0.4 percent of the county. It is easy to till and, for row crops, it is one of the best soils on uplands in the county. It is productive under good management and is suited to cotton, soybeans, corn, small grain, and some truck crops. Adapted tree crops are peaches and pecans. Bahiagrass, bermudagrass, sericea lespedeza, white clover, and annual lespedeza are suitable pasture plants. Trees that grow well are pine, oak, hickory, yellow-poplar, beech, and sweetgum.

If properly fertilized and tilled, this soil can be used continuously for cultivated crops that produce large amounts of residue.

Fertilization is necessary to obtain favorable yields of crops and pasture. Apply fertilizer according to the results of soil tests, the needs of crops, and local experience.

Good tilth is easily maintained under good management. The operation of heavy farm equipment may cause a plowsole to form directly below the plow layer. Varying the depth of tillage and growing deep-rooted legumes help to correct this condition. Keep tillage to the minimum needed to control weeds.

Row arrangement should be on the contour or across the slope. Irrigation is feasible on these soils.

CAPABILITY UNIT IIe-1

This capability unit consists of moderately well drained to somewhat excessively drained soils on natural levees on bottom land. The surface layer is very friable fine sandy loam 5 to 8 inches thick. The subsoil is fine sandy loam or sandy clay loam. The soils are—

Beulah fine sandy loam, gently undulating.
Bosket-Dubbs fine sandy loams, gently undulating.
Dubbs fine sandy loam, gently undulating.
Iuka soils.

These soils have moderate to moderately rapid permeability and infiltration, except where there is a plowsole. Their available water capacity is low to moderate, and their content of organic matter is medium, but their natural fertility is moderate to high. They are medium to strongly acid.

These soils occupy about 1.3 percent of the county. Because they are easily tilled and suitable for a variety of crops, they are among the best soils in the county for farming. Cotton, corn, soybeans, small grain, nursery stock, and early truck crops grow well under good management. Vetch and Austrian winter peas are adapted winter cover crops. Bahiagrass, bermudagrass, dallisgrass, tall fescue, white clover, and lespedeza are good pasture plants. Also, sudangrass and other summer grasses grow well. Trees that grow well are pecan, cottonwood, oak, hickory, and sweetgum.

If proper fertilization and tillage methods are used, including cross-slope cultivation, these soils can be used continuously for cultivated crops that produce large amounts of residue. Sown crops that produce a large amount of residue can be grown without cross-slope cultivation.

Fertilization is necessary for favorable yields of most crops and pasture plants. Most crops respond to lime, and it is required for alfalfa. Apply fertilizer and lime according to the results of soil tests, the needs of crops, and the results of local experience.

These soils can be safely tilled throughout a wide range of moisture content. They tend to crust and pack after heavy rains, however, and a good stand of crops is sometimes difficult to establish. Spring is the best time to prepare a seedbed. These soils frequently develop a compact plowsole under continuous plowing to the same depth. Keeping tillage to a minimum, varying the depth of tillage, and growing deep-rooted legumes and sod crops help to relieve this condition.

Because of the undulating surface, excess water collects in depressions; some of these areas need artificial drainage. Land leveling is feasible on less steep areas.

CAPABILITY UNIT IIe-2

This capability unit consists of moderately well drained to well drained, nearly level soils that developed in thick loess. The surface layer is friable silt loam, and the subsoil is silty clay loam. Some of these soils have a thin fragipan at a depth of about 30 inches. Some areas are eroded, and the plow layer is a mixture of the surface layer and subsoil. The soils in this unit are—

Loring silt loam, 1 to 3 percent slopes.
Loring silt loam, 1 to 3 percent slopes, eroded.
Memphis silt loam, 1 to 3 percent slopes.

These soils have moderate permeability and infiltration, except where there is a plowsole, and they have moderate available water capacity. Their content of organic matter is low, but their natural fertility is moderate. These soils are medium acid to very strongly acid.

These soils make up about 4.4 percent of the county. They are easy to till, and for row crops they are among the best soils on uplands in the county. They are productive under good management and are suitable for cotton, soybeans, corn, small grain, and some truck crops. Adapted tree crops are peaches and pecans. Bahiagrass, bermudagrass, sericea lespedeza, white clover, and annual lespedeza are suitable pasture plants. Trees that grow well are pine, oak, hickory, yellow-poplar, beech, and sweetgum.

The slight hazards of runoff and erosion are the chief limitations. If these soils are terraced and cultivated on the contour and are properly fertilized and tilled, they can be used continuously for cultivated crops that produce large amounts of residue. If row crops are grown in a system that includes grasses and legumes, contour cultivation is needed if terraces are not used. Sown crops that produce large amounts of residue can be grown without special row direction.

Fertilization is necessary to obtain favorable yields of crops and pasture. Some crops and pasture respond to lime. Apply fertilizer and lime according to the results of soil tests, the needs of crops, and local experience.

These soils can be tilled within a wide range of moisture content. If left bare, they tend to puddle, crust, and pack under heavy rains, and cover crops or crop residue should be used for mulch between crop seasons. A plowsole frequently develops if the soils are plowed and cultivated continuously to the same depth. Varying the depth of tillage and growing deep-rooted legumes and sod crops help to correct this condition. The best time to prepare a seedbed is in spring. Keep tillage to the minimum needed to control weeds.

Diversion terraces are needed above long slopes to divert runoff. If the irrigation system is properly designed and constructed, furrow irrigation is feasible on these soils without the hazard of erosion.

CAPABILITY UNIT IIe-3

The only soil in this capability unit is Stuttgart silt loam, 1 to 3 percent slopes. This deep, nearly level soil is somewhat poorly drained to moderately well drained. It developed in thin loess under tall grasses. The surface layer is friable silt loam 4 to 6 inches thick. The subsoil is firm silty clay loam, and a claypan is at a depth of about 20 inches.

This soil has moderate infiltration and available water capacity and slow permeability. Its content of organic matter and fertility are moderate to low. The soil is slightly acid to very strongly acid.

This soil occupies about 0.4 percent of the county and is suitable for a variety of crops. Rice, soybeans, grain sorghum, small grain, cotton, and corn grow well under good management. Red clover, white clover, crimson clover, lespedeza, vetch, and Austrian winter peas are well-suited legumes. Suitable grasses are bahiagrass, bermudagrass, ryegrass, and tall fescue. Some truck crops and nursery crops also grow well.

Erosion and runoff are moderate and are the chief limitations. If this soil is terraced and cultivated on the contour and is properly fertilized and tilled, it can be used continuously for cultivated crops that produce large amounts of residue. Contour cultivation is needed if row crops are grown in a system that includes grasses and legumes. Sown crops that produce large amounts of residue can be grown continuously without terracing or special row direction.

Fertilization is necessary for favorable yields of all crops and pasture. Some pasture plants respond to lime. Apply fertilizer according to the results of soil tests, the needs of the crops, and local experience.

Good tilth is easily maintained under good management. The operation of heavy farm equipment may cause a plowsole to form directly below the plow layer. Varying the depth of tillage and growing deep-rooted legumes help to correct this condition. Turning under crop residue and a winter cover crop each year helps to maintain organic matter.

If the irrigation systems are properly designed and constructed, these soils can be irrigated by row or border systems without the hazard of erosion.

CAPABILITY UNIT IIw-1

This unit consists of deep, level and nearly level, somewhat poorly drained soils that developed in thick loess. The surface layer is friable silt loam 4 to 6 inches thick. The subsoil is firm silty clay loam that has a fragipan. The soils are—

Calloway silt loam, 0 to 1 percent slopes.
Calloway silt loam, 1 to 3 percent slopes.

These soils have moderate infiltration, permeability, and water-holding capacity. They contain a small amount of organic matter and have low natural fertility, and they are medium to strongly acid.

These soils occupy about 10.9 percent of the county, and they are suitable for a variety of crops. Cotton, soybeans, corn, grain sorghum, and small grain grow well under good management. Rice is suitable in some areas. Sericea lespedeza, red clover, white clover, annual lespedeza, crimson clover, vetch, and Austrian winter peas are well-suited legumes. Bahiagrass, bermudagrass, tall fescue, and ryegrass are the chief grasses well suited to these soils. Pecan trees and many nursery crops grow well. Other suitable trees are sweetgum, oak, and hickory.

Wetness is the chief limitation. If these soils are fertilized, tilled, and drained, they can be used continuously for cultivated crops that produce a large amount of residue. If the soils are not artifically drained, late planted crops are likely to be more successful than early planted crops.

Fertilization is necessary for favorable yields of all crops and pasture. Some pasture plants respond to lime. Apply fertilizer according to results of soil tests, the needs of the crops, and local experience. Turning under crop residue and growing a winter crop each year help to maintain organic matter.

Good tilth is easily maintained if the soils are adequately drained and otherwise well managed. Tillage may be delayed several days after rains. Crop rows should be so arranged that excess water moves to V-type or W-type ditches that have adequate outlets. The operation of heavy farm equipment may cause a plowsole to form directly below the plow layer. Varying the depth of tillage and growing deep-rooted legumes help to correct this condition.

CAPABILITY UNIT IIw-2

This capability unit consists of somewhat poorly drained soils on bottom lands. The surface layer is friable fine sandy loam or silt loam 4 to 8 inches thick. The subsoil is friable silt loam or silty clay loam. The soils in this unit are—

Arkabutla silt loam.
Dundee fine sandy loam, 0 to 1 percent slopes.
Dundee silt loam, 0 to 1 percent slopes.

These soils have moderate permeability and infiltration, except where there is a plowsole, and they have moderate available water capacity. Their content of organic matter is medium, and their natural fertility is moderate to high (*14*). The soils are slightly to strongly acid.

These soils make up about 5.9 percent of the county. They are easy to till and are among the better soils on bottom lands for row crops. Crops grow well under good management. The soils are suitable for cotton, soybeans, corn, grain sorghum, and small grain. Bahiagrass, bermudagrass. dallisgrass, tall fescue, white clover, and lespedeza are adapted pasture plants. Trees that grow well are pecan, oak, hickory, cottonwood, and sweetgum.

If these soils are properly fertilized, tilled, and drained, they can be used continuously for cultivated crops that produce large amounts of residue. Late crops are likely to be more successful than early crops unless the soils are artificially drained.

Fertilizer is required for favorable yields of cultivated crops and pasture plants. Some cultivated crops and pasture plants respond to lime. Apply fertilizer and lime according to the results of soil tests, the needs of the crops, and local experience.

These soils can be tilled throughout a wide range of moisture content. If left bare, they tend to crust and pack under heavy rains. Therefore, cover crops or crop residue should be used for surface mulch between crop seasons. A plowsole frequently develops if the soils are continually plowed and cultivated to the same depth. Varying the depth of tillage and growing deep-rooted legumes and sod crops tend to correct this condition. The best time for seedbed preparation is in the spring. Keep tillage to the minimum needed to control weeds. Turning under row-crop residue and growing a winter cover crop each year help to maintain organic matter.

The rows should be so arranged that excess water runs off into V-type or W-type ditches that have an adequate outlet. Furrow irrigation is feasible on these soils.

CAPABILITY UNIT IIw-3

This capability unit consists of somewhat poorly drained, level to nearly level soils that developed in loess. They have developed under open hardwoods and an understory of prairie grasses. The surface layer is friable silt loam 4 to 6 inches thick. The subsoil is silt loam and silty clay loam. The soils are—

Hillemann silt loam, 0 to 1 percent slopes.
Hillemann silt loam, 1 to 3 percent slopes.

These soils have moderate to slow infiltration and permeability. Their available water capacity is moderate. They contain a small to medium amount of organic matter and have low to moderate natural fertility. They are slightly acid to very strongly acid.

These soils occupy about 2.3 percent of the county, and they are suitable for a variety of crops. Rice, soybeans, sorghum, small grain, cotton, corn, and lespedeza grow well under good management. Red clover, white clover, crimson clover, vetch, and Austrian winter peas are well-suited legumes. Bahiagrass, bermudagrass, ryegrass, and tall fescue are adapted grasses.

If these soils are properly fertilized, tilled, and drained, they can be used continuously for cultivated crops that produce a large amount of residue.

A suitable cropping system for irrigated rice consists of 2 or 3 years of rice and 2 years of a high-residue row crop, lespedeza, or fallow. Rice grown on these soils can be damaged unless the irrigation and drainage system provides for rapid application and removal of irrigation water and excess rainfall. Row crops that are grown in rotation with rice can be irrigated through the rice irrigation system. This should not be attempted, however, unless an adequate drainage system has been installed.

Fertilizer is required for favorable yields of all crops and pasture. Some pasture plants respond to lime. Apply fertilizer according to the results of soil tests, the needs of the crops, and the result of local experience. Turning under crop residue and growing a winter cover crop each year help to maintain organic matter.

Good tilth is easily maintained under good management. The operation of heavy farm equipment may cause a plowsole to form directly below the plow layer. Varying the depth of tillage and growing deep-rooted legumes are means of correcting this condition.

Because of wetness, tillage may be delayed several days after rains. Rows should be so arranged that excess water drains into V-type or W-type ditches.

CAPABILITY UNIT IIw-4

This capability unit consists of level to undulating, somewhat poorly drained clayey soils. The surface layer is silty clay 5 to 7 inches thick. The subsoil is silty clay, and it is underlain at a depth of 10 to 20 inches by coarser material. The soils are—

Bowdre silty clay, 0 to 1 percent slopes.
Bowdre silty clay, gently undulating.
Bowdre silty clay, undulating.

When dry, these soils harden and crack; when wet, they are very plastic. They have moderate to slow infiltration and permeability and moderate available water capacity. Their natural fertility is moderate. They are slightly acid to medium acid.

These soils occupy about 0.6 percent of the county. They are suitable for a variety of crops. Cotton, soybeans, small grain, and grain sorghum grow well under good management. Alfalfa, red clover, white clover, and lespedeza are well-suited legumes. Adapted grasses are bermudagrass, ryegrass, and tall fescue. Trees that grow well are pecan, cottonwood, oak, hickory, and sweetgum.

Wetness is the chief limitation. If these soils are properly fertilized, tilled, and drained, they can be used continuously for cultivated crops that produce a large amount of residue.

Fertilizer is sometimes required for favorable yields. Most crops respond to lime. Apply fertilizer and lime according to the results of soil tests, the needs of the crops, and the results of local experience.

Successful tillage is possible only within a narrow range of moisture content. Good tilth is difficult to maintain. The best time to plow is in the fall or early winter; this allows the clods in the seedbed to crumble in the process of wetting, freezing, and drying. Seedbeds should be on high rows for drainage and aeration, and rows should be so arranged that excess water drains into V- or W-type ditches.

Land leveling and smoothing are feasible on some soils in this unit. Furrow and border irrigation are feasible on suitable slopes.

CAPABILITY UNIT IIIe-1

This capability unit consists of well-drained to somewhat excessively drained, undulating soils on natural levees on bottom land. Their surface layer is very friable fine sandy loam 5 to 8 inches thick. The subsoil is friable to firm sandy clay loam or fine sandy loam. The soils are—

Beulah fine sandy loam, undulating.
Bosket-Dubbs fine sandy loams, undulating.
Dubbs fine sandy loam, undulating.

These soils have moderate to moderately rapid permeability and infiltration, except where there is a plowsole. Their available water capacity is low to moderate. Their content of organic matter is medium to low, but their natural fertility is moderate to high. They are medium to strongly acid.

These soils make up about 1.7 percent of the county. They are among the best in the county for row crops. Cotton, soybeans, corn, small grain, and truck crops grow well under good management. Vetch and Austrian winter peas are adapted winter cover crops. Bahiagrass, bermudagrass, white clover, and lespedeza are good pasture plants. Sudangrass and other summer grasses also grow well. Alfalfa, tall fescue, and dallisgrass are only fairly well suited. Trees that grow well are pecan, cottonwood, oak, hickory, and sweetgum.

If a cover crop is grown every other year and if the soils are properly fertilized and tilled, including the use of cross-slope cultivation, these soils can be used continuously for cultivated crops that produce a large amount of residue. Sown crops that produce large amounts of residue can be grown continuously without cross-slope cultivation.

Fertilizer is required for favorable yields of most crops and pasture plants. Most crops respond to lime. Apply fertilizer and lime according to the results of soil tests, the needs of the crops, and the results of local experience.

These soils can be tilled throughout a wide range of moisture content. If left bare, they tend to puddle, crust, and pack after a heavy rain, and a good stand may be difficult to establish. Use a cover crop or crop residue for a mulch between crop seasons. The best time to prepare a seedbed is in spring. Keep tillage to the minimum needed to control weeds. These soils frequently develop a compact plowsole under continuous plowing and cultivation to the same depth. Varying the depth of tillage and growing deep-rooted legumes or sod crops help to correct this condition.

If these soils are cultivated, row arrangement across the prevailing slope helps to control runoff and reduce the amount of deposition in drains and swales. Because of the undulating surface, excess water collects in depressions. Many of the depressions need to be drained by V- or W-type ditches or other drainage systems.

CAPABILITY UNIT IIIe-2

This capability unit consists of moderately well drained to well drained, gently sloping soils in thick loess. The surface layer is friable silt loam 4 to 8 inches thick. The subsoil is friable silt loam or silty clay loam. The soils in this unit are—

Loring silt loam, 3 to 8 percent slopes.
Loring silt loam, 3 to 8 percent slopes, eroded.
Loring silt loam, 3 to 8 percent slopes, severely eroded.
Memphis silt loam, 3 to 8 percent slopes, eroded.

The Loring soils in this unit have a weakly developed fragipan at a depth of about 30 inches. Some soils in this unit are eroded, and the plow layer is a mixture of the surface layer and subsoil. There are a few shallow gullies in places.

These soils have moderate permeability, infiltration, and available water capacity. Their content of organic matter is low, and their natural fertility is moderate. They are medium acid to very strongly acid.

These soils make up about 3.8 percent of the county. They are suited to most of the commonly grown crops. Cotton, soybeans, corn, small grain, grain sorghum, and some truck and nursery crops grow well under good management. Peaches are especially well adapted. Suitable grasses are bahiagrass, bermudagrass, tall fescue, and ryegrass. Sericea lespedeza, white clover, and annual lespedeza are well-suited legumes. Trees that grow well are pine, oak, hickory, yellow-poplar, beech, and sweetgum.

Erosion and runoff are the chief limitations. If properly fertilized and tilled, these soils can be used for cultivated crops that produce a large amount of residue. Soil-improving grasses or legumes should be included in the cropping system every 3 or 4 years if fields are terraced and cultivated on the contour, and every 2 or 3 years if contour cultivation alone is used. In a stripcropping system, a strip of high-residue grass, legumes, or sown crops should be alternated every other year with a high-residue row crop. Diversion terraces are needed above long slopes to divert runoff. Without supporting practices to control runoff and erosion, a clean-tilled crop should be grown no more than 1 year in 4 and a close-growing or soil-improving crop in the other years. Turning under crop residue and growing a winter cover crop are means of maintaining organic matter. Peach orchards should be terraced and planted on the contour, and a winter cover crop should be grown every year (fig. 9).

Fertilization is necessary to obtain favorable yields of all cultivated crops and pasture plants. Some cultivated crops and pasture plants respond to lime. Apply fertilizer and lime according to the result of the soil tests, the needs of the crops, and the results of local experience.

These soils can be tilled throughout a wide range of moisture content. If left bare, they tend to puddle, crust, and pack under heavy rains, and they erode readily. A cover crop or crop residue should be used for surface mulch between crop seasons. A plowsole frequently develops if the soils are continuously plowed and cultivated to the same depth. Varying the depth of tillage and growing deep-rooted legumes or sod help to correct this condition. The best time to prepare a seedbed is in spring. Keep tillage to the minimum needed to control weeds.

CAPABILITY UNIT IIIw-1

This capability unit consists of level to undulating, somewhat poorly drained clayey soils. The surface layer is clay 5 to 7 inches thick. The subsoil is clay, and it is underlain at a depth of 20 to 36 inches by coarser textured material. The soils are—

Earle clay, 0 to 1 percent slopes.
Earle clay, gently undulating.
Earle clay, undulating.

When dry, these soils harden and crack; when wet, they are very plastic. Infiltration and permeability are slow. The available water capacity is moderate to high, the content of organic matter is low to medium, and the nat-

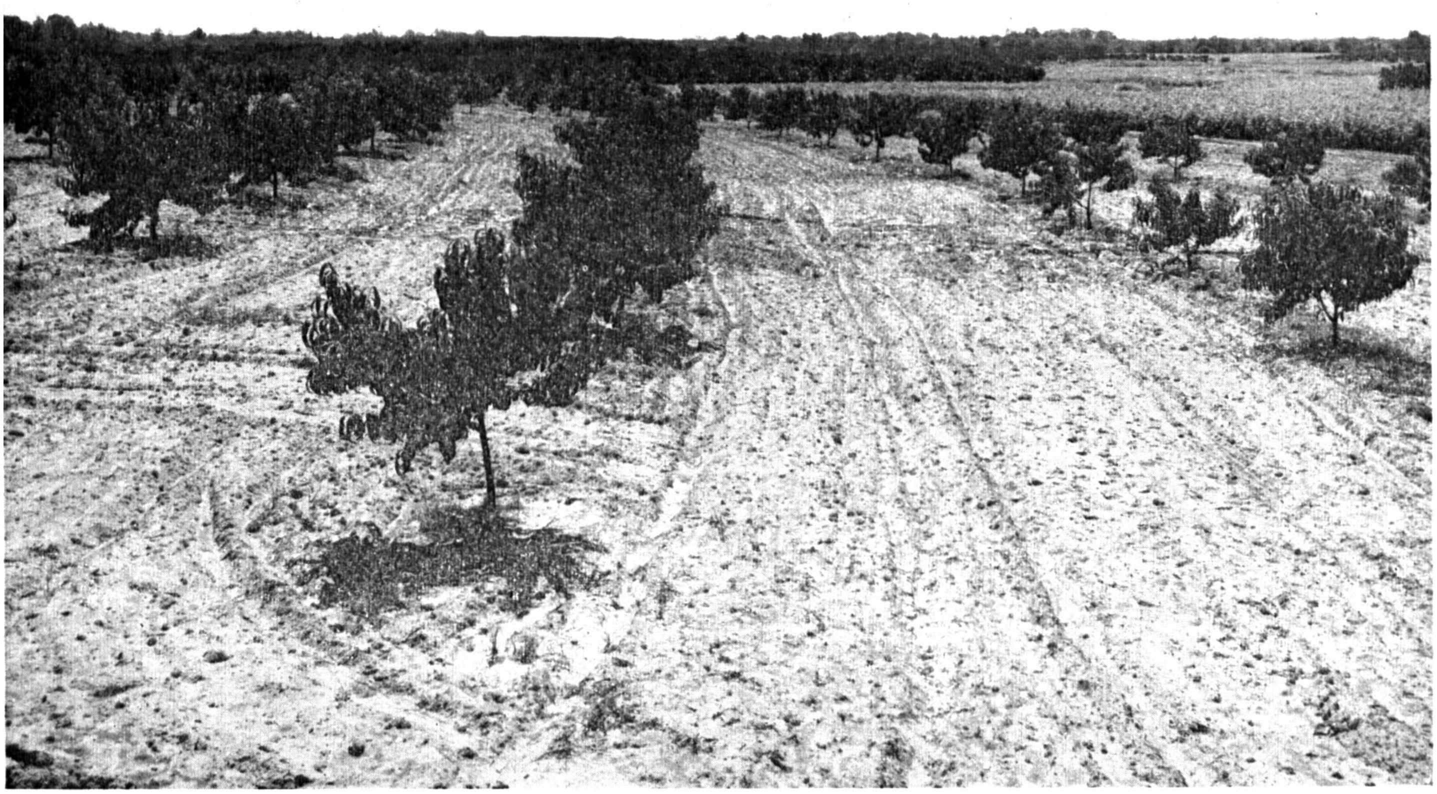

Figure 9.—**Young peach orchard growing on Loring silt loam, 3 to 8 percent slopes, eroded; trees are planted on contour terraces for erosion control and water conservation.**

ural fertility is moderate. The soils are medium acid to slightly acid.

These soils occupy about 11.9 percent of the county, and they are suitable for a variety of crops. Cotton, corn, soybeans, small grain, and grain sorghum grow well under good management (fig. 10). Alfalfa, red clover, white clover, and lespedeza are well-suited legumes. Adapted grasses are bermudagrass, ryegrass, and tall fescue. Trees that grow well are pecan, cottonwood, oak, hickory, and sweetgum.

Wetness is the chief limitation. If the soils are properly fertilized, tilled, and drained, they can be used continuously for cultivated crops that produce large amounts of residue.

Phosphorus and potassium are sometimes required for favorable yields of crops, and nitrogen for nonlegumes. Most crops respond to lime, and it is commonly required for alfalfa. Apply fertilizer and lime according to the results of soil tests, the needs of the crops, and the results of local experience.

These soils can be tilled only within a narrow range of moisture content. Good tilth is difficult to maintain. The best time to plow is in fall and early in winter; this allows the clods in the seedbed to be crumbled by the process of wetting, freezing, and drying. Seedbeds should be on high rows for drainage and aeration. Rows should be so arranged that excess water drains into V-type and W-type ditches.

Land leveling and smoothing are feasible on some soils in this unit. Furrow and border irrigation are feasible on suitable slopes.

CAPABILITY UNIT IIIw-2

This capability unit consists of deep, poorly drained, level or nearly level soils that developed in thin loess, under tall bunch grasses. The surface layer is friable silt loam 4 to 6 inches thick. The subsoil is silty clay loam,

Figure 10.—Cotton growing on Earle clay, gently undulating; this field yielded 750 pounds of lint cotton per acre.

underlain at a depth of about 20 inches by a claypan. The soils are—

Crowley silt loam, 0 to 1 percent slopes.
Crowley silt loam, 1 to 3 percent slopes.

These soils have slow infiltration and permeability, and their available water capacity is moderate. Their fertility and content of organic matter are low to medium. They are strongly acid to slightly acid.

These soils occupy about 1.6 percent of the county. They are suitable for a variety of crops. Rice, soybeans, sorghum, small grain, cotton, and corn grow well under good management. Lespedeza, red clover, white clover, crimson clover, vetch, and Austrian winter peas are well-suited legumes. Bahiagrass, bermudagrass, ryegrass, and tall fescue are adapted grasses. Some truck and nursery crops also grow well.

If properly fertilized, tilled, and drained, the soils in this unit can be used continuously for cultivated crops that produce large amounts of residue.

A suitable cropping system for irrigated rice consists of 2 or 3 years of rice and 2 years of a high-residue row crop, lespedeza, or fallow. Rice grown on these soils may be damaged unless the irrigation and drainage system provides for rapid application and removal of irrigation water and removal of excess rainfall. If crops are grown in rotation with rice, they can be irrigated through the rice irrigation system. This should not be attempted, however, unless an adequate drainage system has been installed.

Fertilizer is required for favorable yields of all crops and pasture. Some pasture plants respond to lime. Apply fertilizer according to the results of soil tests, the needs of the crops, and the results of local experience. Turning under crop residue and growing a winter cover crop each year are means of helping to maintain organic matter.

Good tilth is easily maintained under good management. The operation of heavy farm equipment may cause a plowsole to form directly below the plow layer. Varying the depth of tillage and growing deep-rooted legumes help to correct this condition.

Because of wetness, tillage may be delayed several days after rains. Rows should be so arranged that excess water drains into V-type or W-type ditches.

CAPABILITY UNIT IIIw-3

This capability unit consists of somewhat poorly drained to moderately well drained soils on bottom land. The surface layer is friable fine sandy loam or silt loam 4 to 8 inches thick. The subsoil is sandy clay loam or silty clay loam. The soils are—

Dundee fine sandy loam, gently undulating.
Dundee fine sandy loam, undulating.
Dundee silt loam, gently undulating.
Dundee silt loam, undulating.

These soils have moderate permeability, infiltration, and available water capacity. Their content of organic matter is medium, and their fertility is moderate to high. These soils are slightly acid to strongly acid.

These soils occupy about 2 percent of the county. They are easy to till, and, for row crops, they are among the better soils on bottom land in the county. They produce fairly high yields under good management and are suited to cotton, soybeans, corn, grain sorghum, and small grain. Bahiagrass, bermudagrass, and tall fescue are suitable grasses. White clover, lespedeza, vetch, and Austrian winter peas are adapted legumes. Trees that grow well are pecan, oak, hickory, cottonwood, and sweetgum.

If properly fertilized, tilled, and drained, these soils can be used continuously for cultivated crops that produce large amounts of residue. Late planted crops are likely to be more successful than early planted crops, unless the soils are artificially drained.

Fertilizer may be required for favorable yields of cultivated crops and pasture. Some cultivated crops and pasture plants respond to lime. Apply fertilizer and lime according to the results of soil tests, the needs of the crops, and the results of local experience.

These soils can be tilled throughout a wide range of moisture content. If left bare they tend to crust and pack under heavy rains, and a cover crop or crop residue should be used for surface mulch between crop seasons. These soils frequently develop a plowsole under continuous plowing and cultivation to the same depth. Varying the depth of tillage and growing deep-rooted legumes and sod crops help to correct this condition. The best time for seedbed preparation is in spring. Tillage should be kept to the minimum necessary to control weeds. Turning under crop residue and growing a winter legume for green manure help to maintain organic matter.

Tillage may be delayed several days after rains, because water ponds in low areas. Rows should be so arranged that excess surface water drains into V-type or W-type ditches. Land leveling and smoothing are practical on some areas of these soils. After leveling, row and border irrigation are practical.

CAPABILITY UNIT IIIw-4

This capability unit is composed of poorly drained, level soils in thick loess. The surface layer is friable silt loam about 6 inches thick. The subsoil is friable to firm silt loam or silty clay loam. The soils are—

Calhoun silt loam.
Henry silt loam.

The Henry soils have a fragipan at a depth of 20 to 36 inches. The soils of this unit have moderate infiltration but slow permeability. Their available water capacity is low to moderate, depending upon the depth to the pan. Their content of organic matter is low, but their natural fertility is moderate. These soils are slightly to very strongly acid.

These soils make up about 14.2 percent of the county. They are well suited to rice, soybeans, and grain sorghum. Adapted legumes are vetch, Austrian winter peas, white clover, and annual lespedeza. Adapted grasses are bermudagrass, dallisgrass, tall fescue, white clover, and lespedeza. Trees that grow well are oak, sweetgum, blackgum, tupelo-gum, and cypress.

If these soils are properly fertilized, tilled, and drained, they can be used continuously for cultivated crops that produce large amounts of residue. Unless the soils are artificially drained, however, it may be difficult to establish and harvest early planted or late maturing, irrigated or dryfarmed crops.

An example of a suitable cropping system for irrigated rice consists of 2 or 3 years of rice and 2 years of a high-residue row crop, lespedeza, or fallow land. Rice grown on these soils may be damaged unless the irrigation and drainage system provides for rapid application and removal of irrigation water and rapid removal of excess rainfall. Crops grown in rotation with rice can be irrigated by the row or border method through the rice irrigation system. This should not be attempted, however, unless an adequate drainage system has been installed. Rows should be so arranged that excess surface water drains into V-type or W-type ditches.

Fertilizer is required for favorable yields of most crops and pasture plants. Some cultivated crops and pasture plants respond to lime. Apply fertilizer and lime according to the results of soil tests, the needs of the crops, and the results of local experience.

These soils can be tilled throughout a wide range of moisture content, but tillage may be delayed for several days after rains. If left bare, the soils tend to crust and pack. The best time for seedbed preparation is in spring. Tillage should be kept to the minimum needed to control weeds. Turning under crop residue and growing a winter cover crop help to maintain organic matter.

CAPABILITY UNIT IIIw-5

This capability unit consists of level to undulating, poorly drained soils in thick beds of slack-water clay. The surface layer is clay or silty clay loam. The subsoil is clay. The soils are—

Alligator and Sharkey clays, 0 to 1 percent slopes.
Alligator and Sharkey clays, gently undulating.
Alligator and Sharkey clays, undulating.
Alligator and Sharkey silty clay loams, overwash.

These soils shrink and crack when dry and expand when wet (fig. 11). They have very slow infiltration and permeability but high available water capacity. Their content of organic matter is medium, and their natural fertility is high. They are medium to strongly acid.

These soils occupy about 23.9 percent of the county. Without artificial drainage, they are best suited to short-season, early maturing crops. Cotton, rice, soybeans, and grain sorghum grow well under good management. Bermudagrass, tall fescue, and dallisgrass are the chief grasses well suited to these soils. White clover, vetch, and Austrian winter peas are well-suited legumes. Trees that grow well are pecan, oak, hickory, cottonwood, sweetgum, and tupelo-gum.

Excess water is the chief limitation. If properly fertilized, tilled, and drained, these soils can be used continuously for cultivated crops that produce large amounts of residue. An example of a suitable cropping system for irrigated rice is 3 years of rice and 2 years of a high-

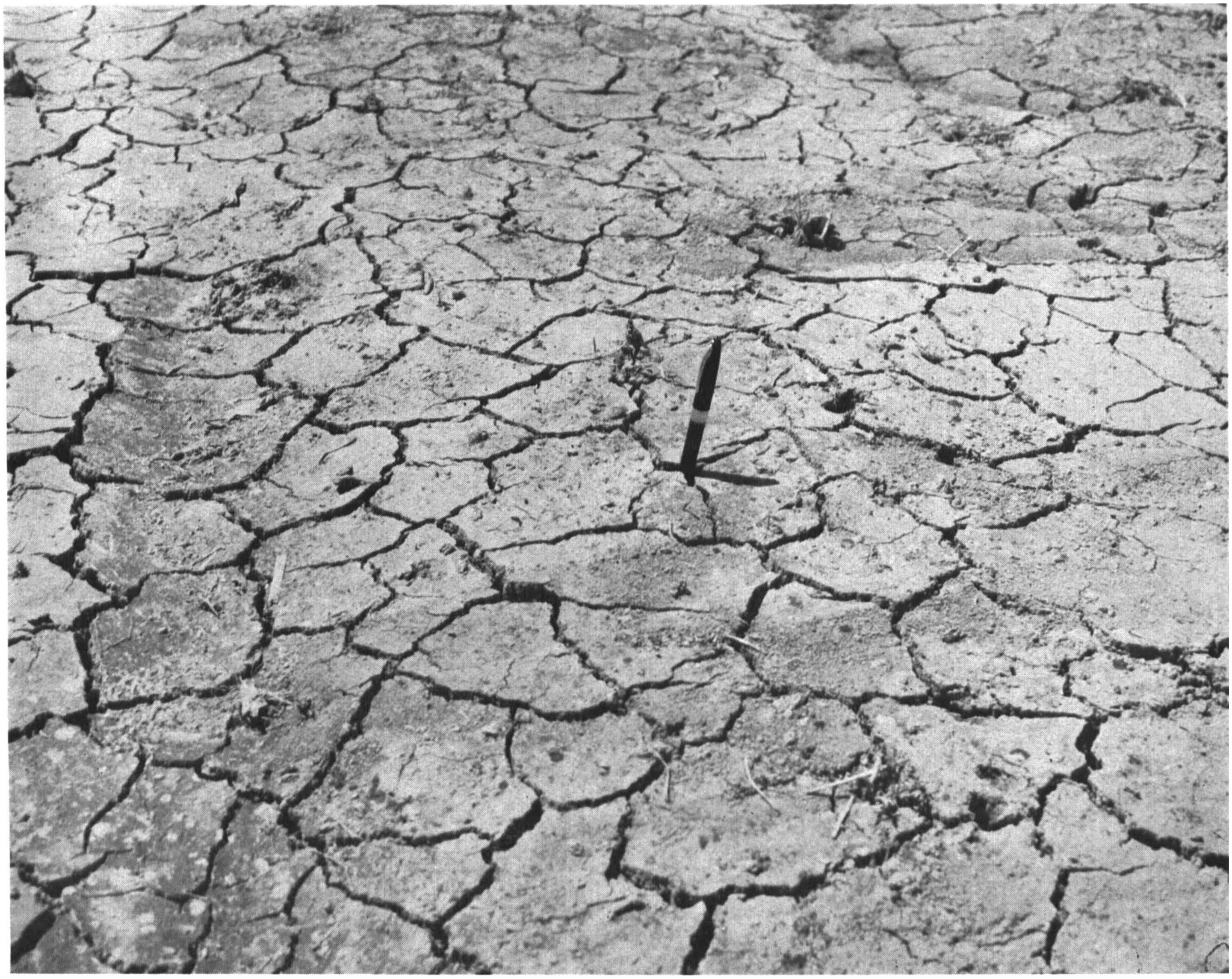

Figure 11.—Surface of Alligator clay, 0 to 1 percent slopes. When dry, this soil shrinks and forms cracks 1 to 4 inches wide and several feet deep; when wet, the soil expands and cracks fill.

residue row crop. Rice grown on these soils may be damaged unless the irrigation and drainage system provides for rapid application and removal of irrigation water and removal of excess rainfall. Crops grown in rotation with rice can be irrigated by the row or border method through the rice irrigation system. This should not be attempted, however, unless an adequate drainage system is installed.

Fertilizer is sometimes required for favorable yields. Most crops respond to lime. Apply fertilizer and lime according to the results of soil tests, the needs of the crops, and the results of local experience.

These soils can be tilled only within a narrow range of moisture content, and tillage may be delayed for several days after a rain. Good tilth is difficult to maintain. The best time to plow is in the fall or early in winter; this practice allows the clods in the seedbed to be crumbled by wetting, freezing, and drying. The rows of a seedbed should be high to provide drainage and aeration. Rows should be so arranged that excess water drains into V-type and W-type ditches. Land leveling and smoothing are feasible in some areas. Furrow and border irrigation are feasible on suitable slopes.

CAPABILITY UNIT IIIs-1

The only soil in this capability unit is Bruno loamy sand, undulating. This is a deep, excessively drained soil. Its surface layer and subsoil are loamy sand.

The infiltration and permeability of this soil are rapid, and the available moisture capacity is low. The content of organic matter and natural fertility are low. The soil is strongly acid to slightly acid.

This soil occupies about 0.3 percent of the county and has a limited suitability for crops. Early truck crops, early corn, and small grain are fairly well suited. Vetch is a well-suited winter legume. The best crops for this soil are those that grow in winter and spring when moisture is normally abundant. Trees that are suited to this soil

799-305—66——3

are cottonwood, black willow, sycamore, and some oaks. Pecan trees are suited but may be difficult to establish.

Droughtiness is the chief limitation, though wind erosion causes some damage in the spring. If properly fertilized and tilled, this soil can be used continuously for sown crops that produce a large amount of residue. Low-residue crops should not be grown continuously unless a cover crop is grown each year. If stripcropping is used to control wind erosion, strips of high-residue row crops should alternate with high-residue sown crops. A low-residue row crop, followed by a cover crop, can be grown in a system that includes a high-residue sown crop.

Fertilizer is required for most crops. Some crops respond to lime where the soil is acid. Apply fertilizer and lime accordingly to the results of soil tests, the needs of crops, and the results of local experience.

This soil can be tilled throughout a wide range of moisture content. If crop rows are arranged across undulating slopes, the maximum amount of rainfall will be captured to filter into the soil.

CAPABILITY UNIT IVe-1

This capability unit consists of deep, moderately well drained to well drained, moderately sloping soils in thick loess. The surface layer is friable silt loam 4 to 8 inches thick. The subsoil is silty clay loam. The soils are—

Loring silt loam, 8 to 12 percent slopes.
Loring silt loam, 8 to 12 percent slopes, eroded.
Loring silt loam, 8 to 12 percent slopes, severely eroded.
Memphis silt loam, 8 to 12 percent slopes, eroded.

The Loring soils in this unit have a fragipan in the subsoil. Some soils in this unit are eroded, and the plow layer is a mixture of the surface layer and subsoil. There are a few shallow gullies in some areas.

These soils have moderate permeability, infiltration, and available moisture capacity. They contain only a small amount of organic matter and have moderate natural fertility. They are medium to strongly acid.

These soils occupy about 0.9 percent of the county. They have a limited suitability for crops. Sown grain sorghum and small grain produce fair yields under careful management. Sericea lespedeza, white clover, annual lespedeza, and vetch are well-suited legumes. Bahiagrass, bermudagrass, and ryegrass are the main grasses suited to these soils. Peaches and some nursery crops grow well. Other trees that grow well are pine, oak, hickory, beech, and yellow-poplar.

Fertilization is necessary for all crops and pasture. Some crops respond to lime. Apply fertilizer and lime according to the results of soil tests, the needs of the crops, and the results of local experience.

Runoff and erosion are the chief limitations, and they are so severe that the soils are not suitable for continuous cultivation. These soils are best used for permanent pasture or woods. Contour tillage and diversion terraces are needed to divert runoff. Peaches should be planted on terrace ridges, and a cover crop grown in orchards every year.

CAPABILITY UNIT VIe-1

This capability unit consists of moderately well drained to well drained, moderately steep soils in thick loess on Crowley Ridge. The surface layer is friable silt loam about 6 inches thick. The subsoil is silty clay loam. The soils are—

Loring and Memphis silt loams, 12 to 20 percent slopes.
Loring and Memphis silt loams, 12 to 20 percent slopes, eroded.

The Loring soils in this unit have a fragipan in the subsoil. Permeability, infiltration, and available water capacity are moderate. The content of organic matter is medium to low, and the natural fertility is moderate. The soils are medium to very strongly acid.

These soils occupy about 2.3 percent of the county. They are not suitable for cultivation. They are productive, but the steep slopes, rapid runoff, and severe hazard of erosion limit their use to permanent pasture and trees. Bermudagrass is one of the suitable grasses. Sericea lespedeza and annual lespedeza are the most suitable legumes. Trees that grow well are oak, hickory, pine, yellow-poplar, sweetgum, and black walnut.

Fertilization is necessary to obtain moderate yields of most forage plants. Some forage plants respond to lime.

Shallow gullies are in some fields. These gullies should be shaped and seeded or sodded, or planted with closely spaced trees.

CAPABILITY UNIT VIw-1

The only soil in this capability unit is Zachary silt loam. This poorly drained, level soil is on bottom land and subject to frequent flooding. During wet seasons the water table is at the surface. The surface layer is grayish-brown silt loam 5 to 7 inches thick. The subsoil is gray silt loam and silty clay loam.

Permeability and infiltration are slow, and the available water capacity is moderate. The content of organic matter is medium to low, and the natural fertility is moderate. The soil is strongly acid.

This soil makes up about 6.5 percent of the county and has a limited suitability for crops. Soybeans, grain sorghum, and other late planted, early maturing crops can be safely grown in some years; in most years, however, these crops will be flooded. Suitable grasses are bermudagrass, dallisgrass, and tall fescue. Areas of this soil that are drained and protected by levees produce good yields of soybeans, grain sorghum, and rice. Unless the soil is protected from flooding, however, it is best used as woodland. Trees that grow well are cypress, blackgum, sweetgum, and water-tolerant oak and hickory.

Fertilizer is required for favorable yields of most crops. Some crops respond to lime. Apply fertilizer and lime according to the results of soil tests, the needs of the crops, and the results of local experience.

Wetness and flooding are the chief limitations. This soil cannot be used for crops unless it is protected from flooding. Crops can be grown, however, in areas protected by levees. Rows should be so arranged that excess water drains into V-type or W-type ditches.

CAPABILITY UNIT VIs-1

The only soil in this capability unit is Lafe silt loam, acid. This soil is poorly drained to somewhat poorly drained and nearly level. It has a friable silt loam surface layer and a very firm silty clay loam subsoil.

This soil has very slow permeability and low available water capacity. The content of organic matter and the natural fertility are low. The soil is very strongly acid in the upper part but, in most places, is alkaline in the lower part.

This soil occupies about 0.1 percent of the county. It is undesirable for cultivation and, under good management, produces only low yields of forage and woodcrops. Bermudagrass is the best grass for pasture, and annual lespedeza and vetch are the best legumes. The woodland produces only a poor quality of post oak and blackjack oak. No trees of commercial quality are known to grow well. This soil contains a large amount of sodium and magnesium. These chemicals, if highly concentrated, are toxic to many plants. The root zone in this soil is shallow, although the soil material is deep. The sodium and magnesium prevent the soil from developing a strong structure in the surface layer. Consequently, the soil is readily eroded.

CAPABILITY UNIT VIIe-1

This capability unit consists of moderately well drained to well drained, moderately steep to steep soils in thick loess on Crowley Ridge. The surface layer is friable silt loam about 6 inches thick. The subsoil is friable silt loam and silty clay loam. The soils are—

Loring and Memphis silt loams, 12 to 40 percent slopes, severely eroded.
Loring and Memphis silt loams, 20 to 40 percent slopes.
Loring and Memphis silt loams, 20 to 40 percent slopes, eroded.

The Loring soils in this unit have a weak fragipan in the subsoil.

These soils have moderate permeability, infiltration, and available water capacity. Their content of organic matter is medium to low, and their natural fertility is moderate. They are medium to very strongly acid.

These soils make up about 1.6 percent of the county. All areas are cutover native woodland or brushland. Because of steep slopes, rapid runoff, and the severe hazard of erosion, these soils are best used as woodland and wildlife habitats. Adapted trees are oak, hickory, yellow-poplar, pine, and black walnut.

Some soils in this unit are eroded, and patches of the subsoil are exposed. Some areas have a few shallow gullies. These areas need special treatment for erosion control. They should be planted with trees spaced closely together and protected from headwaters until the trees have become established.

CAPABILITY UNIT VIIe-2

This capability unit consists of gently sloping to steep, well drained to moderately well drained miscellaneous land types on Crowley Ridge. The land types are—

Gullied land.
Rough broken land.

In most areas of Gullied land, the surface layer has been removed and the surface is an intricate pattern of gullies that vary in depth from a few feet to many feet. The exposed soil material varies in texture from silt loam to silty clay loam. Rough broken land is a mixture of soil material from loess and from the sandy Coastal Plain material that underlies most of Crowley Ridge.

These land types have slow to moderate permeability and infiltration, and their available water capacity is moderate. Their content of organic matter is moderate to very low. They are medium acid to very strongly acid.

These land types occupy about 1.5 percent of the county. They are not suitable for cultivation. Areas of Gullied land not steeper than 12 percent can be reclaimed for pasture by intensive erosion control. Bermudagrass is well suited to these areas. The best use is for woods. Oak, hickory, pine, yellow-poplar, and black walnut are well-suited trees.

Some areas need special treatment for gully control. In pastures, gullies should be sloped, fertilized, and seeded or sodded. Diversion terraces are needed in some places to help control gully erosion. In wooded areas, gullies should be planted with closely spaced trees and protected from headwaters until the trees become established.

Predicted yields [2]

In table 3 are predicted average yields per acre for the principal crops grown on each of the soils of St. Francis County under two levels of management. The yields are those that can be expected over a period of years.

In columns A are average yields to be expected under prevailing management in the county. Under such management, crops are not rotated according to a definite plan, the amount and kind of commercial fertilizer needed are not determined by soil tests, and little is done to control erosion or to provide adequate drainage.

In columns B are yields to be expected under improved management. Such management includes returning crop residue to the soil; fertilizing in amounts determined by soil tests and on the basis of the needs of the crops and the results of local experience; choosing suitable crops and varieties; preparing a seedbed properly; planting or seeding at recommended rates and at the right time; inoculating legumes if necessary; cultivating row crops at a shallow depth; controlling weeds, insects, and diseases; providing adequate surface drainage; terracing and cultivating on the contour in sloping areas or cultivating across slopes in undulating areas; and controlling grazing.

Use of Soils for Woodland [3]

In this section the principal kinds of trees and the soils in which they grow are briefly discussed. The soils are placed in woodland suitability groups, and the factors that determined the grouping are explained. Each woodland suitability group is then described, and suitable management is suggested.

St. Francis County was originally covered almost entirely by virgin forests. The deep, loessal soils in the western part of the county, including Crowley Ridge, and the rich alluvium of the bottom lands supported excellent stands of hardwood timber.

According to the 1959 Census of Agriculture, about 20 percent of the land area of the county is classified as commercial forest land, privately owned by farmers and others. There is considerable opportunity for developing this resource through improved management.

Overcutting, wildfire, and overgrazing have depleted the forests on Crowley Ridge to stands that are generally understocked and have a large proportion of cull and weed trees. Most of Crowley Ridge is still woodland and has the greatest potential for woodland development in the county. On the loess plain west of the ridge and on the bottom lands, the more valuable species have been harvested primarily for lumber, and most of these areas have

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[2] W. Wilson Ferguson, management agronomist, Soil Conservation Service, assisted in preparing this section.

[3] James M. Case and James T. Beene, foresters, Soil Conservation Service, assisted in the preparation of this section.

TABLE 3.—*Predicted average yields per acre of*

[Yields in columns A are expected over a period of years under prevailing management; those in columns B are expected

Mapping unit	Capability unit	Cotton (lint)		Soybeans	
		A	B	A	B
		Lb.	*Lb.*	*Bu.*	*Bu.*
Alligator and Sharkey clays, 0 to 1 percent slopes	IIIw-5	275	410	18	30
Alligator and Sharkey clays, gently undulating	IIIw-5	300	380	20	30
Alligator and Sharkey clays, undulating	IIIw-5	-----	-----	22	32
Alligator and Sharkey silty clay loams, overwash	IIIw-5	300	400	18	30
Arkabutla silt loam	IIw-2	450	650	30	38
Beulah fine sandy loam, gently undulating	IIe-1	425	600	22	33
Beulah fine sandy loam, undulating	IIIe-1	400	550	18	30
Bosket-Dubbs fine sandy loams, 0 to 1 percent slopes	I-1	500	700	31	40
Bosket-Dubbs fine sandy loams, gently undulating	IIe-1	475	650	28	38
Bosket-Dubbs fine sandy loams, undulating	IIIe-1	400	550	22	32
Bowdre silty clay, 0 to 1 percent slopes	IIw-4	450	625	26	35
Bowdre silty clay, gently undulating	IIw-4	440	590	25	32
Bowdre silty clay, undulating	IIw-4	430	580	22	31
Bruno loamy sand, undulating	IIIs-1	-----	-----	-----	-----
Calhoun silt loam	IIIw-4	300	425	18	25
Calloway silt loam, 0 to 1 percent slopes	IIw-1	410	580	22	28
Calloway silt loam, 1 to 3 percent slopes	IIw-1	400	560	21	27
Collins silt loam	I-1	490	690	24	35
Crowley silt loam, 0 to 1 percent slopes	IIIw-2	460	600	22	30
Crowley silt loam, 1 to 3 percent slopes	IIIw-2	430	570	22	30
Dubbs fine sandy loam, gently undulating	IIe-1	450	690	30	40
Dubbs fine sandy loam, undulating	IIIe-1	430	650	28	40
Dundee fine sandy loam, 0 to 1 percent slopes	IIw-2	430	710	23	36
Dundee fine sandy loam, gently undulating	IIIw-3	450	700	20	35
Dundee fine sandy loam, undulating	IIIw-3	425	690	18	33
Dundee silt loam, 0 to 1 percent slopes	IIw-2	445	720	23	36
Dundee silt loam, gently undulating	IIIw-3	445	690	19	33
Dundee silt loam, undulating	IIIw-3	400	690	18	33
Earle clay, 0 to 1 percent slopes	IIIw-1	450	620	22	30
Earle clay, gently undulating	IIIw-1	450	600	22	30
Earle clay, undulating	IIIw-1	435	580	20	28
Gullied land	VIIe-2	-----	-----	-----	-----
Henry silt loam	IIIw-4	275	400	18	30
Hillemann silt loam, 0 to 1 percent slopes	IIw-3	400	550	18	30
Hillemann silt loam, 1 to 3 percent slopes	IIw-3	360	500	18	30
Iuka soils	IIe-1	475	625	27	35
Lafe silt loam, acid	VIs-1	-----	-----	-----	-----
Loring silt loam, 0 to 1 percent slopes	I-2	500	725	24	32
Loring silt loam, 1 to 3 percent slopes	IIe-2	480	700	22	27
Loring silt loam, 1 to 3 percent slopes, eroded	IIe-2	425	650	20	27
Loring silt loam, 3 to 8 percent slopes	IIIe-2	400	600	18	25
Loring silt loam, 3 to 8 percent slopes, eroded	IIIe-2	350	550	15	20
Loring silt loam, 3 to 8 percent slopes, severely eroded	IIIe-2	-----	-----	-----	-----
Loring silt loam, 8 to 12 percent slopes	IVe-1	-----	-----	-----	-----
Loring silt loam, 8 to 12 percent slopes, eroded	IVe-1	-----	-----	-----	-----
Loring silt loam, 8 to 12 percent slopes, severely eroded	IVe-1	-----	-----	-----	-----
Loring and Memphis silt loams, 12 to 20 percent slopes	VIe-1	-----	-----	-----	-----
Loring and Memphis silt loams, 12 to 20 percent slopes, eroded	VIe-1	-----	-----	-----	-----
Loring and Memphis silt loams, 12 to 40 percent slopes, severely eroded	VIIe-1	-----	-----	-----	-----
Loring and Memphis silt loams, 20 to 40 percent slopes	VIIe-1	-----	-----	-----	-----
Loring and Memphis silt loams, 20 to 40 percent slopes, eroded	VIIe-1	-----	-----	-----	-----
Memphis silt loam, 1 to 3 percent slopes	IIe-2	500	775	26	36
Memphis silt loam, 3 to 8 percent slopes, eroded	IIIe-2	460	700	24	33
Memphis silt loam, 8 to 12 percent slopes, eroded	IVe-1	-----	-----	-----	-----
Rough broken land	VIIe-2	-----	-----	-----	-----
Stuttgart silt loam, 1 to 3 percent slopes	IIe-3	425	575	20	32
Zachary silt loam	VIw-1	-----	-----	-----	-----

[1] Yields vary with rainfall; highest yields are obtained during wet growing seasons; because of insufficient data and generally low level of management, yields for only one level of management are shown.

principal crops under two levels of management

under improved management; absence of yield indicates crop is not commonly grown under management specified]

Rice		Grain sorghum		Wheat		Corn (ear)		Lespedeza hay	Peaches		Common bermudagrass		Fescue	
A	B	A	B	A	B	A	B	A [1]	A	B	A	B	A	B
Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Bu.*	*Bu.*	*Animal-unit month* [2]	*Animal-unit month* [2]	*Animal-unit month* [2]	*Animal-unit month* [2]
65	90	56	72	20	35			1. 25			4	6	5	8
45	65	52	66	25	40			1. 20			4	6	5	8
		48	61	20	38			1. 00			4	6	5	8
60	90	56	72	22	37			1. 25			4	6	5	8
		50	72	25	46	45	70	. 90						
		32	57	27	45	32	57	1. 30			5	8	5	8
		27	55	22	41	30	50	1. 20			5	8	5	8
		61	80	31	47	40	70	1. 50			5	8	6	9
		57	78	26	45	36	57	1. 50			5	8	6	9
		50	70	25	45	35	55	1. 40			5	8	6	9
		37	62	25	40	35	60	1. 80			6	8	6	9
		42	57	27	44	35	60	1. 70			6	8	6	9
		40	55	27	45	30	55	1. 60			6	8	6	9
				13	22						2	3. 5		
65	85	35	65					1. 00			4	6	5	7
70	95	40	72	24	38	25	50	1. 60			5	7	5	8
60	85	32	66	25	36	20	40	1. 50			5	7	5	8
		45	80	28	46	45	70	1. 75			6	9	5	8
70	92	50	75	26	45	37	58	1. 50			5	7	5	8
60	80	47	72	25	40	37	58	1. 40			5	7	5	8
		57	78	28	45	45	70	1. 50			5	8	6	9
		50	72	26	45	40	65	1. 50			5	8	6	9
		60	86	30	42	45	75	1. 60			5	9	5	9
		59	81	30	45	45	70	1. 60			5	9	5	9
		50	72	30	40	40	65	1. 50			5	9	5	9
		60	85	30	42	40	70	1. 80			5	9	5	9
		57	78	25	35	35	65	1. 80			5	9	5	9
		50	70	20	40	35	60	1. 60			5	9	5	9
		70	90	30	45	35	55	1. 80			5	7. 5	5	9
		66	87	28	43	35	55	1. 80			5	7. 5	5	9
		60	80	25	40	30	50	1. 60			5	7. 5	5	9
65	90	55	80					1. 20			4	6	4	7
75	95	50	75	27	40	35	55	1. 50			5	7	5	7
75	85	47	72	27	40	35	55	1. 20			5	7	5	7
		50	70	27	45	45	70	1. 50			5	9	5	8
								. 70			2	3		
		38	70	25	42	25	60	1. 70			5	7	5	8
		35	67	25	42	23	55	1. 60	195	390	5	7	5	8
		32	60	22	40	20	50	1. 60	190	380	5	7	5	8
		26	50	22	36	25	50	1. 30	163	330	4. 5	6. 5	5	7. 5
		20	40	18	36	20	45	1. 00	140	220	4	6	4	7
								. 80	120	225	4	5. 5	3. 5	6. 5
								. 60	130	260	3. 5	5	3. 5	5. 5
								. 50	120	240	3	5		
								. 40			2. 5	4		
											4	5		
											3	4		
											3	4		
											3	5		
											3	4		
		36	67	25	43	30	80	1. 75	145	390	5	7	5	8
		20	40	20	39	20	50	1. 60	150	300	5	7	5	8
								. 50	130	250	3	5		
65	90	50	75	25	45	25	45	1. 50			4	6. 5	6	9
45	61							. 60						

[2] An animal-unit-month represents a month of grazing on 1 acre for one animal unit without injury to the pasture. An animal unit is the equivalent of one cow, steer, or horse; five hogs; or seven sheep or goats.

been cleared for more intensive use. When the uncleared areas are drained, a considerable portion of the remaining woodland will probably be cleared. Since levees have been built to control flooding, most of the bottom lands have been cleared and only the poorly drained and flooded areas have an appreciable acreage of woodland. The remaining bottom-land forests are generally in poor condition because of overcutting and wildfire.

On the ridges and upper slopes of Crowley Ridge, white oak, southern red oak, black oak, shortleaf pine, and hickory are the principal commercial tree species. On the middle and lower slopes, and on the loess plain, the principal commercial species include cherrybark oak, white oak, beech, black oak, southern red oak, yellow-poplar, Shumard oak, sweetgum, and white ash.

On bottom lands, the composition of species varies considerably according to soil textures, internal drainage, and topography. In swamps where water stands most of the year, cypress and tupelo-gum predominate. On the poorly drained areas, sweetgum, willow oak, hackberry, Nuttall oak, overcup oak, American elm, and green ash generally predominate. On the better drained areas, cherrybark oak, cow oak, Shumard oak, water oak, sweetgum, willow oak, Nuttall oak, and green ash generally predominate.

Rating of soils for woodland

Management of woodland can be planned more effectively if soils are rated according to those factors that affect the growth of trees and management of stands. In this report the soils were rated according to the following factors: (1) Species suitability, (2) potential soil productivity for major woodcrops (tree species or forest types), (3) plant competition, (4) seedling mortality, (5) equipment limitations, and (6) erosion hazard.

The ratings were based on information obtained from detailed plot studies, measurements of different tree species on various soils, published and unpublished records, and the experience and judgment of technicians working with tree crops in this area. The factors on which the ratings were based are defined as follows:

Species suitability refers to the suitability of trees for a given soil or site. For each soil, the principal species were rated as *preferred*, or *acceptable*. The ratings were based on growth rate, expected commercial value of trees, quality of products, resistance to hazards, and soil limitations. Species suitability is an important factor to consider in selecting trees for managing in existing stands or for planting.

Potential soil productivity is the amount of wood products a soil can produce under a given level of management. Each soil mapping unit was rated according to its productivity for one or more species of trees. In this report potential soil productivity is expressed as site class. Site class, as herein used, is the average height of dominant trees, to the nearest 10-foot interval, at age 30 for cottonwood, age 35 for sycamore, and age 50 for other species. The potential yearly growth, or approximate yields in board feet under intensive management, is based on the site class rating for each species or type.

Potential soil productivity is important in determining (1) the most economical rotations, or the best rotation age of trees for producing specified products; (2) the length of cutting cycles, or the spacing of trees for a given cutting cycle; (3) the priority of locations for planting and managing trees; and (4) the yields that can be expected under different kinds of management.

Plant competition refers to the degree of competition and rate of invasion by unwanted trees, shrubs, and vines when openings are made in the canopy. Competition is *slight* if natural regeneration of preferred species is not impeded by invasion of unwanted trees, shrubs, or vines. Competition is *moderate* if natural regeneration of preferred species is not prevented by unwanted species. Some release work, stand improvement, or weeding is necessary to obtain a well-stocked stand of the preferred species. Competition is *severe* if natural regeneration of preferred species is restricted by invasion of unwanted species to the extent that a well-stocked stand of desirable trees cannot be produced without special treatment.

Woodland managers need to know the degree of plant competition that can be expected on different soils in order to plan their operations to obtain fully stocked stands of desirable trees.

Equipment limitations refers to the soil characteristics and topographic features that restrict or prohibit the use of conventional equipment for planting trees, constructing roads, controlling unwanted vegetation, harvesting wood products, or controlling fire. The limitations in St. Francis County are caused primarily by wetness, the texture of the surface soil, and flooding. On Crowley Ridge, steepness of slope is also a limiting factor.

The limitations are *slight* if conventional equipment can be used at any time of the year, except during short periods of heavy rainfall. The soil is excessively to moderately well drained and is not subject to flooding or excess surface water. The limitations are *moderate* if conventional equipment can normally be used from March through November each year. Occasional floods may occur. The water level is normally below the surface, or seldom above the surface for extended periods. The limitations are *severe* if conventional equipment normally can be used only during the summer months, usually May through September. Such limitations may be caused by frequent floods, by a water level above the surface of the soil for extended periods, or by soil wetness, all of which result in poor traction and bogging of equipment.

Woodland managers can plan the type of equipment to use and when to use it if they know the equipment limitations on different soils.

Seedling mortality is the expected mortality of seedlings of the preferred species that are established by planting, direct seeding, or natural seeding. In St. Francis County seedling mortality is primarily the result of poor drainage or flooding. Mortality is highest in areas subject to long periods of flooding or excess surface water.

Seedling mortality is *slight* if adequate natural regeneration ordinarily occurs where suitable seed sources exist. The mortality of planted seedlings does not ordinarily exceed 30 percent. The hazard is *moderate* if natural regeneration cannot be relied upon without site preparation. The mortality of planted seedlings is normally between 30 and 60 percent. Disking, furrowing, bedding, or other special measures improve the chances of survival. The mortality is *severe* if natural regeneration cannot be relied upon. The mortality of planted seedlings normally exceeds 70 percent. In wet areas, the chances for survival can be improved by bedding and other special measures. Some replanting is usually necessary.

These ratings assume the use of healthy planting stock and proper planting methods. Information about seedling mortality helps woodland managers to select methods, equipment, and seasons for establishing stands by planting, direct seeding, or natural reseeding.

Erosion hazard refers to the degree of potential sheet and gully erosion of soils. Steepness of slope is the main cause of erosion in St. Francis County, especially in uplands. The hazard is *slight* on slopes of 0 to 3 percent; *moderate* on slopes of 3 to 8 percent; and *severe* on slopes of 8 percent and steeper.

Erosion can be controlled by growing adapted species of trees, maintaining well-stocked stands, harvesting trees selectively, and carefully locating, constructing, and maintaining the necessary roads, skid trails, and landings.

Woodland suitability groups

After each soil was rated on the basis of the factors defined, the soils were placed in woodland suitability groups. Each group consists of soils that produce similar kinds of woodcrops, need similar management to produce these crops when the existing stands are the same, and have about the same potential productivity. There are five such groups in the county. The sixth woodland suitability group is made up of soils not commonly used for woodcrops.

In the woodland suitability groups that follow, the site class ratings given are based on soil-woodland site studies by the Soil Conservation Service and the Forest Service. In addition, applicable site index curves and other data were used from the following sources: For *loblolly and shortleaf pines*—site indexes by Coile and Schumacher, Journal of Forestry, June 1953 (*6*); for *cottonwood*—Occasional paper 178, Southern Forest Experiment Station (*4*); and for *sweetgum and mixed oak-gum*—Occasional Paper 176, Southern Forest Experiment Station (*5*).

The potential yearly growth is the volume in board feet (Doyle rule) that can be produced by well-stocked, managed stands of pines to age 60, cottonwood to age 35, other hardwoods to age 70. The yields for pines were adapted from Report Number 6, Georgia Forest Research Council, (*3*), and those for hardwoods were adapted from Agriculture Handbook No. 181, U.S. Forest Service (*7*).

In determining the site class for mixed oak-gum types in each woodland suitability group, species that usually occur as major components of a stand were selected as indicators. The indicators were cherrybark oak in woodland suitability groups 2, 3, and 4, and Nuttall oak in woodland suitability group 5.

WOODLAND SUITABILITY GROUP 1

This woodland suitability group consists of those parts of Loring and Memphis silt loams that are on the level to strongly sloping tops and sides of ridges in the loessal uplands of Crowley Ridge. Those parts that are on ridgetops and that reach about 50 feet down the side slopes, or to a point where the gradient does not exceed 12 percent, are included. The soils are—

LgA Loring silt loam, 0 to 1 percent slopes.
LgB Loring silt loam, 1 to 3 percent slopes.
LgB2 Loring silt loam, 1 to 3 percent slopes, eroded.
LgC Loring silt loam, 3 to 8 percent slopes.
LgC2 Loring silt loam, 3 to 8 percent slopes, eroded.
LgC3 Loring silt loam, 3 to 8 percent slopes, severely eroded.
LgD Loring silt loam, 8 to 12 percent slopes.
LgD2 Loring silt loam, 8 to 12 percent slopes, eroded.
LgD3 Loring silt loam, 8 to 12 percent slopes, severely eroded.
MeB Memphis silt loam, 1 to 3 percent slopes.
MeC2 Memphis silt loam, 3 to 8 percent slopes, eroded.
MeD2 Memphis silt loam, 8 to 12 percent slopes, eroded.

These soils are deep and moderately well drained to well drained. They have medium to rapid runoff, medium internal drainage, and moderate permeability. Their available water capacity is moderate, and they are somewhat droughty. The Loring soils have a fragipan in their subsoil that slightly restricts penetration of water and plant roots.

For this woodland group, the preferred species are shortleaf pine and loblolly pine, and these are the most suitable species for planting. Loblolly pine does not occur naturally, but trial plantings as old as 25 years indicate that this species is as well adapted as shortleaf pine. Acceptable species are black oak, southern red oak, and white oak.

The site class is approximately 50 for shortleaf pine and 60 for loblolly pine. Shortleaf pine has a potential yearly growth of 200 board feet, and loblolly pine, 260 board feet.

Plant competition is moderate on these soils. Pine seedlings usually require some release for survival and normal growth. Seedling mortality is generally slight; however, in areas that have little protective vegetation, seedlings may be damaged by frost heaving during severe freezes.

Equipment limitations are slight. The hazard of erosion is moderate on slopes of less than 8 percent, but severe on steeper slopes.

WOODLAND SUITABILITY GROUP 2

The soils of woodland suitability group 2 are mainly the Loring and Memphis. These are moderately well drained to well drained, deep silty soils. They have medium to very rapid runoff, medium internal drainage, moderate permeability, and moderate available water capacity. The Loring soils have a fragipan in their subsoil that slightly restricts penetration of water and plant roots.

On Crowley Ridge, this woodland group consists of the middle and lower slopes of Loring silt loam and Memphis silt loam. On the gently rolling loess plain west of the ridge, however, this woodland group consists of entire mapping units of Loring silt loam and Memphis silt loam.

On Crowley Ridge, the parts of Loring and Memphis soils in this woodland group are those that are steeper than 12 percent and those that are less than 12 percent but are more than 50 feet down from the tops of the ridges. The mapping units represented are—

LgB Loring silt loam, 1 to 3 percent slopes.
LgB2 Loring silt loam, 1 to 3 percent slopes, eroded.
LgC Loring silt loam, 3 to 8 percent slopes.
LgC2 Loring silt loam, 3 to 8 percent slopes, eroded.
LgC3 Loring silt loam, 3 to 8 percent slopes, severely eroded.
LgD Loring silt loam, 8 to 12 percent slopes.
LgD2 Loring silt loam, 8 to 12 percent slopes, eroded.
LgD3 Loring silt loam, 8 to 12 percent slopes, severely eroded.
LmE Loring and Memphis silt loams, 12 to 20 percent slopes.
LmE2 Loring and Memphis silt loams, 12 to 20 percent slopes, eroded.
LmF3 Loring and Memphis silt loams, 12 to 40 percent slopes, severely eroded.
LmF Loring and Memphis silt loams, 20 to 40 percent slopes.
LmF2 Loring and Memphis silt loams, 20 to 40 percent slopes, eroded.

MeB Memphis silt loam, 1 to 3 percent slopes.
MeC2 Memphis silt loam, 3 to 8 percent slopes, eroded.
MeD2 Memphis silt loam, 8 to 12 percent slopes, eroded.
Rb Rough broken land.

West of Crowley Ridge, on the gently rolling loess plain, all areas of the following mapping units are in woodland group 2.

LgA Loring silt loam, 0 to 1 percent slopes.
LgB Loring silt loam, 1 to 3 percent slopes.
LgB2 Loring silt loam, 1 to 3 percent slopes, eroded.
LgC Loring silt loam, 3 to 8 percent slopes.
LgC2 Loring silt loam, 3 to 8 percent slopes, eroded.
LgC3 Loring silt loam, 3 to 8 percent slopes, severely eroded.
LgD Loring silt loam, 8 to 12 percent slopes.
LgD2 Loring silt loam, 8 to 12 percent slopes, eroded.
LgD3 Loring silt loam, 8 to 12 percent slopes, severely eroded.
MeB Memphis silt loam, 1 to 3 percent slopes.
MeC2 Memphis silt loam, 3 to 8 percent slopes, eroded.
MeD2 Memphis silt loam, 8 to 12 percent slopes, eroded.

The preferred species are cherrybark oak, Shumard oak, southern red oak, black oak, white oak, sweetgum, yellow-poplar, black walnut, loblolly pine, and shortleaf pine. Acceptable species are water oak, basswood, and sassafras. Loblolly pine and yellow-poplar are the most suitable species for planting in open areas. Cherrybark oak and black walnut are suitable for interplanting in hardwood stands.

The site class is approximately 90 for cherrybark oak, Shumard oak, southern red oak, black oak, sweetgum, and yellow-poplar; 80 for white oak, black walnut, and loblolly pine; and 70 for shortleaf pine. Sweetgum has a potential yearly growth of 410 board feet, mixed oak-gum 360 board feet, and loblolly pine 380 board feet.

Plant competition is moderate to severe and is most severe at or near the base of slopes. The early release of preferred species is important. Seedling mortality is slight.

Equipment limitations are moderate, primarily because of poor traction. The use of logging equipment may be limited for brief periods during wet weather. In some places steep slopes limit the choice of road locations.

The hazard of erosion is slight to moderate on slopes that range from 0 to 8 percent but severe on steeper slopes. This hazard should be considered in the location and maintenance of roads, fire lanes, landings, and skid trails.

WOODLAND SUITABILITY GROUP 3

This group consists of deep, somewhat poorly drained and poorly drained silty soils on level and nearly level loessal uplands. Runoff is slow to ponded. Internal drainage and permeability are slow, and the available water capacity is moderate. Except for Calhoun silt loam, these soils all have a fragipan in their subsoil beginning at a depth of 17 to 36 inches. The fragipan restricts penetration of water and plant roots. All areas of the following soils are in this group—

Ca Calhoun silt loam.
C1A Calloway silt loam, 0 to 1 percent slopes.
C1B Calloway silt loam, 1 to 3 percent slopes.
He Henry silt loam.

The preferred species are loblolly pine, cherrybark oak, sweetgum, and white oak. Acceptable species are water oak and southern red oak. Loblolly pine is the most suitable species for planting in open fields. Cherrybark oak is suitable for interplanting in hardwood stands.

The site class is approximately 80 for loblolly pine and sweetgum; 90 for cherrybark oak; 70 for white oak; 90 for mixed oak-gum; and 70 for shortleaf pine. Sweetgum has a potential yearly growth of 290 board feet; mixed oak-gum 360 board feet; loblolly pine 380 board feet; and shortleaf pine 330 board feet.

Plant competition is moderate to severe for desirable seedlings, but it does not generally prevent the establishment of a good stand of trees. Competition sometimes delays establishment of stands, however, and usually retards normal growth and development. Seedling mortality is slight to moderate. The primary problem is the drowning out of seedlings because of poor surface drainage and internal drainage.

Equipment limitations are moderate. These limitations are primarily caused by boggy conditions and poor traction. Logging with conventional equipment is usually limited to the summer months. Erosion is a slight hazard.

WOODLAND SUITABILITY GROUP 4

This group consists of deep, moderately well drained to somewhat poorly drained soils derived from silty alluvium. These soils are level, and runoff is slow. Permeability and internal drainage are slow to moderate. Available water capacity is moderate. All areas of the following soils are in this group—

Ak Arkabutla silt loam.
Co Collins silt loam.

The preferred species are cottonwood, sweetgum, wild pecan, cherrybark oak, water oak, and sycamore. Acceptable species are willow oak, cow oak, Shumard oak, and hackberry. Cottonwood and sweetgum are suitable for planting in open fields. Cultivation of these trees is necessary the first year to assure adequate survival. Cherrybark oak is well suited for interplanting in hardwood stands.

The site class is approximately 110 for cottonwood; 100 for sweetgum, sweet pecan, cherrybark oak, and sycamore; and 90 for water oak. Cottonwood has a potential yearly growth of 760 board feet; sweetgum 530 board feet; and mixed oak-gum 460 board feet.

Plant competition is severe and may impede the establishment and normal growth of desired trees. Seedling mortality is slight.

Equipment limitations are slight to moderate, and erosion is a slight hazard.

WOODLAND SUITABILITY GROUP 5

This group consists of deep, poorly and somewhat poorly drained, silty and clayey soils derived from alluvium. The soils range from level to undulating, and runoff is very slow to medium. Their permeability and internal drainage are slow to very slow. The available water capacity is moderate to high. All areas of the following soils are in this group—

AcA Alligator and Sharkey clays, 0 to 1 percent slopes.
AcB Alligator and Sharkey clays, gently undulating.
AcC Alligator and Sharkey clays, undulating.
Ad Alligator and Sharkey silty clay loams, overwash.
EcA Earle clay, 0 to 1 percent slopes.
EcB Earle clay, gently undulating.
EcC Earle clay, undulating.
Za Zachary silt loam.

The preferred species are cottonwood, sweetgum, Nuttall oak, water oak, and willow oak. Acceptable species are sweet pecan, sycamore, overcup oak, cypress, persimmon, and hackberry. Cottonwood and sweetgum are most suitable for planting in open areas, but plantings must be cultivated. Nuttall oak is favored for interplanting in hardwood stands.

The site class is approximately 90 for cottonwood, sweetgum, Nuttall oak, water oak, and willow oak. Cottonwood has a potential yearly growth of 410 board feet; sweetgum 410 board feet; and mixed oak-gum 360 board feet.

Plant competition is severe and may impede the establishment and normal development of desired trees. Seedling mortality is slight to moderate. The mortality is moderate where water remains on the surface. Surface drainage may be needed to retain the preferred species.

Equipment limitations are severe. The use of conventional logging equipment is usually limited to the dry summer months. Erosion is a slight hazard.

WOODLAND SUITABILITY GROUP 6

This group consists of deep, sandy and silty soils that are excessively drained to poorly drained. They are rapidly to very slowly permeable. These soils range from level to steep. They are nearly all cleared and intensively cultivated, or they have distinct limitations for woodcrop production. All areas of the following soils are in this group—

BaB	Beulah fine sandy loam, gently undulating.
BaC	Beulah fine sandy loam, undulating.
BdA	Bosket-Dubbs fine sandy loams, 0 to 1 percent slopes.
BdB	Bosket-Dubbs fine sandy loams, gently undulating.
BdC	Bosket-Dubbs fine sandy loams, undulating.
BeA	Bowdre silty clay, 0 to 1 percent slopes.
BeB	Bowdre silty clay, gently undulating.
BeC	Bowdre silty clay, undulating.
Br	Bruno loamy sand, undulating.
CwA	Crowley silt loam, 0 to 1 percent slopes.
CwB	Crowley silt loam, 1 to 3 percent slopes.
DbB	Dubbs fine sandy loam, gently undulating.
DbC	Dubbs fine sandy loam, undulating.
DdA	Dundee fine sandy loam, 0 to 1 percent slopes.
DdB	Dundee fine sandy loam, gently undulating.
DdC	Dundee fine sandy loam, undulating.
DuA	Dundee silt loam, 0 to 1 percent slopes.
DuB	Dundee silt loam, gently undulating.
DuC	Dundee silt loam, undulating.
Gu	Gullied land.
HmA	Hillemann silt loam, 0 to 1 percent slopes.
HmB	Hillemann silt loam, 1 to 3 percent slopes.
Ik	Iuka soils.
La	Lafe silt loam, acid.
StB	Stuttgart silt loam, 1 to 3 percent slopes.

All of the acreage of the Beulah, Bosket-Dubbs, Bowdre, Bruno, Dubbs, Dundee, and Iuka soils is cleared and cultivated except for odd areas and areas along streambanks. The wooded areas comprise less than 5 percent of the total acreage of these soils. Because of their small wooded acreage and the trend toward further land clearing, these soils have not been rated for woodcrops.

The Crowley, Hillemann, and Stuttgart are prairie soils that developed under tall bunch grass or scattered timber with a heavy understory of grass. The adaptability of commercial tree species on these soils has not been determined. Most areas are cultivated. Idle areas are quickly invaded by trees when seed sources are available, and some commercial species may grow well.

Gullied land varies in productivity according to the kind of soil that it was originally and the amount of surface soil that has been removed by erosion. Loblolly and shortleaf pines are generally best for stabilizing gullies, but mulching is generally necessary on completely barren areas.

Because of poor physical condition, droughtiness, and the toxic concentration of sodium and magnesium, as indicated by laboratory analyses, the Lafe soil is not adapted to commercial tree species.

Use of Soils for Wildlife[4]

Wildlife species need a habitat that provides food, cover, and water. The kind of food and cover that can be produced for wildlife, and the supply of water are related to the kind of soil, its management, and its location in the county.

Each animal species is attracted to its choice foods. The quality and quantity of the food produced for wildlife depend first of all on the inherent capacity of the soil to produce, and then on the cultural methods, fertilizer, and planting schedule used in management.

Cover for wildlife is generally abundant in St. Francis County on Crowley Ridge, but it is somewhat deficient in many of the Mississippi River bottom lands east of Crowley Ridge because of the intensive farming practices used.

Water for wildlife is generally plentiful because of the several major river systems in the county and the adequate annual rainfall. Abundant rainfall may benefit ducks but may force quail, deer, and rabbits to move to higher ground to survive. Farm ponds and reservoirs can be feasibly built on all the soils of the county, except the Bruno, Beulah, Bosket, Dubbs, and Dundee soils of the bottom lands.

The main kinds of wildlife in the county are upland wildlife, waterfowl, and fish.

The upland wildlife consists chiefly of bobwhites, rabbits, deer, doves, squirrels, and nongame birds. These species are common throughout the county and abundant where choice food and sufficient cover are available. The suitability of the most important food plants, both native and cultivated, for this kind of wildlife is rated in table 4.

Ducks are the principal kind of waterfowl in the county. Thousands of acres of land are naturally or artificially flooded each year to attract ducks, and normally there are enough ducks to provide excellent hunting. The suitability of food plants for ducks is also rated in table 4.

The topography and natural productivity of the rich bottom-land soils make them ideal for fish culture. The water-holding capacity of the soils is good. Water is abundant either from the ground or the surface. On Crowley Ridge, practically all soil types will hold impounded water available from either springs or runoff.

Wildlife suitability groups

Soils that have similar characteristics and therefore provide similar food, cover, and water supplies for wildlife have been placed in a wildlife suitability group. There are seven of these groups in the county.

The plants that were rated in table 4 for suitability as food for the most important kinds of wildlife have been rated in table 5 according to their suitability for growth on the soils of each of the wildlife groups.

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

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

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

Plant	Part of plant eaten	Bobwhite	Deer	Dove	Duck	Rabbit	Squirrel	Non-game birds [1]		
								Fruit eaters	Seed eaters	Nut eaters
Bahiagrass	Forage	3	1	3	3	3	3	3	3	3
	Seed	3	2	2	3	3	3	3	2	3
Blackberry and dewberry	Forage	3	2	3	3	3	3	3	3	3
	Fruit	1	3	3	3	3	2	1	3	3
Blackgum	Fruit	2	3	3	3	3	1	1	3	2
Browntop millet	Seed	1	3	1	1	3	3	3	1	3
Cherry, black	Fruit	1	3	3	3	3	1	1	3	2
Clover, crimson	Forage	2	1	3	3	1	3	3	3	3
Clover, white	Forage	2	1	3	3	1	3	3	3	3
Corn	Seed	1	1	1	1	1	1	3	1	2
Cowpeas	Forage	3	1	3	3	1	3	3	3	3
	Seed	1	1	2	3	2	3	3	3	3
Croton (doveweed or goatweed)	Seed	1	3	1	3	3	3	3	1	3
Dogwood, flowering	Fruit	1	3	3	3	3	1	1	3	3
Grapes, wild	Fruit	3	3	3	3	3	2	1	3	3
Greenbrier	Forage	3	1	3	3	1	3	3	3	3
Hickory	Nut	3	2	3	3	3	1	3	2	1
Lespedeza (annual, bicolor, japonica).	Forage	3	1	3	3	2	3	3	3	3
	Seed	1	3	3	3	3	3	3	3	3
Millet, Japanese	Seed	2	3	1	1	3	3	3	1	3
Oaks	Acorn	1	1	3	1	3	1	3	3	1
Pecan (native and improved)	Nut	1	1	3	1	3	1	3	2	1
Pines	Seed	1	3	1	3	3	1	3	1	1
Ragweed, common	Seed	1	3	1	3	3	3	3	1	3
Rice	Seed	1	3	2	1	3	3	3	1	2
Small grain (oats, rye, barley).	Forage	2	1	3	1	3	3	3	3	3
	Seed	2	3	2	2	2	3	3	1	2
Smartweed	Seed	2	3	3	1	3	3	3	3	3
Soybeans	Forage	3	1	3	3	1	3	3	3	3
	Seed	1	3	2	1	3	3	3	3	3
Sweetgum	Seed	1	3	3	3	3	3	3	3	3
Tickclover	Seed	1	3	3	3	3	3	3	3	3
Walnut	Seed	2	3	3	3	3	1	3	2	1
Wheat	Forage	2	1	3	3	3	3	3	3	3
	Seed	1	3	1	3	3	3	3	1	2

[1] Among the *fruit eaters* are bluebirds, catbirds, mockingbirds, and waxwings; *seed eaters*, blackbirds, cardinals, meadowlarks, sparrows, and towhees; *nut eaters*, chickadees, grackles, bluejays, titmice, and woodpeckers.

WILDLIFE SUITABILITY GROUP 1

This group consists of gray and brown loamy soils that have an acid claypan. They are moderately well drained to poorly drained soils that developed in thin loess under prairie grasses. They are in the loess plain area. The soils in this group are:

Crowley silt loam, 0 to 1 percent slopes.
Crowley silt loam, 1 to 3 percent slopes.
Stuttgart silt loam, 1 to 3 percent slopes.

These soils occupy about 2 percent of the county. Suitable crops are rice, soybeans, sorghum, small grain, cotton, and corn. Red clover, white clover, crimson clover, vetch, Austrian winter peas, and lespedeza are well suited legumes. Bahiagrass, bermudagrass, ryegrass, and tall fescue are adapted grasses. The soils in this group are well suited for growing choice food plants for such wildlife species as rabbits, doves, bobwhites, and ducks. Their ability to hold water makes these soils suitable for impoundments for fish and for ducks.

WILDLIFE SUITABILITY GROUP 2

This group consists of moderately well drained to poorly drained, gray and brown loamy soils that developed in thick loess under mixed hardwood trees. They are in the loess plain area. The soils in this group are:

Calloway silt loam, 0 to 1 percent slopes.
Calloway silt loam, 1 to 3 percent slopes.
Calhoun silt loam.
Henry silt loam.
Hillemann silt loam, 0 to 1 percent slopes.
Hillemann silt loam, 1 to 3 percent slopes.

These soils occupy about 27.4 percent of the county. Suitable crops are rice, soybeans, corn, cotton, grain sorghum, and small grain. Lespedeza, Austrian winter peas, vetch, and crimson clover are well suited legumes. Bahiagrass, bermudagrass, ryegrass, and tall fescue are adapted grasses. These soils are well suited for growing choice foods for such wildlife species as bobwhites, doves, rabbits, squirrels, deer, and ducks. Their ability to hold water

TABLE 5.—*Rating of plants for wildlife suitability groups*

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

Plants	Wildlife suitability groups						
	1	2	3	4	5	6	7
Bahiagrass	1	1	2	3	1	3	3
Blackberry and dewberry	1	1	1	2	1	3	3
Blackgum	3	2	2	3	1	1	1
Browntop millet	1	1	1	3	1	2	3
Cherry, black	3	1	1	3	2	2	3
Clover, crimson	1	1	2	3	1	2	3
Clover, white	1	1	2	3	1	1	3
Corn	1	1	1	3	1	1	2
Cowpeas	1	1	1	3	1	1	2
Croton	1	1	1	3	1	3	2
Dogwood, flowering	3	1	1	3	3	3	3
Grapes, wild	1	1	1	3	2	2	1
Greenbriers	1	1	1	3	1	1	1
Hickory	3	1	1	3	1	1	1
Lespedeza, annual	1	1	1	2	1	1	3
Lespedeza (bicolor, japonica)	2	2	1	3	2	3	3
Millet, Japanese	1	1	2	3	1	1	1
Oaks, upland [1]	3	2	1	3	2	3	3
Oaks, lowland [2]	3	1	2	3	1	1	1
Pecan, native	3	1	3	3	1	1	1
Pecan, improved	3	1	2	3	1	1	1
Pines	3	2	1	3	2	3	3
Ragweed, common	2	2	1	3	1	3	3
Rice	1	1	3	3	3	1	2
Small grain (oats, rye, barley)	1	1	1	3	1	2	1
Smartweed	1	2	3	3	1	1	1
Soybeans	1	1	2	3	1	1	1
Sweetgum	3	2	2	3	1	1	1
Tickclover	1	2	1	3	1	3	3
Walnut	3	2	1	3	3	3	3
Wheat	1	1	1	3	1	2	1

[1] Oaks, upland—black, blackjack, Northern red, post, Southern red, and white.

[2] Oaks, lowland—cherrybark, pin, swamp, chestnut, water, and willow.

makes them suitable as impoundments for fish and for ducks.

WILDLIFE SUITABILITY GROUP 3

This group consists of moderately well drained to well drained, brown loamy soils that developed in thick loess under mixed hardwood trees. They are in the loess plain area and on Crowley Ridge. The soils in this group are:

- Gullied land.
- Loring silt loam, 0 to 1 percent slopes.
- Loring silt loam, 1 to 3 percent slopes.
- Loring silt loam, 1 to 3 percent slopes, eroded.
- Loring silt loam, 3 to 8 percent slopes.
- Loring silt loam, 3 to 8 percent slopes, eroded.
- Loring silt loam, 3 to 8 percent slopes, severely eroded.
- Loring silt loam, 8 to 12 percent slopes.
- Loring silt loam, 8 to 12 percent slopes, eroded.
- Loring silt loam, 8 to 12 percent slopes, severely eroded.
- Loring and Memphis silt loams, 12 to 20 percent slopes.
- Loring and Memphis silt loams, 12 to 20 percent slopes, eroded.
- Loring and Memphis silt loams, 12 to 40 percent slopes, severely eroded.
- Loring and Memphis silt loams, 20 to 40 percent slopes.
- Loring and Memphis silt loams, 20 to 40 percent slopes, eroded.
- Memphis silt loam, 1 to 3 percent slopes.
- Memphis silt loam, 3 to 8 percent slopes, eroded.
- Memphis silt loam, 8 to 12 percent slopes, eroded.
- Rough broken land.

These soils occupy about 14.9 percent of the county. Because of the slopes and the erosion hazard, some of these soils are not suitable for cultivation. Suitable crops for cultivated soils are soybeans, corn, grain sorghum, and small grain. Lespedeza and clover are adapted legumes. Bermudagrass and ryegrass are adapted grasses. These soils are well suited for growing choice foods for such wildlife species as bobwhites, doves, rabbits, squirrels, and deer. The ability of the Loring and Memphis soils and Gullied land to hold water makes them suitable for farm fishponds. Rough broken land is not generally suited for farm ponds.

WILDLIFE SUITABILITY GROUP 4

The only soil in this group is Lafe silt loam, acid. It is a gray to grayish-brown soil that developed in thick loess. It is somewhat poorly drained and has a high content of sodium and magnesium below a depth of about 10 inches. Lafe silt loam, acid, is in the loess plain area and developed under scrub oak and three-awn grasses.

This soil occupies about 0.1 percent of the county. It is poorly suited for use as wildlife habitats.

WILDLIFE SUITABILITY GROUP 5

This group consists of gray and brown loamy soils in alluvium. They are somewhat poorly drained to somewhat excessively drained soils on natural levees on bottom lands. The soils in this group are:

- Beulah fine sandy loam, gently undulating.
- Beulah fine sandy loam, undulating.
- Bosket-Dubbs fine sandy loams, 0 to 1 percent slopes.
- Bosket-Dubbs fine sandy loams, gently undulating.
- Bosket-Dubbs fine sandy loams, undulating.
- Bruno loamy sand, undulating.
- Dubbs fine sandy loam, gently undulating.
- Dubbs fine sandy loam, undulating.
- Dundee fine sandy loam, 0 to 1 percent slopes.
- Dundee fine sandy loam, gently undulating.
- Dundee fine sandy loam, undulating.
- Dundee silt loam, 0 to 1 percent slopes.
- Dundee silt loam, gently undulating.
- Dundee silt loam, undulating.
- Iuka soils.

These soils occupy about 6.4 percent of the county. Suitable crops are cotton, soybeans, corn, small grain, and grain sorghum. Lespedezas, Austrian winter peas, and clover are well suited legumes. Bahiagrass, bermudagrass, ryegrass, and tall fescue are adapted grasses. These soils are well suited as a site for growing choice food for bobwhites, doves, and rabbits. They are poorly suited or not suited for farm ponds, fish ponds, or impoundments.

WILDLIFE SUITABILITY GROUP 6

This group consists of gray and brown clayey soils in alluvium. They are poorly drained and somewhat poorly drained soils in slack-water areas on bottom lands. The soils in this group are:

- Alligator and Sharkey clays, 0 to 1 percent slopes.
- Alligator and Sharkey clays, gently undulating.
- Alligator and Sharkey clays, undulating.
- Alligator and Sharkey silty clay loams, overwash.
- Bowdre silty clay, 0 to 1 percent slopes.
- Bowdre silty clay, gently undulating.
- Bowdre silty clay, undulating.
- Earle clay, 0 to 1 percent slopes.
- Earle clay, gently undulating.
- Earle clay, undulating.

These soils occupy about 36.4 percent of the county. Suitable crops are cotton, soybeans, corn, small grain, and grain sorghum. Red clover, white clover, vetch, and Austrian winter peas are suitable legumes. Bahiagrass, bermudagrass, ryegrass, and tall fescue are adapted grasses. These soils are well suited for growing choice food plants for such wildlife species as squirrels, deer, doves, and ducks. The ability of the Alligator and Sharkey soils to hold water makes them suitable as impoundments for fish and for ducks. The Bowdre and Earle soils are not generally suitable for impoundments.

WILDLIFE SUITABILITY GROUP 7

This group consists of gray and brown loamy soils. They are somewhat poorly drained to poorly drained and consist of alluvial material that washed from soils that developed entirely in loess. They are subject to flooding. The soils in this group are:

Arkabutla silt loam.
Collins silt loam.
Zachary silt loam.

These soils occupy about 11.7 percent of the county. Because of frequent flooding, Zachary soils are not suitable for cultivation. Suitable crops for the other soils in this group are cotton, corn, soybeans, and grain sorghum. White clover, vetch, and Austrian winter peas are suitable legumes. Bermudagrass and tall fescue are adapted grasses. These soils are well suited as sites for growing choice food plants for deer, squirrels, doves, and ducks. They are suitable as impoundments for fish and for ducks.

Engineering Uses of the Soils [5]

Soil engineering deals with soils as structural material and as foundation material upon which structures rest. Soils may have widely different engineering properties within the space covered by a single project. Generally, the soil must be used in the locality and in the condition in which it occurs. Important steps in soil engineering are to locate the various kinds of soils, determine their engineering properties, correlate their properties with the requirements of the job, and select the best available material for each job.

Engineers of the United States Bureau of Public Roads and the Soil Conservation Service collaborated with soil scientists of the Soil Conservation Service in preparing this section.

This section of the Soil Survey Report contains information about the soils of St. Francis County that is useful to engineers, particularly for highway construction and agricultural engineering. Additional information about the soils can be obtained from the detailed soil map at the back of the report and the sections "Descriptions of the Soils" and "Genesis, Classification, and Morphology of Soils."

The information in this section and in other parts of the report can be used by engineers to—

1. Make soil and land use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Assist in designing drainage and irrigation structures and in planning dams and other structures for soil and water conservation.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting highway, pipeline, and airport locations and in planning detailed soil surveys for the intended locations.
4. Locate sand and gravel for use in structures.
5. Correlate performance of engineering structures with types of soil and thus develop information that will be useful in designing and maintaining structures.
6. Determine the suitability of soil units for cross-country movements of vehicles and construction equipment.
7. Supplement information obtained from other published maps and reports and aerial photographs for the purpose of making soil maps and reports that can be used readily by engineers.

The engineering interpretations reported here can be useful for many purposes. It should be emphasized, however, that they may not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and where the excavations are deeper than the depth of the layer here reported. Even in these situations, the soil map is useful for planning more detailed field investigation and for suggesting the kinds of problems that may be expected.

At many construction sites, major soil variations occur within the depth of proposed excavations, and several different soils may occur within short distances. If the maps, descriptions, and other data in this report are used to plan detailed soil investigations at construction sites, a minimum number of soil samples will be needed for laboratory testing. After testing the soils and observing their behavior, in place, under various conditions, engineers should be able to anticipate to some extent the properties of the various types wherever they are mapped.

Some terms used by soil scientists may not be familiar to engineers. Many of these terms are defined in the Glossary at the back of this report.

Engineering classification systems

Most highway engineers classify soil materials in accordance with the system approved by the American Association of State Highway Officials (AASHO) (*1*). In this system soil materials are classified in seven principal groups. The groups range from A–1, consisting of gravelly soils of high bearing capacity, to A–7, consisting of clay soils having low strength when wet. Within each group, the relative engineering value of the soil material may be indicated by a group index number. Group indexes range from 0 for the best materials to 20 for the poorest. The group index number is shown in parentheses, following the soil group symbol, for example A–4(8).

Some engineers prefer to use the Unified Soil Classification System (*9*). In this system soil materials are identified as coarse grained (8 classes), fine grained (6 classes), or highly organic.

In the system used by the U.S. Department of Agriculture, the texture of the soil horizon (layer) depends on the proportional amount of the different sized mineral particles. The soil materials are classified as cobblestones, gravel, sand, silt, and clay. Rarely does a soil consist of only one particle size, but a particle size may dominate so that a soil exhibits the characteristics of material com-

[5] JAMES F. BURROW, agricultural engineer, Soil Conservation Service, assisted in the preparation of this section.

posed of only that particle size. For example, a soil consisting of 40 percent clay is called *clay*. Characteristically, it feels slick, sticky, and plastic when wet.

Soil test data, engineering properties of the soils, and interpretations

To be able to make the best use of the soil maps and the soil survey report, the engineer should know the properties of the soil materials and the condition of the soil in place. Tables 6, 7, and 8 in this section contain a summary of soil properties significant to engineering and some engineering interpretations.

Soil test data.—Samples of the principal soil types in four extensive soil series were tested according to standard procedures to help evaluate the soils for engineering purposes. The results of those tests are given in table 6.

Each soil type was sampled to a depth of about 5 feet at one or more sites. A total of 11 sites were sampled. The test data show some variations in the characteristics of these soils but probably do not show the entire range of variations in the lower horizons. The data, therefore, may not be adequate for estimating the characteristics of soil material in cuts on rolling topography.

The engineering soil classifications in table 6 are based on data obtained by mechanical analysis and by tests made to determine liquid limits and plastic limits. Mechanical analyses were made by combined sieve and hydrometer methods.

The liquid limit and plastic limit tests measure the effect of water on the consistence of the soil material. As the moisture content of clayey soil increases from a very dry state, the material changes from a solid to a semisolid, or plastic, state (*2*). As the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from a solid state to a plastic state. The liquid limit is the moisture content at which the material passes from a plastic state to a liquid state. The plasticity index is the numerical difference between the liquid and the plastic limit. It indicates the range of moisture content within which a soil material is plastic.

If a soil material is compacted at successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material will increase 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; for, 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.

Engineering properties of the soils.—In table 7 the soils of the county are listed and briefly described and estimates of their physical and chemical properties that affect engineering works are given. The estimated properties are based on the typical profile of each soil. If test data are available, the data in table 7 are for the modal, or typical, profiles. If test data are not available, the estimates are based on test data obtained from similar soils in this county or nearby counties and on past experience in engineering construction. The soil profile is divided into layers significant to engineering uses, and the thickness and depth of each layer are given. A more complete description of soil profiles is given in the section "Genesis, Classification, and Morphology of Soils."

The permeability, as shown in table 7, is the rate that water moves through soil material that has not been disturbed. It depends largely upon the soil texture and structure.

The available water capacity, in inches per inch of soil depth, is approximately the amount of capillary water in the soil when it is wet to field capacity. This amount of water will wet air-dry soil material to a depth of 1 inch without deeper percolation.

In table 7 reaction is shown in pH values, which indicate the estimated acidity or alkalinity of the soil. A pH value of less than 7.0 indicates acidity, and one of more than 7.0 indicates alkalinity.

Dispersion is an estimate of the degree and rapidity with which a soil crumbles into individual particles and thereby loses stability.

Shrink-swell potential of soil material refers to the change in volume that results from a change in moisture content. It is estimated primarily on the amount and type of clay in the soil.

Interpretations.—The features that are most likely to affect the use of the soils for engineering practices are given in table 8. The data in this table are based on actual test data given in table 6, estimates in table 7, and actual field experience. These data are useful in determining the suitability of the various soils for use in highway construction and conservation work. The data should be used to supplement the information obtained during field investigations.

Some of the soil features that affect highway construction are discussed in the following paragraphs.

Some of the problems of designing, constructing, and maintaining highways are caused by the properties of the soils or by drainage. The bedrock in this county is no great problem, because it is at great depth. Because of its depth, however, it cannot be used as footing for foundations.

The Alligator soils and the upper layers of the Bowdre and Earle soils shrink when dry and swell when wet. These soils are not suitable for subgrade, because the contraction and expansion cause pavements to warp and crack. Cracking and warping can be minimized by using as a foundation course beneath the pavement a thick layer of soil material that shrinks and swells very little. The foundation course should extend through the shoulder of the road.

The general suitability of the various soils as sources of topsoil is shown in table 8. Sandy loams and loamy sands are the best topping material for the shoulders of roads and will support a limited amount of traffic.

Many of the soils have either a high water table or ponded water on the surface for long periods each year (see table 7). Roads on these soils should be constructed on fill sections and should be provided with adequate underdrains and surface drains. In lowlands and other areas that are flooded, roads are best constructed on a continuous embankment that is several feet above the level of frequent floods. Swampy soils provide a poor foundation for roads; hence, swampy soil material should be removed from roadway sections and replaced by more stable material.

TABLE 6.—*Engineering test data* [1] *for soil*

[Dashed lines indicate that

Soil type and location of samples	Parent material	Bureau of Public Roads report No.	Depth	Horizon	Mechanical analysis [2]			
					Percentage passing sieve—			
					No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)
			Inches					
Alligator clay:								
½ mile east of Whitmore, NW¼SW¼SE¼ sec. 3, T. 5 N., R. 5 E.	Slack-water sediments.	62–11–1	0–4	Ap1	--------	100	96	86
		62–11–2	8–20	C1g	--------	100	99	90
Calloway silt loam:								
½ mile west of Forrest City High School, NW¼NE¼NW¼ sec. 29, T. 5 N., R. 3 E.	Loess.	62–2–1	0–7	Ap1	--------	--------	--------	99
		62–2–2	20–36	B22xt	--------	100	99	98
		62–2–3	36–48	B23xt	--------	--------	100	99
2½ miles south of Pinetree, SW¼NW¼ SW¼ sec. 32, T. 6 N., R. 2 E.	Loess.	62–10–1	0–8	Ap1	100	99	96	93
		62–10–2	14–30	B22xt	100	99	96	94
		62–10–3	30–48	B23xt	100	99	97	95
5 miles south of Pinetree, SE¼NE¼SE¼ sec. 12, T. 5 N., R. 1 E.	Loess.	62–8–1	0–4	Ap1	100	99	98	96
		62–8–2	20–29	B22xt	99	98	94	91
		62–8–3	29–48	B23xt	100	99	97	95
Henry silt loam:								
2½ miles west of Jumpers Corner, NW¼NE¼NE¼ sec. 10, T. 4 N., R. 1 E.	Loess.	62–9–1	0–5	Ap	100	98	97	96
		62–9–2	13–30	B21tg	100	99	98	97
		62–9–3	30–72	B22xtg	100	99	96	94
Loring silt loam:								
1½ miles southwest of Forrest City, NE¼NE¼NE¼ sec. 19, T. 4 N., R. 3 E.	Loess.	62–1–1	0–6	Ap1	--------	--------	--------	99
		62–1–2	16–26	B22t	--------	--------	--------	99
		62–1–3	35–53	B23xt	--------	100	99	97
		62–1–4	53–80	C	--------	--------	100	98
2½ miles north of Wheatley-Possey Cemetery, NW¼NW¼NW¼ sec. 21, T. 4 N., R. 1 W.	Loess.	62–6–1	0–4	Ap1	--------	100	98	96
		62–6–2	8–20	B22t	--------	100	98	92
		62–6–3	28–50	B23xt	--------	100	98	85
		62–6–4	50–72	C	--------	100	99	81
2½ miles northwest of Wheatley and ¾ mile west of cemetery, SW¼SW¼SW¼ sec. 17, T. 4 N., R. 1 W.	Loess.	62–7–1	0–4	Ap1	--------	100	99	97
		62–7–2	12–20	B21t	--------	100	99	96
		62–7–3	20–32	B22xt	--------	100	96	90
		62–7–4	32–72	B23xt	--------	100	97	92
1½ miles southeast of Forrest City, SW¼NE¼SW¼ sec. 3, T. 4 N., R. 3 E.	Loess.	62–3–1	4–9	B1	--------	--------	--------	99
		62–3–2	16–28	B22t	--------	--------	100	99
		62–3–3	28–36	B23xt	--------	--------	100	99
		62–3–4	36–72	C	--------	--------	100	99
1 mile north of Forrest City, SW¼NE¼NW¼ sec. 22, T. 5 W., R. 3 E.	Loess.	62–4–1	10–19	B1	--------	--------	--------	99
		62–4–2	19–30	B22t	--------	100	99	98
		62–4–3	30–46	B23xt	--------	100	99	98
		62–4–4	46–72	C	--------	--------	--------	99
3 miles southeast of Colt, NE¼NW¼SW¼ sec. 27, T. 6 N., R. 3 E.	Loess.	62–5–1	9–14	B1	--------	--------	--------	99
		62–5–2	14–26	B22t	--------	100	99	99
		62–5–3	26–35	B23xt	--------	100	98	96
		62–5–4	35–72	C	--------	--------	--------	99

[1] Tests performed by the Arkansas State Highway Department in cooperation with U.S. Department of Commerce, Bureau of Public Roads, in accordance with standard procedures of the American Association of State Highway Officials (AASHO) (*1*).

[2] Mechanical analysis according to the 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, 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 use in naming textural classes for soils.

samples taken from eleven soil profiles

data are not available]

Mechanical analysis [2]—Continued							Liquid limit	Plasticity index	Moisture density [3]		Classification	
Particle-size distribution (percent) [4]												
Very coarse sand (2.0–1.0 mm.)	Coarse sand (1.0–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.10 mm.)	Very fine sand (0.10–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (less than 0.002 mm.)			Maximum dry density	Optimum moisture	AASHO	Unified [5]
									Lb. per cu ft.	*Percent*		
0. 05	0. 28	0. 25	0. 58	0. 80	30. 8	67. 2	83	45	85	30	A-7-5(20)	MH-CH.
. 03	. 10	. 08	. 10	. 20	20. 2	79. 3	82	44	83	32	A-7-5(20)	MH-CH.
----	. 13	. 08	. 20	1. 09	91. 0	7. 5	[6] NP	[6] NP	100	18	A-4(8)	ML.
. 10	. 35	. 13	. 18	. 84	80. 8	17. 6	31	7	109	16	A-4(8)	ML-CL.
----	. 20	. 12	. 15	. 63	66. 0	32. 9	58	33	101	21	A-7-6(20)	CH.
----	----	----	----	----	----	----	30	6	103	18	A-4(8)	ML-CL.
----	----	----	----	----	----	----	35	14	107	19	A-6(10)	CL.
----	----	----	----	----	----	----	37	14	105	20	A-6(10)	ML-CL.
----	----	----	----	----	----	----	35	8	99	21	A-4(8)	ML.
----	----	----	----	----	----	----	44	19	103	21	A-7-6(12)	ML-CL.
----	----	----	----	----	----	----	43	16	101	22	A-7-6(11)	ML-CL.
1. 00	2. 35	1. 00	1. 43	1. 62	78. 8	13. 8	34	9	100	20	A-4(8)	ML-CL.
. 45	1. 15	. 45	. 40	. 55	64. 5	32. 5	42	16	103	21	A-7-6(11)	ML-CL.
. 18	1. 48	. 83	1. 60	1. 13	67. 0	27. 8	39	15	102	22	A-6(10)	ML-CL.
. 06	. 13	. 13	. 25	. 83	87. 3	11. 3	27	3	103	17	A-4(8)	ML.
----	----	. 05	. 15	. 60	70. 3	28. 9	42	13	101	22	A-7-6(10)	ML.
----	. 05	----	. 05	. 70	79. 2	20. 0	40	11	104	20	A-6(8)	ML.
----	----	. 03	. 15	. 92	82. 6	16. 3	37	10	105	19	A-4(8)	ML.
----	----	----	----	----	----	----	32	5	104	18	A-4(8)	ML.
----	----	----	----	----	----	----	39	11	103	21	A-6(8)	ML.
----	----	----	----	----	----	----	33	10	109	17	A-4(8)	ML-CL.
----	----	----	----	----	----	----	29	11	114	15	A-6(8)	CL.
----	----	----	----	----	----	----	34	7	102	19	A-4(8)	ML.
----	----	----	----	----	----	----	42	15	102	19	A-7-6(10)	ML-CL.
----	----	----	----	----	----	----	38	15	106	19	A-6(10)	ML-CL.
----	----	----	----	----	----	----	37	18	109	18	A-6(11)	CL.
----	. 13	. 10	. 15	. 92	73. 5	25. 2	33	10	107	17	A-4(8)	ML-CL.
----	. 05	. 10	. 12	. 73	72. 6	26. 4	41	13	104	20	A-7-6(9)	ML.
----	. 05	----	. 08	. 77	72. 7	26. 4	40	16	103	21	A-6(10)	ML-CL.
----	. 05	. 05	. 10	. 70	81. 4	17. 7	33	10	105	19	A-4(8)	ML-CL.
----	----	----	----	----	----	----	32	10	109	16	A-4(8)	ML-CL.
----	----	----	----	----	----	----	42	16	105	19	A-7-6(11)	ML-CL.
----	----	----	----	----	----	----	41	16	104	20	A-7-6(11)	ML-CL.
----	----	----	----	----	----	----	37	14	106	19	A-6(10)	ML-CL.
----	----	----	----	----	----	----	36	10	106	18	A-4(8)	ML-CL.
----	----	----	----	----	----	----	42	15	104	20	A-7-6(10)	ML-CL.
----	----	----	----	----	----	----	43	17	104	21	A-7-6(11)	ML-CL.
----	----	----	----	----	----	----	42	18	104	21	A-7-6(12)	ML-CL.

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

[4] Percentage of particle size was analyzed by the soils laboratory, University of Arkansas.

[5] SCS and BPR have agreed to consider that all soils having plasticity indexes within two points of the A-line are to be given a borderline classification. Examples of borderline classifications obtained by this use are MH–CH and ML–CL.

[6] NP=Nonplastic.

TABLE 7.—*Brief descriptions of the soils and*

[Dashed lines indicate that

Symbol on map	Soil name	Brief description	Depth to seasonal high water table [1]	Drainage	Depth from surface [2]
			Feet		*Inches*
AcA AcB AcC Ad	Alligator and Sharkey clays, 0 to 1 percent slopes. Alligator and Sharkey clays, gently undulating. Alligator and Sharkey clays, undulating. Alligator and Sharkey silty clay loams, overwash.	*Alligator part:* Dark-gray or dark grayish-brown clay or silty clay loam over gray mottled clay.	0–0. 5	Poor.	0–4 4–8 8–20 20–72
		Sharkey part: Dark-gray or dark grayish-brown clay or silty clay loam over mottled dark-gray or gray clay.	0–0. 5 0–0. 5 0–0. 5 0–0. 5	Poor.	0–9 9–35 35–48
Ak	Arkabutla silt loam.	Grayish-brown or dark grayish-brown silt loam over mottled brown, light brownish-gray and light-gray silt loam or silty clay loam.	2–4	Somewhat poor.	0–7 7–16 16–31 31–48
BaB BaC	Beulah fine sandy loam, gently undulating. Beulah fine sandy loam, undulating.	Dark-brown fine sandy loam over yellowish-brown fine sandy loam.	6+	Somewhat excessive.	0–10 10–30 30–48
BdA BdB BdC	Bosket-Dubbs fine sandy loams, 0 to 1 percent slopes. Bosket-Dubbs fine sandy loams, gently undulating. Bosket-Dobbs fine sandy loams, undulating.	*Bosket part:* Brown to dark-brown fine sandy loam over dark-brown or yellowish-brown sandy clay loam. *Dubbs part:* See Dubbs fine sandy loam.	5	Good to moderately good.	0–5 5–20 20–48
BeA BeB BeC	Bowdre silty clay, 0 to 1 percent slopes. Bowdre silty clay, gently undulating. Bowdre silty clay, undulating.	Dark-brown or very dark brown silty clay over fine sandy loam, sandy clay loam, silt loam or stratified beds of silty and sandy material.	0. 5–6	Somewhat poor.	0–7 7–13 13–18 18–48
Br	Bruno loamy sand, undulating.	Dark grayish-brown to light brownish-gray loamy sand over brown or light yellowish brown loamy sand or sand.	6+	Excessive.	0–8 8–34 34–48
Ca	Calhoun silt loam.	Mottled yellowish-brown silt loam over light brownish-gray, dark grayish-brown, and grayish-brown silt loam and silty clay loam.	0	Poor.	0–3 3–8 8–21 21–42 42–56
ClA ClB	Calloway silt loam, 0 to 1 percent slopes. Calloway silt loam, 1 to 3 percent slopes.	Very dark grayish-brown to brown silt loam over dark-brown and grayish-brown mottled silt loam. Silty clay loam fragipan at depth of 17 to 23 inches.	2	Somewhat poor.	0–7 7–13 13–20 20–36 36–48
Co	Collins silt loam.	Dark-brown to dark grayish-brown silt loam over brown and light grayish-brown silt loam.	2–4	Moderately good.	0–7 7–26 26–48
CwA CwB	Crowley silt loam, 0 to 1 percent slopes. Crowley silt loam, 1 to 3 percent slopes.	Dark grayish-brown or very dark grayish-brown silt loam over red mottled silty clay.	2	Poor.	0–6 6–9 9–17 17–27 27–33 33–46
DbB DbC	Dubbs fine sandy loam, gently undulating. Dubbs fine sandy loam, undulating.	Brown to dark grayish-brown fine sandy loam over yellowish-brown mottled sandy clay loam.	4	Moderately good.	0–6 6–18 18–22 22–48

their estimated physical and chemical properties

data are not available]

Classification			Percentage passing sieve—		Permeability[3]	Available water capacity[4]	Reaction[4]	Dispersion	Shrink-swell potential
USDA texture	Unified	AASHO	No. 10	No. 200[4]					
					Inches per hour	*Inches per inch of soil*	*pH value*		
Clay	MH–CH	A–7	100	95	<0.2	0.19	6.0	Low	Very high.
or silty clay loam	CL	A–6	100	90	0.2–0.63	0.21	6.0	Moderate	Very high.
Clay	MH–CH	A–7	100	95	<0.2	0.19	6.0	Low	Very high.
Clay	MH–CH	A–7	100	95	<0.2	0.19	5.5	Low	Very high.
Clay	MH–CH	A–7	100	95	<0.2	0.19	5.5	Low	Very high.
Clay	MH–CH	A–7	100	95	<0.2	0.19	6.4	Low	Very high.
or silty clay loam	CL	A–6	100	90	0.2–0.63	0.21	6.4	Moderate	Very high.
Clay	MH–CH	A–7	100	95	<0.2	0.19	6.4	Low	Very high.
Clay	MH–CH	A–7	100	95	<0.2	0.19	7.6	Low	Very high.
Silt loam	ML–CL	A–4	100	95	0.2–0.63	0.22	6.0	High	Low.
Silt loam	ML–CL	A–4	100	95	0.2–0.63	0.22	6.0	High	Low.
Silt loam	ML–CL	A–4	100	95	0.2–0.63	0.22	5.5	High	Low.
Silt loam	ML–CL	A–4	100	95	0.2–0.63	0.22	5.5	High	Low.
Fine sandy loam	ML–CL	A–4	100	30	2.0–6.3	0.14	6.0	High	Low.
Fine sandy loam	ML–CL	A–4	100	30	2.0–6.3	0.14	6.0	High	Low.
Sandy loam	CL	A–6	100	20	2.0–6.3	0.13	6.0	High	Low.
Fine sandy loam[5]	ML–CL	A–4	100	30	0.63–2.0	0.14	6.5	High	Low.
Sandy clay loam	SC	A–6	100	40	0.2–0.63	0.17	6.0	Moderate	Moderate.
Sandy loam	SM	A–2	100	20	2.0–6.3	0.13	6.0	High	Low.
Silty clay	ML–CL	A–6	100	90	<0.2	0.19	6.5	Low	Very high.
Silty clay	ML–CL	A–6	100	90	0.2–0.63	0.17	6.5	Low	Very high.
Sandy clay loam	SC	A–6	100	40	0.2–0.63	0.17	6.0	Moderate	Moderate.
Sandy loam	SM	A–2	100	20	0.63–6.3	0.13	6.0	High	Low.
Loamy sand	SM	A–2	100	5	>6.3	0.08	6.5	High	Low.
Loamy sand	SM	A–2	100	5	>6.3	0.08	6.5	High	Low.
Loamy sand	SM	A–2	100	5	>6.3	0.08	6.5	High	Low.
Silt loam	ML–CL	A–4	100	95	0.2–0.63	0.22	5.5	High	Low.
Silt loam	ML–CL	A–4	100	95	0.2–0.63	0.22	5.0	High	Low.
Silty clay loam	CL	A–6	100	90	0.2–0.63	0.17	5.0	Moderate	Moderate.
Silty clay loam	CL	A–6	100	90	0.2–0.63	0.17	5.5	Moderate	Moderate.
Silt loam	ML–CL	A–4	100	95	0.2–0.63	0.17	6.0	High	Low.
Silt loam	ML–CL	A–4	100	95	0.2–0.63	0.14	6.0	High	Low.
Silt loam	ML–CL	A–4	100	95	0.2–0.63	0.14	6.5	High	Low.
Silt loam	ML–CL	A–4	100	95	0.2–0.63	0.14	6.5	High	Low.
Silty clay loam	ML–CL	A–4	100	90	0.2–0.63	0.17	6.5	Moderate	Moderate.
Silty clay loam	CH	A–7	100	90	0.2–0.63	0.17	6.5	Moderate	Moderate.
Silt loam	ML–CL	A–4	100	95	0.2–0.63	0.22	6.0	High	Low.
Silt loam	ML–CL	A–4	100	95	0.2–0.63	0.22	5.5	High	Low.
Silt loam	ML–CL	A–4	100	95	0.2–0.63	0.22	5.5	High	Low.
Silt loam	ML–CL	A–4	100	95	0.2–0.63	0.22	7.0	High	Low.
Silt loam	ML–CL	A–4	100	95	0.2–0.63	0.22	6.0	High	Low.
Silt loam	ML–CL	A–4	100	95	0.2–0.63	0.22	6.5	High	Low.
Silty clay	CH	A–7	100	90	<0.2	0.22	5.0	Low	Very high.
Silty clay	CH	A–7	100	90	<0.2	0.19	5.5	Low	Very high.
Silty clay	CH	A–7	100	90	<0.2	0.19	6.0	Low	Very high.
Fine sandy loam	ML–CL	A–4	100	30	0.63–2.0	0.14	6.5	High	Low.
Sandy clay loam	SC	A–6	100	40	0.2–0.63	0.17	5.5	Moderate	Moderate.
Sandy clay loam	SC	A–6	100	40	0.2–0.63	0.17	5.5	Moderate	Moderate.
Fine sandy loam	ML–CL	A–4	100	30	0.63–2.0	0.14	6.0	High	Low.

TABLE 7.—*Brief descriptions of the soils and their*

Symbol on map	Soil name	Brief description	Depth to seasonal high water table [1]	Drainage	Depth from surface [2]
			Feet		*Inches*
DdA DdB DdC DuA DuB DuC	Dundee fine sandy loam, 0 to 1 percent slopes. Dundee fine sandy loam, gently undulating. Dundee fine sandy loam, undulating. Dundee silt loam, 0 to 1 percent slopes. Dundee silt loam, gently undulating. Dundee silt loam, undulating.	Dark-brown or brown fine sandy loam or silt loam over light brownish-gray to dark grayish-brown silty clay loam.	2–4	Somewhat poor.	0–5 5–17 17–27 27–36 36–48
EcA EcB EcC	Earle clay, 0 to 1 percent slopes. Earle clay, gently undulating. Earle clay, undulating.	Grayish-brown to very dark grayish-brown clay, over gray and dark-gray mottled clay, over coarser textured sediments at depths of 20 to 36 inches.	2–4	Poor.	0–5 5–30 30–37 37–50
Gu	Gullied land.	Severely eroded land where gullies have cut deeply into the substrata.	10+	----------	----------
He	Henry silt loam.	Gray silt loam over gray mottled silt loam; a fragipan from 20 to 36 inches below the surface.	0	Poor.	0–2 2–6 6–14 14–18 18–28 28–51
HmA HmB	Hillemann silt loam, 0 to 1 percent slopes. Hillemann silt loam, 1 to 3 percent slopes.	Dark-gray silt loam over silty clay, silty clay loam, and silt loam. High sodium saturation at about 25 inches.	2	Somewhat poor.	0–4 4–9 9–16 16–23 23–27 27–43
Ik	Iuka soils.	Brown silt loam, fine sandy loam, or sandy loam over brown and grayish-brown silt loam and loamy sand.	2–4	Moderately good.	0–3 3–8 8–20 20–27 27–39 39–46
La	Lafe silt loam, acid.	Very dark grayish-brown or grayish-brown silt loam over mottled grayish-brown, brownish-gray, olive-brown, and yellowish-brown silty clay loam. High sodium saturation throughout profile.	1–3	Somewhat poor.	0–3 3–5 5–14 14–30 30–38 38–48
LgA LgB LgB2 LgC LgC2 LgC3 LgD LgD2 LgD3	Loring silt loam, 0 to 1 percent slopes. Loring silt loam, 1 to 3 percent slopes. Loring silt loam, 1 to 3 percent slopes, eroded. Loring silt loam, 3 to 8 percent slopes. Loring silt loam, 3 to 8 percent slopes, eroded. Loring silt loam, 3 to 8 percent slopes, severely eroded. Loring silt loam, 8 to 12 percent slopes. Loring silt loam, 8 to 12 percent slopes, eroded. Loring silt loam, 8 to 12 percent slopes, severely eroded.	Brown, yellowish-brown, or dark-brown silt loam over dark-brown or yellowish-brown silt loam or silty clay loam; a thin, weakly expressed fragipan 22 to 33 inches below the surface.	10	Moderately good.	0–4 4–9 9–16 16–28 28–36 36–72
LmE LmE2 LmF	Loring and Memphis silt loams, 12 to 20 percent slopes. Loring and Memphis silt loams, 12 to 20 percent slopes, eroded. Loring and Memphis silt loams, 20 to 40 percent slopes.	Dark-brown or dark yellowish-brown silt loam over dark-brown or brown silty clay loam; the subsoil of Loring soils has a thin, weakly developed fragipan beginning 22 to 33 inches below the surface.	10+	Moderately good and good.	----------

estimated physical and chemical properties—Continued

Classification			Percentage passing sieve—		Permeability [3]	Available water capacity [4]	Reaction [4]	Dispersion	Shrink-swell potential
USDA texture	Unified	AASHO	No. 10	No. 200 [4]					
					Inches per hour	*Inches per inch of soil*	*pH value*		
Fine sandy loam	SM	A–4	100	30	0. 63–2. 0	0. 14	6. 0	High	Low.
or silt loam	ML–CL	A–4	100	95	0. 63–2. 0	0. 14	6. 0	High	Low.
Silty clay loam	CL	A–6	100	90	0. 2–0. 63	0. 21	5. 5	Moderate	Moderate.
Fine sandy loam	SM	A–4	100	30	0. 63–2. 0	0. 14	6. 0	High	Low.
Very fine sandy loam.	ML–CL	A–4	100	30	0. 63–2. 0	0. 22	6. 0	High	Low.
Loamy fine sand	SM	A–2	100	8	>6. 3	0. 08	6. 0	High	Low.
Clay	CH	A–7	100	95	<0. 2	0. 19	6. 0	Low	Very High
Clay	CH	A–7	100	95	<0. 2	0. 19	5. 0	Low	Very High.
Sandy clay loam	ML–CL	A–4	100	40	0. 2–0. 63	0. 17	5. 5	Moderate	Moderate.
Fine sandy loam	SM	A–2	100	30	0. 63–2. 0	0. 14	6. 0	High	Low.
Silt loam to silty clay loam.	ML–CL	A–4	100	95	0. 2–0. 63			High to moderate.	Low.
Silt loam to silty clay loam.	ML–CL	A–6	100	90	0. 2–0. 63			High to moderate.	Moderate.
Silt loam	ML–CL	A-4	100	95	0. 2–0. 63	0. 22	5. 5	High	Low.
Silt loam	ML–CL	A–4	100	95	0. 2–0. 63	0. 22	5. 0	High	Low.
Silt loam	ML–CL	A–4	100	95	0. 2–0. 62	0. 22	5. 0	High	Low.
Silt loam	ML–CL	A–4	100	95	0. 2–0. 63	0. 22	5. 0	High	Low.
Silty clay loam	CL	A–6	100	95	0. 2–0. 63	0. 17	5. 0	Moderate	Moderate.
Silt loam	ML–CL	A–4	100	95	0. 2–0. 63	0. 22	5. 5	High	Low.
Silt loam	ML–CL	A–4	100	95	0. 2–0. 63	0. 22	7. 5	High	Low.
Silt loam	ML–CL	A–4	100	95	0. 2–0. 63	0. 22	6. 5	High	Low.
Silt loam	ML–CL	A–4	100	95	0. 2–0. 63	0. 22	5. 0	High	Low.
Silty clay	ML–CL	A–6	100	90	<0. 2	0. 19	4. 5	Low	Very high.
Silty clay loam	ML–CL	A–6	100	90	0. 2–0. 63	0. 21	5. 5	Moderate	Moderate.
Silt loam	ML-CL	A–4	100	95	0. 2–0. 63	0. 22	6. 0	High	Low.
Fine sandy loam	SM	A–2	100	30	0. 63–2. 0	0. 14	7. 0	High	Low.
Loam	ML	A–4	100	50	0. 8–2. 5	0. 08	6. 5	High	Low.
Loam	ML	A–4	100	50	0. 8–2. 5	0. 08	6. 0	High	Low.
Loamy sand	SM	A–2	100	5	>6. 3	0. 08	6. 0	High	Low.
Silt loam	ML–CL	A–4	100	95	0. 2–0. 63	0. 22	6. 0	High	Low.
Loam	ML	A–4	100	50	0. 8–2. 5	0. 08	6. 0	High	Low.
Silt loam	ML–CL	A–4	100	95	0. 2–0. 63	0. 22	5. 5	High	Low.
Silt loam	ML–CL	A–4	100	98	0. 2–0. 63	0. 22	5. 5	High	Low.
Silty clay loam	ML–CL	A–6	100	90	0. 2–0. 63	0 21	5. 5	Moderate	Moderate.
Silty clay loam	ML–CL	A–6	100	90	<0. 2	0. 19	5. 0	Moderate	Moderate.
Silt loam	ML–CL	A–4	100	90	0. 2–0. 63	0. 21	8. 0	High	Low.
Silt loam	ML–CL	A–4	100	95	0. 2–0. 63	0. 21	8. 5	High	Low.
Silt loam	ML–CL	A–4	100	95	0. 2–0. 63	0. 22	6. 5	High	Low.
Silt loam	ML–CL	A–4	100	95	0. 2–0. 63	0. 22	5. 0	High	Low.
Silty clay loam	ML–CL	A–6	100	90	0. 2–0. 63	0. 21	5. 0	Moderate	Moderate.
Silty clay loam	ML	A–7	100	90	0. 2–0. 63	0. 21	5. 0	Moderate	Moderate.
Silty clay loam	ML–CL	A–6	100	90	0. 63–2. 0	0. 21	5. 0	Moderate	Moderate.
Silt loam	ML–CL	A–4	100	95	0. 2–0. 63	0. 22	5. 5	High	Low.

TABLE 7.—*Brief descriptions of the soils and their*

Symbol on map	Soil name	Brief description	Depth to seasonal high water table [1]	Drainage	Depth from surface [2]
			Feet		*Inches*
LmF2 LmF3	Loring and Memphis silt loams, 20 to 40 percent slopes, eroded. Loring and Memphis silt loams, 12 to 40 percent slopes, severely eroded.	For data on Loring soils in this undifferentiated group refer to Loring silt loams in this table, and for data on Memphis soils refer to Memphis silt loam.			
MeB MeC2 MeD2	Memphis silt loam, 1 to 3 percent slopes. Memphis silt loam, 3 to 8 percent slopes, eroded. Memphis silt loam, 8 to 12 percent slopes, eroded.	Brown to dark grayish-brown silt loam over brown to dark yellowish-brown silty clay loam.	10+	Good	0–4 4–12 12–26 26–40 40–56
Rb	Rough broken land	This land type consists of sandy and silty soil material on steep, irregular, strongly dissected slopes; it is a mixture of loess and sandy and clayey coastal plain material. (Because this soil material varies, its properties are not estimated.)	----------	Good	20–60
StB	Stuttgart silt loam, 1 to 3 percent slopes.	Dark-brown or dark grayish-brown silt loam over silty clay; the lower part is a claypan.	2	Somewhat poor.	0–5 5–11 11–19 19–35 35–48
Za	Zachary silt loam.	Gray to dark grayish-brown silt loam over gray silt loam and silty clay.	0	Poor.	0–4 4–14 14–23 23–31 31–48

[1] In winter the water table can be expected to rise almost to the surface.
[2] Depths are those shown in the typical soil profile of each series described in the section "Genesis, Classification, and Morphology of Soils;" dashed lines indicate depths are too variable to be meaningful.

estimated physical and chemical properties—Continued

Classification			Percentage passing sieve—		Permeability[3]	Available water capacity[4]	Reaction[4]	Dispersion	Shrink-swell potential
USDA texture	Unified	AASHO	No. 10	No. 200[4]					
					Inches per hour	*Inches per inch of soil*	*pH value*		
Silt loam	ML-CL	A-4	100	95	0. 2-0. 63	0. 22	6. 0	High	Low.
Silty clay loam	ML-CL	A-6	100	90	0. 2-0. 63	0. 21	5. 0	Moderate	Moderate.
Silty clay loam	ML-CL	A-6	100	90	0. 2-0. 63	0. 21	5. 0	Moderate	Moderate.
Silt loam	ML-CL	A-4	100	90	0. 2-0. 63	0. 22	5. 0	High	Low.
Silt loam	ML-CL	A-4	100	95	0. 2-0. 63	0. 22	6. 0	High	Low.
Silt loam	ML-CL	A-4	100	95	0. 2-0. 63	0. 22	6. 5	High	Low.
Silt loam	ML-CL	A-4	100	95	0. 2-0. 63	0. 22	6. 5	High	Low.
Silt loam	ML-CL	A-4	100	95	0. 2-0. 63	0. 22	6. 5	High	Low.
Silty clay	CH	A-7	100	90	0. 2-0. 63	0. 21	5. 5	Low	Very high.
Silty clay	CH	A-7	100	90	<0. 2	0. 19	6. 0	Low	Very high.
Silt loam	ML-CL	A-4	100	95	0. 2-0. 63	0. 22	6. 5	High	Low.
Silt loam	ML-CL	A-4	100	95	0. 2-0. 63	0. 22	6. 0	High	Low.
Silt loam	ML-CL	A-4	100	95	0. 2-0. 63	0. 22	5. 5	High	Low.
Silt loam	ML-CL	A-4	100	95	0. 2-0. 63	0. 21	5. 5	High	Low.
Silty clay	CH	A-7	100	90	<0. 2	0. 21	5. 5	Low	Very high.

[3] Permeability is based on soil structure without compaction.
[4] The values shown are midpoint in a range.
[5] Textural class represents a typical profile of Bosket soils.

TABLE 8 —*Interpretations*

[Gullied land, Iuka soils, and Rough broken land are not

Soil series and map symbols	Suitability for road subgrade and road fill	Suitability as source of—		Adaptability to winter grading [1]	Farm ponds and reservoirs	
		Topsoil	Sand and gravel		Kind	Hazard
Alligator (AcA, AcB, AcC, Ad)	Poor	Poor	None	Very poor; poorly drained; high clay content; seasonal high water table.	Excavated	None
Arkabutla (Ak)	Poor	Fair	None	Poor; somewhat poorly drained; seasonal high water table.	Excavated	Sand and gravel below 5 feet in places.
Beulah (BaB, BaC)	Good	Good	Good (sand).	Good; occurs on well-drained ridges of natural levees.	None	High seepage rate; coarse sand below 4 feet.
Bosket [2] (BdA, BdB, BdC)	Good	Good	Fair (sand)	Good; occurs on well-drained ridges of natural levees.	None	High seepage rate; medium sandy material below 4 feet.
Bowdre (BeA, BeB, BeC)	Poor to fair	Poor	Poor (sand)	Poor to fair	None	High seepage rate; thin clay layer; sandy material below 2 feet.
Bruno (Br)	Fair; poorly graded.	Poor	Good (sand).	Good; on well-drained ridges of natural levees.	None	High seepage rate; medium and coarse sandy material.
Calhoun (Ca)	Poor	Fair	None	Poor; poorly drained; seasonal high water table.	Excavated	None
Calloway (C1A, C1B)	Fair	Fair	None	Poor; somewhat poorly drained; seasonal high water table.	Excavated	None
Collins (Co)	Fair	Fair	None	Fair; moderately well drained; occasional flooding.	Excavated	High seepage rate; sand and gravel below 5 feet in places.
Crowley (CwA, CwB)	Poor	Fair	None	Poor; poorly drained	Excavated	None
Dubbs (BdA [3], BdB [3], BdC [3], DbB, DbC).	Good	Good	Poor (sand)	Fair; well drained; seasonal high water table.	None	High seepage rate; medium to coarse sandy material below 4 feet.
Dundee (DdA, DdB, DdC, DuA, DuB, DuC).	Fair	Fair	Poor (sand)	Fair; somewhat poorly drained to moderately well drained; seasonal high water table.	None	High seepage rate; sandy material below 4 feet.
Earle (EcA, EcB, EcC)	Poor	Poor	Poor (sand)	Very poor; somewhat poorly drained; high clay content; seasonal high water table.	None	High seepage rate; sandy material below 3 feet.

of soils for engineering uses

listed in this table, because their soil material varies]

Irrigation dikes and levees	Land leveling	Artificial drainage	Irrigation	Terraces, diversions, and waterways
Poorly suited; shrinks and swells; high percentage of clay.	Suitable; no limiting soil features.	Needed; high content of clay; high water table.	Moderate intake rate when dry and cracked; very slow when wet; high percentage of clay.	Not needed, because of topography; level to undulating.
Well suited; no limiting soil features.	Suitable; no limiting soil features	Surface drainage needed; slow internal drainage; seasonal high water table.	Moderate intake rate; moderate available water-holding capacity.	Not needed, because of topography; level.
Poorly suited; high seepage rate; sandy material throughout profile.	Suitable; no limiting soil features.	Not needed; good natural drainage; sandy material throughout profile.	Good intake rate; low available water-holding capacity.	Not needed, because of topography gently undulating and undulating.
Fairly well suited; moderate seepage rate; medium sandy material below 4 feet.	Suitable; no limiting soil features.	Not needed; good natural drainage; medium sandy material.	Fair intake rate; moderate available water-holding capacity.	Not needed, because of topography; level to undulating.
Fairly well suited if ditches and levees are well constructed; sandy material below 2 feet.	Suitable; medium cuts; underlain by sand below 2 feet.	Needed; ditchbanks slough when cut into underlying sand; sandy material below 2 feet.	Slow intake rate; high available water-holding capacity.	Not needed, because of topography; level to undulating.
Poorly suited; sandy material throughout profile.	Not suitable; coarse sandy texture below 18 inches.	Not needed; good natural drainage; sandy throughout profile.	Not suitable	Not needed, because of topography; undulating.
Well suited; no limiting soil features.	Suitable; no limiting soil features.	Needed; slow runoff; poor internal drainage; high water table.	Slow intake rate; moderate available water-holding capacity.	Not needed, because of topography; level.
Well suited if dikes and levees are well constructed; no limiting features.	Suitable; no limiting soil features.	Needed; fragipan restricts internal drainage; seasonal high water table.	Fair intake rate; moderate available water-holding capacity.	Terraces not needed, because of topography; diversions and waterways needed in places to protect from headwater; fragipan about 20 inches below surface.
Well suited; no limiting soil features.	Suitable; no limiting soil features.	Not generally needed; slow internal drainage; seasonal high water table.	Fair intake rate; moderate available water-holding capacity.	Not needed, because of topography; level.
Well suited; no limiting soil features.	Suitable; cuts less than 2 feet; clayey material below 2 feet.	Needed; seasonal high water table; clayey material below 2 feet.	Slow intake rate; moderate available water-holding capacity.	Not needed, because of topography; level to nearly level.
Well suited; no limiting soil features.	Suitable; no limiting soil features.	Not needed; good natural drainage; medium to coarse sandy material from 4 feet.	Moderate intake rate; moderate available water-holding capacity.	Not needed, because of topography; gently undulating to undulating.
Well suited; no limiting soil features.	Suitable; no limiting soil features.	Surface drainage needed; slow internal drainage; seasonal high water table.	Moderate intake rate; moderate available water-holding capacity.	Not needed, because of topography; level to undulating.
Poorly suited; shrinks and swells; high percentage of clay in upper 3 feet.	Suitable; no limiting soil features.	Needed; clayey surface about 30 inches thick; ditchbanks slough if cut into underlying medium to coarse material.	Moderate intake rate when dry and cracked, very slow when wet; high percentage of clay in upper 3 feet.	Not needed, because of topography; level to undulating.

TABLE 8.—*Interpretations of soils*

Soil series and map symbols	Suitability for road subgrade and road fill	Suitability as source of—		Adaptability to winter grading [1]	Farm ponds and reservoirs	
		Topsoil	Sand and gravel		Kind	Hazard
Henry (He)	Poor	Fair	None	Poor; poorly drained; seasonal high water table.	Excavated	None
Hillemann (HmA, HmB)	Poor	Fair	None	Poor; poorly drained	Excavated	None
Lafe (La)	Poor	Poor	None	Poor; poorly drained; dispersed.	Excavated	None
Loring (LgA, LgB, LgB2, LgC, LgC2, LgC3, LgD, LgD2, LgD3, LmE[4], LmE2[4], LmF[4], LmF2[4], LmF3[4]).	Fair	Fair	Gravel 5 feet or more below surface in places.	Good; moderately well drained to well drained.	Excavated and impounded.	Silty material with low stability.
Memphis (LmE[5], LmE2[5], LmF[5], LmF2[5], LmF3[5], MeB, MeC2, MeD2).	Fair	Fair	Gravel 5 feet or more below surface in places.	Good; well drained	Impounded	Silty material with low stability.
Sharkey [6]						
Stuttgart (StB)	Poor	Fair	None	Fair; somewhat poorly drained to moderately well drained.	Excavated	None
Zachary (Za)	Poor	Poor	None	Very poor; poorly drained; seasonal high water table; frequent overflow.	Excavated	None

[1] The adaptability of these soils in wet weather is the same as that for grading in winter.
[2] Bosket part of Bosket-Dubbs fine sandy loams.
[3] Dubbs part of Bosket-Dubbs fine sandy loams.

The natural levees and ridges are generally the best sites for roads because they have good surface drainage. Some of the soils on natural levees are composed of sandy material that is well suited to use for the foundations of pavements. Any of the medium-textured soils are suitable for farm and field roads. Good surface drainage is required for roadbeds and shoulders.

Nonfarm Uses of the Soils

The soil survey of St. Francis County was made primarily to learn how the soils can be used for agriculture. The information in the survey, however, is also useful in predicting the behavior of soils when they are used for residential developments, recreational areas, industrial plants, and trafficways.

The information in this subsection and elsewhere in the report is intended only as a guide in rural development, engineering, and other nonfarm uses. This is because most soil mapping units drawn on the soil map include more than one kind of soil. The mapping units that include 85 percent or more of one kind of soil are named for that soil. Thus, an area shown on the soil map as Memphis silt loam is 85 percent or more this kind of soil; up to 15 percent of the area may be other kinds of soils.

The small areas of contrasting soils included in a soil mapping unit may behave quite differently from the soil that gives the mapping unit its name. For example, an area of Loring silt loam, which has moderate limitations for homes on small lots where septic tanks are required for sewage disposal, may include an area of Calloway silt loam. This included soil has very severe limitations for septic tank disposal fields because, unlike Loring silt loam it has a strongly developed fragipan in the subsoil. The fragipan restricts percolation of water and septic-tank effluent. In wet seasons the effluent may be brought to the surface and become a hazard to community health. Because of the possibility of variations within the soil mapping unit, such as the example given, the soil maps should be supplemented by on-site inspection before deciding upon final specific locations of buildings or other construction.

for engineering uses—Continued

Irrigation dikes and levees	Land leveling	Artificial drainage	Irrigation	Terraces, diversions, and waterways
Well suited; no limiting soil features.	Suitable; no limiting soil features.	Needed; slow runoff; poor internal drainage; high water table.	Slow intake rate; moderate available water-holding capacity.	Not needed, because of topography; level.
Well suited; no limiting soil features.	Suitable; cuts less than 2 feet; clayey material below 18 inches.	Needed; seasonal high water table; clayey material below 18 inches.	Slow intake rate; moderate available water-holding capacity.	Not needed, because of topography; level to nearly level.
Poorly suited; very erosive.	Not suited; high in sodium below 15 inches.	Needed; high cost compared with benefits; high sodium content below 15 inches.	Very slow intake rate; high cost compared with benefits; high in sodium below 15 inches.	Not needed, because of topography; level to nearly level.
Well suited; no limiting soil features.	Suitable for limited cuts on low slopes.	Not needed; good natural drainage; slow permeability below about 30 inches.	Slow intake rate; high available water-holding capacity.	Needed on nearly level to gently sloping topography; soil erosive and structures difficult to maintain.
Well suited; no limiting soil features.	Suitable on low slopes.	Not needed; good natural drainage.	Slow intake rate; high available water-holding capacity.	Needed on nearly level to gently sloping topography; soil erosive and structures difficult to maintain.
- - - - - -	- - - - - -	- - - - - -	- - - - - -	
Well suited; no limiting soil features.	Suitable; cuts less than 2 feet.	Needed; seasonal high water table; clayey material below about 18 inches.	Slow intake rate; moderate available water-holding capacity.	Not needed, because of topography; nearly level.
Well suited; no limiting soil features.	Suitable; no limiting soil features.	Needed; slow runoff; poor internal drainage; high water table; floods.	Slow intake rate; moderate available water-holding capacity; high water table.	Not needed, because of topography; level; high water table.

[4] Loring part of Loring and Memphis silt loams.
[5] Memphis part of Loring and Memphis silt loams.
[6] Mapped only in complex with Alligator soil; see Alligator series for engineering characteristics.

Some of the nonfarm uses that are important in the county, and the suitability of the soils for these uses, are shown in table 9.

Ratings of soils for nonfarm uses

The ratings of the soils in table 9 for selected nonfarm uses are based upon a 5-foot depth of the soil. They are composite ratings and reflect the total effects of the limiting features evaluated. Rating classes are defined as follows: *Slight*, the soil has some limitations that are not serious and are easy to overcome; *moderate*, the soil has moderate limitations that can be overcome or corrected by means that are generally practical; *severe*, the soil has severe limitations that are difficult to overcome and make its use questionable; *very severe*, the soil has limitations that are restrictive enough to make its use impractical.

Ratings of soils are made for (1) dwellings having access to public or community sewer systems and (2) dwellings for which septic tank sewage disposal systems are required. Soils for which percolation of septic-tank effluent is not a problem are rated the same for both types of residential development. All the ratings of the soils for residential use are based on soil permeability and percolation, the soil stability, natural wetness, depth to the water table, topography, flood hazard, and suitability of the soil for growing lawn grasses, shrubs, and trees.

The ratings of the soils for light industries in table 9 are for industrial and commercial buildings with load limits of less than three stories. The soils are also rated for trafficways. The ratings for both uses were based on the potential corrosion of metal conduits in the soil; the stability, shrink-swell potential, and permeability of the soils; the topography; the depth to the water table; and the flood hazard. Soils that have a high water table, that are slowly permeable, or that are subject to flooding may require intensive drainage or flood-control measures to make them suitable for heavy construction. A fragipan or a high shrink-swell potential causes special problems in the drainage and stability of a soil that may be very difficult to overcome. Sites with steep slopes and irregular topography may require excessive grading to make

TABLE 9.—*Degree of limitations of the soils for*

[Gullied land and Rough broken land not listed in the

Symbol on map	Mapping unit	Dwelling with—		Recreation	
		Public or community sewage system	Septic tank filter field	Camp site	Picnic area
AcA AcB AcC Ad	Alligator and Sharkey clays, 0 to 1 percent slopes. Alligator and Sharkey clays, gently undulating. Alligator and Sharkey clays, undulating. Alligator and Sharkey silty clay loams, overwash.	Severe: Presumptive bearing value; shrink-swell potential.	Severe: Percolation rate; presumptive bearing value; shrink-swell potential; water table.	Severe: Trafficability.	Severe: Trafficability.
Ak	Arkabutla silt loam.	Moderate: Water table; presumptive bearing value.	Moderate: Water table; presumptive bearing value.	Moderate: Trafficability.	Moderate: Trafficability.
BaB BaC	Beulah fine sandy loam, gently undulating. Beulah fine sandy loam, undulating.	Slight	Slight	Slight	Slight
BdA BdB BdC	Bosket-Dubbs fine sandy loams, 0 to 1 percent slopes. Bosket-Dubbs fine sandy loams, gently undulating. Bosket-Dubbs fine sandy loams, undulating.	Slight	Moderate: Percolation rate.	Moderate: Trafficability; slope where greater than 5 percent.	Moderate: Trafficability.
BeA BeB BeC	Bowdre silty clay, 0 to 1 percent slopes. Bowdre silty clay, gently undulating. Bowdre silty clay, undulating.	Severe: Shrink-swell potential; water table.	Severe: Shrink-swell potential; water table.	Severe: Trafficability.	Severe: Trafficability.
Br	Bruno loamy sand, undulating.	Slight	Slight	Moderate: Slope	Slight
Ca	Calhoun silt loam.	Severe: Water table; presumptive bearing value; flood hazard.	Very severe: Water table; presumptive bearing value; shrink-swell potential; percolation rate; flood hazard.	Severe: Trafficability.	Severe: Trafficability.
ClA ClB	Calloway silt loam, 0 to 1 percent slopes. Calloway silt loam, 1 to 3 percent slopes.	Moderate: Water table; presumptive bearing value.	Very severe: Water table; presumptive bearing value; percolation rate.	Moderate: Trafficability.	Moderate: Trafficability.
Co	Collins silt loam.	Very severe: Flood hazard.	Very severe: Flood hazard.	Moderate: Trafficability.	Moderate: Trafficability.
CwA CwB	Crowley silt loam, 0 to 1 percent slopes. Crowley silt loam, 1 to 3 percent slopes.	Moderate: Water table; shrink-swell potential; presumptive bearing value.	Very severe: Water table; shrink-swell potential; presumptive bearing value; percolation rate.	Moderate: Trafficability.	Moderate: Trafficability.

selected nonfarm uses and the chief limiting features

table, because their soil material varies]

Recreation—Continued		Light industry	Trafficway	Remarks
Intensive play area	Unimproved area			
Severe: Trafficability.	Severe: Trafficability	Severe: Presumptive bearing value; shrink-swell potential; water table.	Severe: Traffic-supporting capacity; water table.	Alligator part: Very high shrink-swell potential; water table at surface in wet seasons; not subject to flooding. Sharkey part: Surface layer is very friable; the underlying clay has a very high shrink-swell potential; water table near surface during wet seasons; not subject to flooding.
Moderate: Trafficability.	Moderate: Trafficability.	Moderate: Water table; presumptive bearing value.	Moderate: Water table; traffic-supporting capacity.	Subject to frequent flooding; temporary high water table in wet seasons.
Slight	Slight	Slight to moderate: Presumptive bearing value.	Moderate: Traffic-supporting capacity.	Not subject to flooding.
Slight for soil on 0 to 1 percent slopes and for gently undulating soil. Moderate for undulating soil; slope where greater than 5 percent.	Slight for soil on 0 to 1 percent slopes and for gently undulating soil. Moderate for undulating soil; slope where greater than 5 percent.	Moderate: Shrink-swell potential.	Moderate: Traffic-supporting capacity.	Not subject to flooding.
Severe: Trafficability	Severe: Trafficability	Moderate: Presumptive bearing value; shrink-swell potential.	Severe: Water table; traffic-supporting capacity.	High shrink-swell potential in upper clayey part; not subject to flooding.
Moderate: Slope	Slight	Moderate: Presumptive bearing value; slope.	Moderate: Traffic-supporting capacity.	Not subject to flooding.
Very severe: Trafficability.	Severe: Trafficability	Severe: Water table; presumptive bearing value; corrosion potential.	Severe: Water table; traffic-supporting capacity; flood hazard.	Compact subsoil restricts percolation; water table at or near surface during wet seasons.
Moderate for soil on 0 to 1 percent slopes: Trafficability. Severe for soil on 1 to 3 percent slopes: Trafficability.	Moderate: Trafficability	Moderate for soil on 0 to 1 percent slopes: Water table; presumptive bearing value. Moderate for soil on 1 to 3 percent slopes: Water table; presumptive bearing value; corrosion potential.	Moderate: Water table; traffic-supporting capacity.	Fragipan restricts percolation; temporary high water table in wet seasons.
Moderate: Trafficability.	Moderate: Trafficability	Severe: Flood hazard; presumptive bearing value.	Severe: Flood hazard; traffic-supporting capacity.	Subject to infrequent flooding in places; temporary high water table.
Severe: Trafficability	Severe: Trafficability	Moderate: Water table; shrink-swell potential; presumptive bearing value; corrosion potential.	Moderate: Water table; traffic-supporting capacity.	Clayey subsoil slows percolation; water table at or near the surface in wet seasons.

TABLE 9.—*Degree of limitations of the soils for*

Symbol on map	Mapping unit	Dwelling with—		Recreation	
		Public or community sewage system	Septic tank filter field	Camp site	Picnic area
DbB DbC	Dubbs fine sandy loam, gently undulating. Dubbs fine sandy loam, undulating.	Slight	Moderate: Percolation rate.	Moderate: Trafficability.	Moderate: Trafficability.
DdA DdB DdC DuA DuB DuC	Dundee fine sandy loam, 0 to 1 percent slopes. Dundee fine sandy loam, gently undulating. Dundee fine sandy loam, undulating. Dundee silt loam, 0 to 1 percent slopes. Dundee silt loam, gently undulating. Dundee silt loam, undulating.	Moderate: Water table; shrink-swell potential.	Moderate: Water table; shrink-swell potential; percolation rate.	Moderate: Trafficability; some slopes greater than 5 percent.	Moderate: Trafficability.
EcA EcB EcC	Earle clay, 0 to 1 percent slopes. Earle clay, gently undulating. Earle clay, undulating.	Severe: Water table; shrink-swell potential; presumptive bearing value.	Very severe: Water table; shrink-swell potential; presumptive bearing value; percolation rate.	Severe: Trafficability.	Severe: Trafficability.
He	Henry silt loam.	Severe: Water table; presumptive bearing value; flood hazard.	Very severe: Water table; presumptive bearing value; shrink-swell potential; percolation rate.	Severe: Trafficability.	Severe: Trafficability.
HmA HmB	Hillemann silt loam, 0 to 1 percent slopes. Hillemann silt loam, 1 to 3 percent slopes.	Moderate: Water table; shrink-swell potential; presumptive bearing value.	Very severe: Water table; shrink-swell potential; presumptive bearing value; percolation rate.	Moderate: Trafficability.	Moderate: Trafficability.
Ik	Iuka soils.	Severe: Water table; presumptive bearing value; flood hazard. Slight on slopes of more than 3 percent.	Severe: Water table; presumptive bearing value; flood hazard. Slight on slopes of more than 3 percent.	Moderate: Trafficability slight on slopes of more than 3 percent.	Moderate: Trafficability slight on slopes of more than 3 percent.
La	Lafe silt loam, acid.	Severe: Water table; presumptive bearing value; flood hazard; productivity.	Very severe: Water table; presumptive bearing value; flood hazard; productivity.	Severe: Trafficability.	Severe: Trafficability.
LgA LgB LgB2 LgC LgC2 LgC3 LgD LgD2	Loring silt loam, 0 to 1 percent slopes. Loring silt loam, 1 to 3 percent slopes. Loring silt loam, 1 to 3 percent slopes, eroded. Loring silt loam, 3 to 8 percent slopes. Loring silt loam, 3 to 8 percent slopes, eroded. Loring silt loam, 3 to 8 percent slopes, severely eroded. Loring silt loam, 8 to 12 percent slopes. Loring silt loam, 8 to 12 percent slopes, eroded.	Slight	Moderate: Percolation rate.	Moderate for soil on 0 to 1 percent slopes: Trafficability. Slight for other Loring soils.	Moderate for soil on 0 to 1 percent slopes: Trafficability. Slight for other Loring soils.

selected nonfarm uses and the chief limiting features—Continued

Recreation—Continued		Light industry	Trafficway	Remarks
Intensive play area	Unimproved area			
Moderate: Trafficability; slope where greater than 5 percent.	Slight for gently undulating soils. Moderate for undulating soil; trafficability; slope where greater than 5 percent.	Moderate: Shrink-swell potential.	Moderate: Traffic-supporting capacity.	Not subject to flooding.
Moderate: Trafficability; some slopes greater than 5 percent.	Moderate: Trafficability.	Moderate: Water table; presumptive bearing value; shrink-swell potential.	Moderate: Water table; traffic-supporting capacity.	Temporary high water table in wet seasons; not subject to flooding.
Severe: Trafficability	Severe: Trafficability	Severe: Water table; shrink-swell potential; presumptive bearing value.	Severe: Water table; traffic-supporting capacity.	High shrink-swell potential; not subject to flooding.
Very severe: Trafficability.	Severe: Trafficability	Severe: Water table; presumptive bearing value; corrosion potential.	Severe: Water table; traffic-supporting capacity; flood hazard.	Fragipan restricts percolation; water table at or near surface during wet seasons.
Severe: Trafficability	Severe: Trafficability	Moderate: Water table; shrink-swell potential; presumptive bearing value; corrosion potential.	Moderate: Water table; traffic-supporting capacity.	Claypan restricts percolation; water table at or near surface during wet seasons.
Moderate: Trafficability; slope.	Moderate: Presumptive bearing value; trafficability.	Severe: Water table; traffic-supporting capacity. Moderate on slopes of 3 percent: Trafficability; slope.	Severe: Water table; traffic-supporting capacity. Moderate on slopes of 3 percent: Traffic-supporting capacity.	Temporary high water table.
Very severe: Trafficability.	Very severe: Trafficability.	Severe: Water table; presumptive bearing value; flood hazard; productivity.	Severe: Water table; traffic-supporting capacity; flood hazard.	Toxic levels of sodium; very dispersed and lacks stability; percolation rate is very slow.
Moderate for soil on 0 to 1 percent slopes: Trafficability. Slight for soils on 1 to 3 percent slopes. Moderate for soils on 3 to 8 and 8 to 12 percent slopes: Slope.	Moderate for soil on 0 to 1 percent slopes: Trafficability. Slight for soils on 1 to 3 percent slopes. Moderate for soils on 3 to 8 and 8 to 12 percent slopes: Slope.	Slight. Moderate for soils on 3 to 8 and 8 to 12 percent slopes: Slope.	Slight	Fragipan slows percolation; soils are erodible.

TABLE 9.—*Degree of limitations of the soils for*

Symbol on map	Mapping unit	Dwelling with—		Recreation	
		Public or community sewage system	Septic tank filter field	Camp site	Picnic area
LgD3	Loring silt loam, 8 to 12 percent slopes, severely eroded.				
LmE	Loring and Memphis silt loams, 12 to 20 percent slopes.	Severe: Slope	Severe for soils on 12 to 20 percent slopes: Percolation rate; slope. Very severe for soils on 12 to 40 and 20 to 40 percent slopes: Percolation rate; slope.	Severe: Slope	Moderate: Slope
LmE2	Loring and Memphis silt loams, 12 to 20 percent slopes, eroded.				
LmF3	Loring and Memphis silt loams, 12 to 40 percent slopes, severely eroded.				
LmF	Loring and Memphis silt loams, 20 to 40 percent slopes.				
LmF2	Loring and Memphis silt loams, 20 to 40 percent slopes, eroded.				
MeB	Memphis silt loam, 1 to 3 percent slopes.	Very slight	Very slight for soil on 1 to 3 percent slopes. Slight for soils on 3 to 8 and 8 to 12 percent slopes.	Slight	Slight
MeC2	Memphis silt loam, 3 to 8 percent slopes, eroded.				
MeD2	Memphis silt loam, 8 to 12 percent slopes, eroded.				
StB	Stuttgart silt loam, 1 to 3 percent slopes.	Moderate: Water table; shrink-swell potential; presumptive bearing value.	Very severe: Water table; shrink-swell potential; presumptive bearing value; percolation rate.	Moderate: Trafficability.	Moderate: Trafficability.
Za	Zachary silt loam.	Very severe: Water table; presumptive bearing value; flood hazard.	Very severe: Water table; presumptive bearing value; flood hazard.	Severe: Trafficability.	Severe: Trafficability.

them suitable for industrial development or highway construction.

The suitability of a soil for developed recreation areas and for unimproved areas is rated in table 9. Developed recreation areas include picnic sites, camp sites, playgrounds, and parks. Ratings of the suitability of the soil for these more intensive recreation uses are based on such factors as productivity, stability, wetness, topography, and accessibility of the soil, on the hazard of flooding, and on the suitability of the soil for impounding water. Ratings for unimproved or natural recreation areas are based mainly on the scenic beauty and the kind and amount of natural vegetation and wildlife the soil supports.

Major geographic areas of the county

St. Francis County is sharply divided into three major geographic areas—the Mississippi River bottom lands, Crowley Ridge, and the broad loess plain. The characteristics of soils and topography of each area are distinct and affect the suitability of the area for nonfarm uses. A general idea of the soils in each of these three areas is given in the section "General Soil Map."

In the Mississippi River bottom lands, topography is level or undulating and causes few restrictions to nonfarm use. In the bottom lands, however, runoff water accumulates in the depressions and broad, level areas. Excess water is constantly present on the surface and within many soils and causes problems of varying intensity. The bottom lands are also characterized by wide deposits of slackwater sediments. These sediments contain a high percentage of clay that expands when wet and contracts and cracks when dry. The high shrink-swell potential of these soils makes them very unstable and seriously limits them for urban development. In general, the soils best suited to agriculture are equally well suited to nonfarm uses.

On Crowley Ridge topography is the chief limitation in urban development. Many areas have short and steep slopes and require extensive grading for major construction. These steeply sloping areas support a wide variety of trees, shrubs, and wildlife; are scenically attractive; and are ideal for natural recreation areas. Other areas have slopes that are less steep and can be developed at less expense. The areas of Crowley Ridge having slopes less than 12 percent are well suited for homesites and for development as recreational areas. The soils, however, are very erodible. They must be protected after grading until ground cover is established. In addition, some of the soils have a fragipan in the subsoil. Slow percolation through the fragipan layer limits the efficiency of sewage disposal systems for septic tanks.

selected nonfarm uses and the chief limiting features—Continued

Recreation—Continued		Light industry	Trafficway	Remarks
Intensive play area	Unimproved area			
Severe for soils on 12 to 20 percent slopes: Slope. Very severe for soils on 12 to 40 and 20 to 40 percent slopes: Slope.	Severe: Slope	Severe for soils on 12 to 20 percent slopes: Slope. Very severe for soils on 12 to 40 and 20 to 40 percent slopes: Slope.	Moderate: Slope; erosion hazard.	Fragipan, where present, slows percolation; soils are erodible.
Slight for soil on 1 to 3 percent slopes. Moderate for soils on 3 to 8 and 8 to 12 percent slopes: Slope.	Slight for soil on 1 to 3 percent slopes. Moderate for soils on 3 to 8 and 8 to 12 percent slopes: Slope.	Slight for soil on 1 to 3 percent slopes. Moderate for soils on 3 to 8 and 8 to 12 percent slopes: Slope.	Slight	Soils are erodible.
Severe: Trafficability	Severe: Trafficability	Moderate: Water table; shrink-swell potential; presumptive bearing value; corrosion potential.	Moderate: Water table; traffic-supporting capacity.	Claypan slows percolation; water table at or near the surface in wet seasons.
Very severe: Trafficability.	Very severe: Trafficability.	Severe: Water table; presumptive bearing value; flood hazard; corrosion potential.	Severe: Water table; flood hazard; traffic-supporting capacity.	Subject to frequent flooding; water table at the surface during much of the year.

The western part of the county is a broad, gently rolling loess plain. The topography does not directly limit the development of this area. The most favorable residential sites are on the crests of slopes. The most severe limitations in this area are excess water on most of the broad, level uplands and flooding along the stream courses. Most of the upland soils have a fragipan or claypan in the subsoil. These panlayers restrict the movement of water through the soil. Instability of foundations and roadbeds, as well as improper functioning of septic tank disposal fields, are directly related to local accumulations of runoff water and the slow percolation rate through the fragipan and claypan.

Genesis, Classification, and Morphology of Soils

In the first part of this section, the five soil-forming factors are explained, and their effects upon the soils of the county are discussed. The second part contains a discussion of the physical and chemical characteristics of the soils, a description of two soil profiles that are typical of soils in the county, and a table showing an analysis of the two profiles. In the third part of this section, the soil series are classified by orders and great soil groups, and a representative profile of each series is described.

Factors of Soil Formation

Soil is formed by climate and living organisms acting upon parent material and influenced by topography and time. The nature of the soil at any point on the earth depends upon the combination of these five major factors at that point. All five of these factors affect the genesis of every soil; the relative importance of each differs from place to place. In extreme cases one factor may dominate the formation of the soil and fix most of its properties, as is common when the parent material consists of pure quartz sand. Little can happen to quartz sand, and the soils derived from it usually have faint horizons. Such a soil in St. Francis County is Bruno loamy sand. Even in quartz sand, however, distinct profiles can be formed under certain types of vegetation where the topography is low and flat and a high water table is present. Thus, the past combination of the five major factors determines the present character of every soil (*13*).

Climate

The climate of St. Francis County is characterized by long warm summers, short mild winters, and moderately high rainfall (*11*). Moderately high summer temperatures favor rapid chemical reactions in the moist soils most of the year. The high rainfall induces intense leaching of soluble and colloidal material (*10*). The shallow depth to which soil is frozen further intensifies the rate of weathering and the translocation of materials.

Climatic conditions are relatively uniform within the county. Parent material, drainage, topography, and age appear to have been the primary factors that caused the differences in soils of the county.

Living organisms

Before the county was settled, soil formation was influenced more by native vegetation than by animal activity. Hardwood and mixed pine-hardwood forests covered most of the upland. The most common species of hardwood trees were red oak, white oak, post oak, willow oak, water oak, black walnut, magnolia, yellow-poplar, hickory, sweetgum, blackgum, and ash; shortleaf pine was common on Crowley Ridge. In the western part of the county, scattered areas of prairie were vegetated with a dense stand of big bluestem, little bluestem, indiangrass, eastern gamagrass, and other tall bunch grasses, as well as a few scattered hardwood trees, mainly along streams.

The Hillemann, Crowley, and Stuttgart soils formed in the prairie areas, which were the first areas to be used for rice. Because of the intensive tillage, land leveling, and flood irrigation required for rice culture, these soils now show little evidence of having developed under grass vegetation. They lack the thick, dark A horizon and the moderate to strong, granular structure common to soils developed in prairies.

On the bottom lands the cover was a dense forest broken by occasional canebrakes. Dense stands of bald cypress filled the swampy areas where the Alligator and Sharkey soils formed, whereas hardwood stands occupied most of the better drained areas and many of the wet ones. Trees on the low ridges were chiefly hickory, pecan, white oak, post oak, red oak, blackgum, and winged elm. In the swales and low places that were wet but not swampy, the principal trees were tupelo-gum, sweetgum, soft elm, green ash, hackberry, cottonwood, overcup oak, and willow oak. Canebrakes covered many of the border flats between the swamps and along the sloughs and bayous.

In these high, well-drained areas along the sloughs and bayous, the Bosket soils, which have a thick, dark surface layer, developed under what is believed to have been mostly canebrake vegetation.

These differences in native vegetation are associated mainly with variations in drainage. Only the major differences in the original vegetation are reflected to any extent in the character of the soils.

By developing agriculture in St. Francis County, man has influenced the formation of the soils. By clearing forests and plowing under prairie sod, cultivating soils, introducing new species of plants, building levees to control floods, and improving natural drainage, man has influenced the soil genesis of the future. Few results of these changes can as yet be seen. Some probably will not be evident for many centuries. The complex community of living organisms affecting soil genesis has been drastically changed as a result of man's activity.

Parent material

The soils of St. Francis County were derived from parent material deposited during three geological ages.

Recent alluvium, deposited by the Mississippi River, and in part reworked by the St. Francis River, is the chief parent material of soils east of Crowley Ridge (fig. 2, p. 2). Small quantities of Recent alluvial sediments along the western edge of this area were brought down by minor streams from the loessal uplands; the total acreage of such sediments is small.

The alluvium along the lower reaches of the Mississippi, including much of St. Francis County, has come from the multitude of soils, rocks, and unconsolidated sediments of some 24 States (*17*). The alluvium is of mixed composition, originating as it does in the wide reaches of the upper Mississippi River basin. Sedimentary rocks of various kinds are predominant in this upper basin, which extends from Montana to Pennsylvania. Other kinds of rocks are also exposed or serve as sediment sources in many places. Immense areas in the upper basin are mantled by glacial drift and loess. The alluvium, therefore, consists of a mixture of many kinds of minerals, most of which are comparatively fresh and only slightly weathered.

Within the alluvial area of St. Francis County, the wide ranges in the texture of the alluvium are related to differences in the site of deposition. As a river overflows its banks and spreads out over the flood plain, the coarser sediments are dropped first. Sands are commonly deposited in bands parallel to and near the channel. The low ridges thus formed are known as natural levees (*17*). The Beulah, Bruno, Bosket, and Dubbs are the main soils derived from the coarse sediments. As the floodwaters continue to spread, they move more slowly and finer sediments, such as silts, are deposited next; they are usually mixed with some sands and clays. The Dundee soils developed in these sediments of intermediate texture. When the flood has passed and water is left standing as shallow lakes or swamps in the lowest part of the flood plain, the finest sediments, the clays, settle out. The Alligator and Sharkey soils have formed in these thick beds of clay. The particle-size distribution in a typical profile of Alligator clay is shown in table 6, page 44.

This simple pattern—coarse sediments near the channel, fine sediments in slack-water areas some distance away, and medium-textured sediments between the two—has been interrupted or altered and is not common at present along the Mississippi River. Over the centuries the river has meandered back and forth across the flood plain, sometimes cutting out all or parts of natural levees laid down earlier, sometimes depositing sands on top of slack-water clays or depositing slack-water clays on top of sands. The Earle and Bowdre soils have formed in areas where thin beds of fine sediments have been deposited over sandy and silty sediments. The normal pattern of sediment distribution from a single channel has been partly truncated in many places and has had more recent beds of alluvium superimposed. Thus, there are many combinations of sediments now on the flood plain. Many areas consist of parts of former channels and their adjoining sandy natural levees, very gently sloping or undulating medium-textured sediments, and slack-water clays. The large areas of slack-water clays have been relatively stable because they lie farthest from the meander belt established by the river in the central part of the flood plain.

Textural differences in the alluvium are accompanied by some differences in chemical and mineralogical composition. Sandier sediments generally contain more quartz than those of intermediate or finer texture. They also contain less feldspars and ferromagnesian minerals; and they generally contain less carbonates, but not always. Some of the more recently deposited natural levees are distinctly calcareous, but many areas of slack-water sediments lack free carbonates and are acid (*13*).

The soils in the uplands of the county were derived wholly or in part from loessal materials deposited during the Pleistocene Epoch. This mantle of wind-transported soil material was laid down over old alluvium. The mantle is thick enough, with few exceptions, that the sola of the soils developed almost entirely in loess, as shown in table 11, p. 66. On Crowley Ridge, the loess is 5 to 20 feet thick or more over a sandy and gravelly substratum. This substratum, or core, is not exposed except on the east face of the Ridge, where it has been mapped as Rough broken land, and in gravel pits and deep gullies elsewhere. The substratum is a remnant of a former broad outwash plain that once filled the Mississippi River valley at this latitude, and was mostly removed before or during the late Pliocene or early Pleistocene time. During much of the Pleistocene time, the Mississippi River flood plain was west of Crowley Ridge, and the Ohio River flowed on the east side (*2*).

Thousands of years ago the wide, deep trough carved west of Crowley Ridge was partly refilled with sandy and clayey sediments by the Mississippi River in much the same manner as the more recent deposits east of the Ridge were laid down. The River meandered westward toward the channels now occupied by the White and Black Rivers, and later progressively northward and eastward through various breaches in Crowley Ridge. One of these breaches is Marianna Gap, about ten miles south of St. Francis County. This gap and the associated channel are now occupied by L'Anguille River.

The channel now occupied by L'Anguille River was partly filled by sediments washed from surrounding loess, and L'Anguille River established its flood plain on these sediments. This flood plain is made up mainly of the Zachary soils. The Arkabutla and Collins soils are on a few slight elevations.

Finally, the vast complex of alluvial terraces west of the Ridge was abandoned entirely by the Mississippi River in favor of the Ohio River channels east of the Ridge. The broad, abandoned back swamps were subsequently drained by smaller, more localized rivers and bayous that occupied former braided channels of the Mississippi River. These local streams were inadequate to maintain the broad alluvial plain as an active flood plain. Those parts of the alluvial plain above overflow were progressively mantled with loess during the same general period that the loess on Crowley Ridge was laid down. In places the loess is as thick on the older terraces as on the Ridge. On this broad, gently rolling plain of thick loess deposits, wide areas of Henry and Calloway soils, along with smaller areas of Calhoun and Loring soils, have developed. Particle-size distributions for typical profiles of Calloway, Henry, and Loring soils are reported in table 6, p. 44.

The Mississippi River and its major tributaries periodically reinvaded parts of this area, however, and buried these loess deposits under new strata of alluvial sediments, which were in turn covered with loess. The Crowley and Stuttgart soils have formed where the loess is about 1 to 2 feet thick over the alluvial sediments.

The mantle of loess is unstratified and is mainly of silt-size particles. The loess is thickest on the west slopes of Crowley Ridge, where it is commonly 20 feet thick or more. It is progressively thinner toward the western part of the county where it is less than 2 feet thick in places.

The loess in St. Francis County is typical, in most respects, of the loess that is distributed throughout the Lower Mississippi Valley. This is to be expected, because the primary source of loess was the flood plain of the Mississippi River (*15*). This loess is made up of particles of rather uniform size; 70 percent to 90 percent or more of its volume is 0.002 to 0.05 millimeter in size. Although no mineralogical studies have been made of the loess in St. Francis County specifically, data from other locations in the lower valley indicate the mineralogy is mixed, but generally uniform in the silt fraction. Of the coarse silt fraction, quartz makes up approximately 70 to 90 percent, feldspars 5 to 25 percent, and various other minerals the rest. The mineral fragments are angular. Their interlocking accounts for the characteristic vertical bluffs in deep cuts. The feldspars are somewhat weathered, but not so much as to have lost their character. The quartz is essentially unweathered. The soils that developed in the loess are acid, though the content of bases is moderately high. The loess itself is calcareous in places at a depth of 5 feet or more.

Topography

The almost level flood plain of the Mississippi River occupies about 44 percent of St. Francis County. The nearly level to steep Crowley Ridge occupies about 11 percent. The remaining 45 percent is west of Crowley Ridge and is a level to sloping plain.

The topography of that part of the county occupied by Mississippi River alluvium ranges from level bodies of slack-water clays to undulating successions of ridges and swales in areas that once bordered the river channel. Local differences in elevation are commonly less than 8 feet. Seldom are there differences of as much as 15 feet within one-quarter mile. Most slopes are less than 3 percent in gradient. Steeper slopes on a few streambanks range up to 15 percent, but their total area is negligible. The highest elevation in this area is along the northern line of the county and is 205 feet above sea level. The lowest elevation is along the southern line and is 175 feet above sea level. This area is drained by the St. Francis River and its tributaries.

Although these differences in elevation are minor, they have had important effects on the genesis of the soils. On the highest parts of the low ridges are the well-drained Bosket soils. These soils developed on convex slopes, where excess surface water drains away readily. Below the Bosket soils, in the level and concave swales between the low ridges, are the somewhat poorly drained Dundee soils. These soils developed from much the same kind of sediments as the Bosket soils. Excess surface water from runoff and from a high water table caused the Dundee soils to be gleyed. At intermediate elevations between the

Bosket and the Dundee soils, and on gentler convex slopes, are the Dubbs soils. These soils show little evidence of alteration by excess surface water, but they are gleyed at a depth of 20 to 30 inches. This gleying suggests that the water table near the surface of the lower Dundee soils continues laterally into the lower B horizon of the Dubbs soils.

Crowley Ridge traverses the county from north to south, passing between Forrest City and Madison. It is 6 miles wide at the northern line of the county and gradually narrows to 3 miles wide at the southern line. It is made up of narrow ridges with steep, short slopes between the ridgetops and the valley streams. The highest elevation is about 400 feet above sea level, and the lowest about 200 feet. Most of this area is drained by Crow Creek and its tributaries.

That part of St. Francis County west of Crowley Ridge is a wide, nearly level to gently sloping loess plain. It is interspersed with poorly drained, level areas and low, gently sloping ridges. The low ridges have convex slopes, and the soils developed on them, chiefly of the Loring series, are brown and moderately well drained to well drained. The Henry soils, on the flats below the ridges, developed in the same kind of parent material that is on the ridges, but these areas have very slow runoff and collect runoff water from higher elevations. As a consequence, the Henry soils are strongly gleyed. Because more water percolates through them, the Henry soils have been more intensely leached and more deeply eluviated than the Loring soils, and their fragipans are more strongly developed.

This area west of the Ridge is drained by L'Anguille River and the East Flat Fork of the Little River and their tributaries. These streams flow from north to south. The dominant soils on their flood plains are the Zachary. The highest elevation in this part of the county is about 240 feet, and the lowest elevation is about 165 feet above sea level.

Time

Geologically, the soils of St. Francis County are young. Even now some areas receive fresh sediments at frequent intervals. It seems probable that the sediments now forming the land surface of the county arrived during and after the advances of the Wisconsin glaciers, the last of which was retreating from the North Central States about 11,000 years ago (*8*).

The length of time required for soil development depends largely on the other factors of soil formation. Less time is generally required for a soil to develop in humid, warm regions with luxuriant vegetation than in dry, cold regions. Also, less time is required if the parent material is coarse textured than if it is fine textured, other things being equal.

The age of the soils in St. Francis County varies considerably. The soils in the smoother parts of the uplands are nearly mature. In the steeper areas, geologic erosion has more nearly kept pace with soil development; consequently, the horizons are not so thick nor so strongly developed as in the more mature soils in less sloping areas. On first bottoms and in areas of local alluvium, the soil materials have been in place for too short a time to develop to maturity.

Physical and Chemical Characteristics of Soils

Some soils of St. Francis County have well-defined genetic horizons, whereas others have faint horizons. The soils of the county have developed by one or more of the following processes: (1) Accumulation of organic matter, (2) leaching of carbonates and salts more soluble than calcium carbonate, (3) translocation of silicate clay minerals, and (4) reduction and transfer of iron and manganese. Two or more of these processes have affected the development of horizons in most soil profiles in the county. For example, the first two processes are reflected in the faint horizons of Beulah fine sandy loam, whereas the first, second, and last are evident in the horizons of Alligator clay. All four processes have affected to some extent the differentiation of horizons in the Calloway soils.

Organic matter has accumulated in the uppermost layer to form an A1 horizon in all of the soils of the county. Most of the soils sampled contain only a small amount of organic matter. Some soils on the bottom lands, such as the Alligator clays, contain a relatively large amount of organic matter.

In most soils of the county, the differentiation between the darker colored A1 and the lighter colored A2 horizon is caused by the addition of organic matter to the A1 and the removal of organic matter, clay minerals, and iron oxides from the A2.

Carbonates and salts have been leached from all soils of the county, and this process is important in the development of horizons in most of the soils. Carbonates have been carried completely out of the profiles of all except the Lafe soils. The content of salts in Lafe and Hillemann soils is still high. Even in the wettest soils, some leaching is indicated by the absence of carbonates and by the acid reactions. Leaching of the very wet soils, such as Henry silt loam, is slow because water moves through the profile slowly.

In uplands the translocation of silicate clay minerals has been one of the chief factors in the development of soil horizons. The Memphis, Loring, and Calloway soils clearly show the effects of this process. On bottom lands, however, the translocation of silicate clay minerals has affected the development of horizons in only a few soils. The soils most affected by this process on bottom lands are Dubbs, Dundee, and Bosket.

Reduction, also called gleying, and transfer of iron have occurred in all of the poorly drained soils. Reduction has been important in differentiating the horizons in the naturally wet Henry, Zachary, Alligator, and Sharkey soils. Some reduction has occurred in Calloway and Collins soils.

The gray colors of the deeper horizons in the wet soils indicate the reduction of iron oxides. In some soils, reduction is accompanied by transfer of iron. Furthermore, in some places the iron is segregated within one or more horizons and forms mottles of various shades of red, brown, and yellow. In other places the iron compounds are segregated and formed into concretions. The latter process is most common in the somewhat poorly drained soils.

The effects of soil-forming processes on the development of soils of the county are shown in the following detailed profile descriptions of Loring silt loam and Memphis silt loam and in the laboratory data in table 10.

The Memphis and Loring soils are the same age and developed in the same kind of parent material under the

TABLE 10.—*Physical and chemical analysis of two selected soils* [1]

Soil and number of sample	Horizon	Depth	Particle-size distribution: Very coarse, coarse, and medium sand (2.0 to 0.25 mm.)	Fine sand (0.25 to 0.10 mm.)	Very fine sand (0.10 to 0.05 mm.)	Silt (0.05 to 0.002 mm.)	Clay (less than 0.002 mm.)	Organic carbon	Exchangeable cations (milliequivalent per 100 grams of soil): Hydrogen	Calcium	Magnesium	Potassium	Sodium	Sum of cations	Base saturation	Reaction
Loring silt loam: S57-Ark-62-1 (1-8)		*Inches*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*							*Percent*	*pH*
5685	Ap	0 to 5	1. 2	1. 1	0. 8	79. 7	17. 2	1. 49	7. 4	3. 8	2. 0	0. 5	0. 1	13. 8	60	5. 5
5686	B21t	5 to 11	. 5	. 5	. 5	68. 9	29. 6	. 24	11. 6	2. 7	2. 3	. 2	. 2	17. 0	40	4. 9
5687	B22t	11 to 16	1. 2	. 8	. 6	71. 8	25. 6	. 19	12. 0	1. 6	2. 4	. 1	. 3	16. 4	34	5. 3
5688	B23t	16 to 21	1. 7	1. 0	. 8	74. 1	22. 4	. 19	12. 0	1. 0	2. 0	. 1	. 4	15. 5	29	5. 3
5689	B24xt	21 to 27	. 3	. 4	. 3	70. 1	28. 9	. 14	12. 4	1. 5	4. 3	. 2	1. 0	19. 4	44	5. 3
5690	B25x	27 to 38	. 3	. 5	. 3	74. 6	24. 3	. 09	7. 9	2. 9	6. 0	. 2	1. 6	18. 6	70	5. 5
5691	B26x	38 to 44	. 4	. 8	. 6	75. 8	22. 4	. 11	3. 6	4. 0	7. 2	. 2	2. 0	17. 0	91	6. 3
Memphis silt loam: S58-Ark-62-1 (1-6)																
8342	Ap	0 to 4	0	. 1	. 3	75. 4	24. 2	. 41	7. 8	4. 1	2. 9	. 5	0	15. 3	59	5. 3
8343	B21t	4 to 19	0	0	. 3	70. 2	29. 5	. 12	12. 0	4. 1	2. 9	. 4	. 2	19. 6	47	5. 0
8344	B22t	19 to 30	0	0	. 2	75. 0	24. 8	. 09	11. 1	3. 8	3. 2	. 3	. 2	18. 6	54	5. 1
8345	B3(a)[2]	30 to 41	0	0	. 3	76. 3	23. 4	. 06	9. 2	4. 4	3. 4	. 3	. 2	17. 5	58	5. 2
8346	B3(b)[2]	41 to 51	0	0	. 2	77. 9	21. 9	. 03	8. 3	5. 3	3. 9	. 3	. 2	18. 0	70	5. 3
8347	C	51 to 70	0	0	. 2	78. 6	21. 2	. 04	7. 4	6. 7	3. 8	. 3	. 2	18. 4	73	5. 4

[1] Analysis by Soil Survey Laboratory, Soil Conservation Service, Lincoln, Nebr. [2] Subdivided for sampling.

same climate and vegetation. Their differences have been caused by topography and by thickness of the loess deposit. The Memphis soils developed in thick loess. They are brown throughout, are well drained, and lack the fragipan horizon that is characteristic of the Loring soils. The Loring soils have a firm, brittle fragipan at a depth of about 30 inches. The fragipan restricts drainage, as indicated by the gray and brown mottling of that horizon. Except for the fragipan and the restricted drainage of the Loring soils, the Memphis and Loring soils are similar in their general physical and chemical characteristics. Both are low in organic matter, are acid in reaction, have a moderate base exchange capacity, and have similar base saturation.

Profile of Loring silt loam in a cultivated area (SW¼SE¼NW¼ sec. 4, T. 3 N., R. 1 W.):

Ap—0 to 5 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium, subangular blocky structure; very friable; clear, smooth boundary.

B21t—5 to 11 inches, brown (7.5YR 5/4) silty clay loam; moderate, fine and medium, subangular blocky structure; friable; many fine roots and few pores; gradual, smooth boundary.

B22t—11 to 16 inches, yellowish-brown (10YR 5/4) silt loam; moderate, fine and medium, subangular blocky structure; friable; few, fine and medium, hard, brown concretions; many fine roots and few, fine and medium pores; gradual, wavy boundary.

B23t—16 to 21 inches, yellowish-brown (10 YR 5/6) silt loam; moderate, medium, subangular blocky structure; friable; few, fine to coarse, hard concretions; many fine roots; abrupt, smooth boundary.

B24xt—21 to 27 inches, coarsely mottled, about equally pale-brown (10YR 6/3) and yellowish-brown (10YR 5/4) silty clay loam; moderate, coarse, subangular blocky structure with tendency to prismatic; few black streaks on ped faces; friable but somewhat brittle; peds brown inside; many fine roots; clear, smooth boundary.

B25x—27 to 38 inches, yellowish-brown (10YR 5/4) silt loam; some faces pale brown (10YR 6/3); moderate, medium, subangular blocky structure; friable but somewhat brittle; common fine roots and many medium pores; clear, smooth boundary.

B26x—38 to 44 inches+, yellowish-brown (10YR 5/4) silt loam with many medium mottles of light brownish gray (10YR 6/2); weak, coarse, angular blocky structure; firm and brittle; few fine roots and many medium pores.

Profile of Memphis silt loam in a cultivated area (SW¼SE¼NW¼ sec. 34, T. 6 N., R. 3 E.):

Ap—0 to 4 inches, dark-brown (10YR 4/3) silt loam; weak, fine, subangular blocky and granular structure; very friable; common fine roots; strongly acid; clear, smooth boundary.

B21t—4 to 19 inches, brown (7.5YR 5/4) silty clay loam; moderate, medium, subangular blocky structure; friable; clay films abundant; few, medium, black, soft concretions or coats on ped faces; few pores and common fine roots; very strongly acid; gradual, wavy boundary.

B22t—19 to 30 inches, brown (7.5YR 5/4) silt loam; moderate, medium, subangular blocky structure; friable; clay films less common than in B21t; few, soft, black films or ped coats; few fine roots and pores; strongly acid; gradual, wavy boundary.

B3—30 to 51 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, angular blocky and subangular blocky structure; very friable; few thin clay films; occasional small pockets of very fine and fine white crystals are also noted in some fine seams; occasional, fine, black masses, soft concretions, or ped coats; few fine pores and roots; strongly acid; diffuse boundary.

C—51 to 70 inches, yellowish-brown (10YR 5/4) silt loam; very friable; reddish-brown (5YR 4/3.5) silt loam at 70 inches; strongly acid.

Classification and Morphology of Soils

Soils are placed in narrow categories so that knowledge of their characteristics can be organized and related to individual farms or other tracts of land. They are placed in broad categories so that they can be studied and compared in large areas, such as countries or continents.

The soils have been classified in six categories. Beginning with the highest and most inclusive, the categories are the order, the suborder, the great soil group, the family, the series, and the type. In the highest category, soil series are grouped into three orders—zonal, intrazonal, and azonal—whereas thousands of soil types are recognized in the lowest category. The suborder and family categories have never been fully developed and thus have been little used. Attention has been given mainly to the classification of soils into soil types and series within counties or comparable areas and to the subsequent grouping of series into great soil groups and soil orders.

Table 11 shows the classification of the soil series by order and great soil group and the factors that have contributed to the differences in the soil profiles. Following the table, the orders and great soil groups are defined. After the definition of each great soil group, the characteristics of each series in the group are discussed and a representative profile of the series is described.

TABLE 11.—*Classification of the soil series and some of the factors that have contributed to differences in their formation*

Order, great soil group, and series	Description of profile	Position	Drainage class	Slope range	Parent material	Degree of profile development
ZONAL ORDER						
Gray-Brown Podzolic soils:				*Percent*		
Bosket	Dark-brown fine sandy loam over brown to yellowish-brown sandy clay loam.	Bottom land.	Well drained	0 to 8	Medium-textured sediments deposited by the Mississippi River.	Moderate.
Dubbs	Brown to dark-brown fine sandy loam over yellowish-brown mottled sandy clay loam.	Bottom land.	Moderately well drained.	0 to 8	Medium-textured sediments deposited by the Mississippi River.	Moderate.
Dundee	Dark-brown or brown fine sandy loam or silt loam over light brownish-gray to dark grayish-brown silty clay loam.	Bottom land.	Somewhat poorly drained.	0 to 8	Medium-textured sediments deposited by the Mississippi River.	Moderate.
Loring	Brown, yellowish-brown, or dark-brown silt loam over dark-brown or yellowish-brown silt loam or silty clay loam; thin, weakly expressed fragipan at a depth of 22 to 33 inches.	Upland	Moderately well drained.	0 to 30	Thick loess; more than 48 inches.	Moderate.
Memphis	Brown to dark grayish-brown silt loam over brown to dark yellowish-brown silty clay loam.	Upland	Well drained	1 to 40	Thick loess	Moderate.
INTRAZONAL ORDER						
Grumusols:						
Sharkey	Dark-gray or dark grayish-brown clay or silty clay loam over gray mottled clay.	Bottom land.	Poorly drained.	0 to 8	Fine-textured sediments from the Mississippi River.	Weak.
Low-Humic Gley soils:						
Alligator	Dark-gray or dark grayish-brown clay or silty clay loam over gray mottled clay.	Bottom land.	Poorly drained.	0 to 8	Fine-textured sediments from the Mississippi River.	Weak.
Planosols:						
Calhoun	Mottled yellowish-brown silt loam over light brownish-gray, dark grayish-brown, and grayish-brown silt loam and silty clay loam.	Upland	Poorly drained.	0 to 1	Thick loess	Moderate.
Calloway	Very dark grayish-brown to brown silt loam over dark-brown and grayish-brown mottled silt loam; silty clay loam fragipan at a depth of 17 to 23 inches.	Upland	Somewhat poorly drained.	0 to 3	Thick loess	Moderate.

TABLE 11.—*Classification of the soil series and some of the factors that have contributed to differences in their formation*—Continued

Order, great soil group, and series	Description of profile	Position	Drainage class	Slope range	Parent material	Degree of profile development
INTRAZONAL ORDER—Continued						
Planosols—Con.						
Crowley	Dark grayish-brown or very dark grayish-brown silt loam over red, mottled silty clay.	Upland	Poorly drained.	0 to 3	Thin loess (less than 20 inches) over a claypan.	Moderate.
Henry	Gray silt loam over gray mottled silt loam; fragipan at a depth of 20 to 36 inches.	Upland	Poorly drained.	0 to 1	Thick loess	Strong.
Hillemann [1]	Dark-gray silt loam over silty clay, silty clay loam, and silt loam; high sodium saturation at about 25 inches.	Upland	Somewhat poorly drained.	0 to 3	Thick loess	Moderate.
Stuttgart	Dark-brown or dark grayish-brown silt loam over silty clay; lower part is a claypan.	Upland	Somewhat poorly drained.	1 to 3	Thin loess (less than 20 inches) over clayey material.	Moderate.
Zachary	Gray to dark grayish-brown silt loam over gray silt loam and silty clay.	Bottom land.	Poorly drained.	0 to 1	Alluvium from loess	Moderate.
Solodized-Solonetz soils:						
Lafe	Very dark grayish-brown or grayish-brown silt loam over mottled grayish-brown, brownish-gray, olive-brown, and yellowish-brown silty clay loam; high sodium saturation through profile.	Upland	Somewhat poorly drained.	0 to 2	Thick loess	Moderate.
AZONAL ORDER						
Alluvial soils:						
Arkabutla	Grayish-brown or dark grayish-brown silt loam over mottled brown, light brownish-gray, and light-gray silt loam or silty clay loam.	Bottom land.	Somewhat poorly drained.	0 to 1	Alluvium from loess	Weak.
Beulah	Dark-brown fine sandy loam over yellowish-brown fine sandy loam.	Bottom land.	Somewhat excessively drained.	0 to 8	Medium-textured sediments deposited by the Mississippi River.	Weak.
Bowdre	Dark-brown or very dark grayish-brown silty clay over fine sandy loam, sandy clay loam, silt loam, or stratified beds of silty and sandy material.	Bottom land.	Somewhat poorly drained.	0 to 8	Fine-textured and medium-textured sediments deposited by the Mississippi River.	Weak.
Bruno	Dark grayish-brown to light brownish-gray loamy sand over brown or light yellowish-brown loamy sand or sand.	Bottom land.	Excessively drained.	0 to 8	Medium- and coarse-textured sediments deposited by the Mississippi River.	Weak.
Collins	Dark-brown to dark grayish-brown silt loam over brown and light grayish-brown silt loam.	Bottom land.	Moderately well drained.	0 to 1	Recent alluvium from loess.	Weak.
Earle	Grayish-brown to very dark grayish-brown clay, over gray or dark-gray mottled clay, over coarser textured sediments at a depth of 20 to 36 inches.	Bottom land.	Somewhat poorly drained.	0 to 8	Fine- and medium-textured sediments deposited by the Mississippi River.	Weak.
Iuka	Brown silt loam, fine sandy loam, or sandy loam over brown and grayish-brown silt loam and loamy sand.	Bottom land.	Moderately well drained.	1 to 3	Medium-textured sediments deposited by the Mississippi River.	Weak.

[1] Grades toward Solodized-Solonetz.

799-305—66——6

Zonal order

The zonal order is made up of great soil groups that have well-developed characteristics reflecting the influence of the active soil-forming factors—climate and living organisms (*10*). Where parent material has been in place a long time and has not been subject to extreme conditions of relief, the soils have the characteristics of zonal soils.

On these soils, climate and vegetation have had the most influence, and relief and age the least. As a result, these soils have many properties in common, although they were derived from various kinds of parent material.

At the surface, all of the undisturbed, well-drained zonal soils have a layer of organic debris in various stages of decomposition. Also, these soils have a dark-colored A1 horizon. The A2 horizon is lighter colored than either the A1 or the B1, because it is the zone of maximum leaching. The B horizon generally has a uniform color of yellow or brown and is finer textured than the A horizon. The B horizon is the zone of maximum accumulation of clay in the soil profile (*16*). Among zonal soils, the C horizon varies in color and texture, but it is commonly variegated yellow, gray, and brown (*12*).

The zonal soils of St. Francis County are in the Gray-Brown Podzolic great soil group.

GRAY-BROWN PODZOLIC SOILS

Gray-Brown Podzolic soils have a thin organic covering and a thin organic-mineral layer over a leached layer that is underlain by an illuviated B horizon. These soils have developed under deciduous forest in a warm-temperate, moist climate. Their thin surface covering of leaf litter overlies a dark, thin, moderately acid humus layer that is somewhat mixed with mineral soil. The A1 horizon is grayish brown to brown and has granular structure. The A2 horizon also is grayish brown to brown. The moderately heavy B horizon has blocky structure, is yellowish brown, and is lighter colored with increasing depth. The total depth of the solum varies considerably but seldom exceeds 40 inches. Podzolization is the main process in the development of these soils (*10*).

In St. Francis County the Bosket, Dubbs, Dundee, Loring, and Memphis series are in this great soil group.

Bosket series.—This series consists of well-drained soils derived from medium-textured general alluvium on natural levees of the Mississippi River and its tributaries.

These soils have a dark-brown fine sandy loam A horizon. Their B horizon is brown to yellowish-brown sandy clay loam.

Bosket soils are medium to strongly acid, have moderately high natural fertility, and contain a moderate amount of organic matter. They are level to undulating; their gradient is generally less than 8 percent.

Bosket soils are in small to medium areas in the southeastern part of the county. All are intermingled in a complex pattern with Dubbs soils and are associated with Beulah and Dundee soils. Bosket soils are more clayey in the B horizon than Beulah soils. They are more sandy in the B horizon than Dubbs and Dundee soils and are better drained internally. Dubbs soils are mottled with gray below a depth of about 18 inches, and Dundee soils are mottled with gray below the plow layer.

Profile (representative of the series) of Bosket fine sandy loam, gently undulating, in a moist, cultivated area (NW¼NW¼NE¼ sec. 22, T. 4 N., R. 5 E.):

Ap—0 to 5 inches, dark-brown (10YR 3/3) fine sandy loam; weak, fine, granular structure; very friable; lower 2 inches is a compact plowsole; abundant roots and few pores; slightly acid; clear, smooth boundary.

Bt—5 to 20 inches, dark-brown (10YR 3/3) sandy clay loam; weak, medium, subangular blocky structure; friable; common, thin, patchy clay films on ped faces; common pores; medium acid; clear, smooth boundary.

C—20 to 48 inches +, dark-brown (10YR 4/3) sandy loam; structureless; very friable; few roots; medium acid.

Dubbs series.—This series consists of moderately well drained soils derived from medium-textured general alluvium on natural levees of the Mississippi River and its tributaries.

Dubbs soils have a brown to dark-brown fine sandy loam A horizon and a yellowish-brown sandy clay loam B horizon. The lower part is mottled with light brownish gray.

These soils are slightly to strongly acid, have moderately high natural fertility, and contain a moderate amount of organic matter. They are gently undulating to undulating; their gradient is generally less than 8 percent. Dubbs soils are in small to medium areas along the St. Francis River and its former channels. They are associated with Bruno, Beulah, Bosket, and Dundee soils. They are finer textured than Bruno and Beulah soils and not so well drained. They are not so well drained as Bosket soils, and are better drained than Dundee soils. Dubbs soils have gray mottles beginning at a depth of 18 to 24 inches, but Bruno, Beulah, and Bosket soils are mottle free, and Dundee soils are mottled with gray throughout the B and C horizons.

Profile (representative of the series) of Dubbs fine sandy loam, gently undulating, in a moist, cultivated area (NW¼NE¼NW¼ sec. 18, T. 5 N., R. 4 E.):

Ap—0 to 6 inches, brown (10YR 5/3) fine sandy loam; weak, fine, granular structure; very friable; abundant roots and many pores; slightly acid; abrupt, smooth boundary.

B21t—6 to 18 inches, yellowish-brown (10YR 5/4) sandy clay loam; moderate, medium, subangular blocky structure; friable; few, thin, patchy clay films; few roots and pores; few, small, dark, soft concretions; strongly acid; clear, smooth boundary.

B22t—18 to 22 inches, yellowish-brown (10YR 5/4) sandy clay loam; common, fine faint, light brownish-gray (10YR 6/2) mottles; moderate, medium, subangular blocky structure; friable; few, thin, patchy clay films; few roots and pores; few, small, dark, soft concretions; strongly acid; clear, smooth boundary.

C—22 to 48 inches +, dark yellowish-brown (10YR 4/4) fine sandy loam; common, medium, distinct, light brownish-gray (10YR 6/2) mottles; weak, coarse, subangular blocky structure; very friable; medium acid.

Dundee series.—This series consists of somewhat poorly drained soils derived from thinly stratified beds of loamy and clayey alluvium that was deposited on natural levees by the Mississippi River and its tributaries.

Dundee soils have a dark-brown or brown fine sandy loam or silt loam A horizon. The B horizon is light brownish-gray to dark grayish-brown silty clay loam, mottled yellow and gray.

These soils are slightly to strongly acid, have moderately high natural fertility, and contain a moderate amount of organic matter. They are level to undulating; their gradient is generally less than 8 percent.

Dundee soils are in medium to large areas along the St. Francis River and its former channels. They are associated with Bosket and Dubbs soils. Dundee soils are finer textured, less friable, and more poorly drained than Bosket and Dubbs soils. Dundee soils have gray mottles throughout the B and C horizons, but Bosket soils are mottle free, and Dubbs soils have gray mottles below a depth of about 18 inches.

Profile (representative of the series) of Dundee fine sandy loam, level, in a moist, cultivated area (NW¼SW¼NE¼ sec. 16, T. 4 N., R. 5 E.):

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

B2t—5 to 17 inches, dark grayish-brown (10YR 4/2) silty clay loam; common, coarse, faint, gray (10YR 5/1) and few, fine, distinct, yellowish-brown (10YR 5/4) mottles; weak, medium and fine, subangular blocky structure; firm; few patchy clay films on ped faces and in pores; many roots and common pores; few, fine, soft, dark concretions; strongly acid; clear, smooth boundary.

B3—17 to 27 inches, dark grayish-brown (10YR 4/2) fine sandy loam; few, medium, faint, gray (10YR 5/1) and few, fine, faint, dark yellowish-brown (10YR 4/4) mottles; weak, medium, subangular blocky structure; very friable; many roots and common pores; few, fine, soft, dark concretions; medium acid; clear, smooth boundary.

C1—27 to 36 inches, dark grayish-brown (10YR 4/2) very fine sandy loam; structureless; very friable; few roots and pores; medium acid; clear, wavy boundary.

C2—36 to 48 inches +, dark grayish-brown (10YR 4/2) loamy fine sand; few, fine, faint, grayish-brown (10YR 5/2) mottles; structureless; very friable; few roots and pores; medium acid.

Loring series.—The Loring series consists of moderately well drained to well drained soils that developed in thick loess under a dense upland hardwood forest.

These soils have a brown, yellowish-brown, or dark-brown silt loam A horizon 4 to 10 inches thick. The B horizon is dark-brown, brown, or yellowish-brown silt loam or silty clay loam. The lower part of the B horizon is a brown or light brownish-gray fragipan mottled with yellowish brown and gray. It is usually thin and weakly expressed. Depth to the fragipan ranges from 22 to 33 inches.

Loring soils are slightly to strongly acid. Their natural fertility is moderate, and their content of organic matter is low. They are nearly level to steep, but their slopes rarely exceed 30 percent.

Loring soils occur mainly in medium to large areas. They are associated with Memphis soils, but Memphis soils do not have the gray mottles and the fragipan that Loring soils have.

Profile (representative of the series) of Loring silt loam, 3 to 8 percent slopes, in a moist, wooded area (SW¼NE¼SW¼ sec. 3, T. 4 N., R. 3 E.):

A1—0 to 4 inches, dark-brown (10YR 3/3) silt loam; moderate, fine, granular structure; very friable; many roots; slightly acid; abrupt, smooth boundary.

B1—4 to 9 inches, yellowish-brown (10YR 5/4) silt loam; weak, moderate, subangular blocky structure; very friable; peds are darker than crushed mass; few roots and root channels; very strongly acid; gradual, smooth boundary.

B21t—9 to 16 inches, dark-brown (7.5YR 4/4) silty clay loam; weak, medium, subangular blocky structure; friable; few, patchy clay films; peds are darker than crushed mass; few roots; few pores; very strongly acid; gradual, smooth boundary.

B22t—16 to 28 inches, dark-brown (7.5YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; common clay films; ped surfaces darker than crushed mass; many pores; few roots; very strongly acid; clear, smooth boundary.

Btx—28 to 36 inches, mottled light brownish-gray (10YR 6/2) and dark-brown (7.5YR 4/2) silty clay loam; moderate, medium, subangular blocky structure; firm; brittle; gray (10YR 6/1) coatings on some peds; few, patchy clay films; few, small, soft, dark concretions; few roots and root channels; very strongly acid; gradual, smooth boundary.

C—36 to 72 inches, dark-brown (7.5YR 4/4) silt loam; massive (structureless); friable; few cracks filled with gray (10YR 6/1) silt; strongly acid.

Memphis series.—This series consists of well-drained soils that developed in thick loess under a dense, upland hardwood forest.

These soils have a brown to dark grayish-brown silt loam A horizon 4 to 10 inches thick. Their B horizon is brown to dark yellowish-brown silty clay loam.

These soils are medium to very strongly acid, have moderate natural fertility, and contain a small amount of organic matter. They are nearly level to steep; their gradient is less than 40 percent.

Memphis soils are in medium to large areas, mainly on Crowley Ridge. They are associated with Loring soils, but they are better drained than those soils, are browner throughout the B horizon, and do not have a fragipan horizon.

Profile (representative of the series) of Memphis silt loam, 3 to 8 percent slopes, eroded, in a moist, cultivated area (NW¼SW¼NE¼ sec. 22, T. 6 N., R. 3 E.):

Ap—0 to 4 inches, brown (10YR 5/3) silt loam; weak, fine and medium, granular structure; very friable; abundant roots; few pores; medium acid; clear, smooth boundary.

B21t—4 to 12 inches, yellowish-brown (10YR 5/4) silty clay loam; weak, moderate, subangular blocky structure; firm; few clay films; plentiful roots; few pores; few, small, dark, soft concretions; few organic stains on ped faces; very strongly acid; gradual, smooth boundary.

B22t—12 to 26 inches, brown (7.5YR 5/4) silty clay loam; moderate, medium, subangular blocky structure; friable; few roots and pores; few, small, dark, soft concretions; few peds coated with gray (10YR 6/1) silt; few clay films; very strongly acid; gradual, smooth boundary.

B3—26 to 40 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, subangular blocky structure; friable; few roots and pores; few, small, dark concretions; few peds coated with gray (10YR 6/1) silt; few patchy clay films; very strongly acid; diffuse boundary.

C—40 to 56 inches +, yellowish-brown (10YR 5/4) silt loam; massive in place, breaking to weak, coarse, subangular blocky structure; friable; few roots; few, small, dark, soft concretions; some vertical cracks filled with gray (10YR 6/1) silt; medium acid.

Intrazonal order

The intrazonal order is made up of great soil groups that reflect the dominating influence of some local factor of relief, parent material, or age over the normal effects of climate and vegetation (*10*). In some nearly level areas where internal and external drainage are restricted, soils that have been in place a long time have certain well-developed profile characteristics that zonal soils do not have. Such soils are associated geographically with zonal soils and are called intrazonal soils. The properties of such soils in this county are generally the result of level relief or age influenced greatly by parent material.

Intrazonal soils in St. Francis County are in the Grumusol, Low-Humic Gley, Planosol, and Solodized-Solonetz great soil groups.

GRUMUSOLS

Grumusols are influenced by their content of montmorillonitic clay. These soils are typically clay in texture. They lack eluvial and illuvial horizons, have moderate to strong, granular structure in the surface horizon, and have a high coefficient of expansion and contraction upon wetting and drying. They shrink or swell markedly as the moisture content changes. As the soils shrink they crack, and materials from upper horizons drop down into lower ones. Thus, the soils are being churned or mixed continually, a process that partly offsets horizon differentiation (*13*).

Grumusols may have a prominent A1 horizon, but they lack a B horizon. They have dull colors of low chroma, as a rule, and are not well drained.

In St. Francis County, the Sharkey series is in this great soil group.

Sharkey series.—This series consists of poorly drained soils derived from thick beds of alluvial clay under a dense forest of water-tolerant hardwoods.

These soils have an A horizon of dark-gray or dark grayish-brown clay or silty clay loam. Their C horizon is dark-gray or gray clay mottled with brown and yellowish brown.

Sharkey soils are slightly acid to mildly alkaline. In places calcium carbonate nodules are at a depth of about 5 feet. These soils have high natural fertility and contain a moderately large amount of organic matter. They also contain a large amount of montmorillonitic clay. They are level to undulating. The slopes are short, and the steepest is less than 8 percent.

Sharkey soils are in broad areas with Alligator, Earle, and Bowdre soils. Sharkey soils are slightly acid to alkaline, but Alligator soils are medium acid to strongly acid. Sharkey soils are more poorly drained than Earle and Bowdre soils and are in thicker beds of clay. Earle soils are in beds of clay 20 to 36 inches thick over coarser material, and Bowdre soils are in beds of clay 10 to 20 inches thick over coarser material.

Profile (representative of the series) of Sharkey clay, 0 to 1 percent slopes, in a moist, cultivated area (NE¼NE¼NE¼ sec. 1, T. 5 N., R. 6 E.):

Ap—0 to 9 inches, dark-gray (N 4/0) clay; moderate, fine, granular structure; hard when dry, firm when moist, plastic when wet; common roots; few pores; common, yellowish-red (5YR 4/6), soft concretions; slightly acid; abrupt, smooth boundary.

C1g—9 to 20 inches, dark-gray (5Y 4/1) clay; common, medium, prominent, strong-brown (7.5YR 5/8) mottles; massive (structureless); hard when dry, firm when moist, plastic when wet; few roots; few pores; many, very fine and few, medium, soft, dark concretions; slightly acid; diffuse boundary.

C2g—20 to 35 inches, gray (10YR 5/1) clay; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; massive (structureless); hard when dry, firm when moist, plastic when wet; few roots; common, fine, soft, dark concretions; slightly acid; diffuse boundary.

C3g—35 to 48 inches +, gray (10YR 5/1) clay; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; massive (structureless); hard when dry, firm when moist, plastic when wet; few roots; common, fine, soft, dark concretions; mildly alkaline.

LOW-HUMIC GLEY SOILS

The Low-Humic Gley soils contain a moderate to small amount of organic matter. They are poorly drained and do not have distinct horizons, although they show the effects of gleying and accumulation of organic matter. Low-Humic Gley soils lack a prominent A1 horizon. The A1 horizon is underlain by the gleyed B horizon. These horizons differ little in texture.

In St. Francis County the Alligator series is the only member of the Low-Humic Gley great soil group.

Alligator series.—This series consists of poorly drained soils derived from thick beds of alluvial clays. These soils formed under a dense forest of water-tolerant hardwoods. The A horizon of Alligator soils is dark-gray or dark grayish-brown clay, or is silty clay loam overwash. The C horizon is gray, mottled clay.

These soils are medium acid to strongly acid, but in places calcium carbonate is present at a depth of about 5 feet. These soils have high natural fertility and a moderately high content of organic matter. They are high in montmorillonitic clays. They are level to undulating. Their slopes are short, and the steepest are less than 8 percent.

Alligator soils are in broad areas with Sharkey soils. Alligator soils are medium acid to strongly acid, however, and the Sharkey soils are slightly acid to alkaline. Alligator soils also occur with Earle and Bowdre soils but are more poorly drained than either of those soils. Alligator soils are in thick beds of clay, but Earle soils are in thinner beds of clay 20 to 36 inches thick over coarser material, and Bowdre soils are in beds of clay only 10 to 20 inches thick over coarser material.

Profile (representative of the series) of Alligator clay, 0 to 1 percent slopes, in a moist, cultivated area (NW¼SW¼SE¼ sec. 3, T. 5 N., R. 5 E.):

Ap1—0 to 4 inches, dark grayish-brown (10YR 4/2) clay; moderate, fine, granular structure; hard when dry firm when moist, plastic when wet; common roots; few pores; medium acid; abrupt, smooth boundary.

Ap2—4 to 8 inches, dark-gray (10YR 4/1) clay; few, fine, prominent, yellowish-brown (10YR 5/6) mottles; moderate, medium and fine, subangular blocky structure; hard when dry, firm when moist, plastic when wet; common roots; few pores; medium acid; abrupt, smooth boundary.

C1g—8 to 20 inches, gray (10YR 5/1) clay with common, medium and coarse, prominent, yellowish-brown (10YR 5/6) mottles; massive (structureless) in place; breaks into weak, medium and coarse, angular blocky fragments; hard when dry, firm when moist, plastic when wet; few slickensides; few roots; common, small, dark, hard concretions; strongly acid; diffuse boundary.

C2g—20 to 72 inches +, gray (N 5/0) clay with common, fine, distinct, yellowish-brown (10YR 5/4) mottles; massive (structureless); hard when dry, firm when moist, plastic when wet; few, small, dark, soft concretions; strongly acid.

PLANOSOLS

Planosols have an eluviated surface horizon underlain by a B horizon that is more strongly illuviated, cemented, or compacted than those of associated zonal soils. These soils have developed in nearly level uplands under grass or forest vegetation in a humid climate (*10*). The climatic conditions were similar to those under which zonal soils developed, but in many areas Planosols are more moist and less well aerated than zonal soils.

The distinguishing feature of Planosols is the accumulation of a well-defined layer of clay or cemented material at a varying depth. This development has taken place in nearly level areas where drainage is restricted (*10*). Internal drainage is slow; thus, aeration is poor and water percolates slowly out of the soil.

In St. Francis County the soils of the Calhoun, Calloway, Crowley, Henry, Hillemann, Stuttgart, and Zachary series are Planosols.

Calhoun series.—This series consists of poorly drained soils developed in thick loess. These soils have a mottled yellowish-brown silt loam A horizon. In places the A2g horizon is light gray. The B horizon is light browish-gray, dark grayish-brown, and grayish-brown silt loam and silty clay loam with tongues of silt in the upper part.

Calhoun soils are medium to very strongly acid. Their content of organic matter is low.

Calhoun soils are in small to medium areas in the loess plains west of Crowley Ridge. These soils are associated with Loring and Calloway soils. They are grayer and more poorly drained than either of the associated soils and do not have a fragipan.

Profile (representative of the series) of Calhoun silt loam in a moist, cultivated area (NW¼NW¼NW¼ sec. 17, T. 4 N., R. 2 E.):

Ap—0 to 3 inches, grayish-brown (10YR 5/2) silt loam; common, fine, distinct, yellowish-brown (10YR 5/4) mottles; weak, fine, granular structure; very friable; abundant roots; few, black, hard concretions; strongly acid; abrupt, smooth boundary.

A2g—3 to 8 inches, grayish-brown (10YR 5/2) silt loam; common, fine, distinct, yellowish-brown (10YR 5/8) mottles along root channels; weak, coarse, subangular blocky structure; friable when moist, slightly brittle when dry; silt coatings on some peds; roots common; few, small, dark, soft concretions; very strongly acid; abrupt, smooth boundary.

B&A—8 to 21 inches, light brownish-gray (10YR 6/2) light silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; moderate, medium, subangular blocky structure; friable; gray (10YR 6/1) tongues of silt about 1½ inches in diameter and ending at depth of 10 to 20 inches; tongues are massive and very friable; dark-brown clay coatings on some peds and in some root channels; few roots; common vesicular pores; few, small, dark, hard and soft concretions; very strongly acid; gradual, wavy boundary.

B2tg—20 to 42 inches, dark grayish-brown (2.5Y 4/2) silty clay loam; few, medium, distinct, light olive-brown (2.5Y 5/6) mottles; moderate, medium, subangular blocky structure; friable when moist, brittle when dry; cracks filled with light-gray (10YR 7/1) silt; common, patchy and continuous clay films in pores and on ped faces; few roots; strongly acid; gradual, wavy boundary.

Cg—42 to 56 inches +, grayish-brown (10YR 5/2) heavy silt loam; common, fine, distinct, light olive-brown (2.5Y 5/4) mottles; moderate, medium, subangular blocky structure; friable; few root holes filled with light-gray (10YR 7/1) silt; common, small, soft and hard, dark concretions; medium acid.

Calloway series.—This series consists of somewhat poorly drained soils developed in thick loess under dense hardwood forest.

These soils have a very dark grayish-brown to brown silt loam A horizon. The B horizon is dark-brown and grayish-brown, mottled silt loam. The lower part of the B horizon is a gray and yellowish-brown, mottled silty clay loam fragipan. The depth to the fragipan ranges from 17 to 23 inches.

Calloway soils are slightly to strongly acid and have moderate natural fertility. Their content of organic matter is low. They are level to nearly level; the gradient is less than 3 percent.

Calloway soils occur mainly in moderate to large areas in association with Loring and Henry soils. They are intermediate between Loring and Henry soils in drainage, color, and relief. They have a more strongly developed fragipan and a paler subsoil mottled nearer the surface than the Loring, and they are not so gray throughout as the Henry soils.

Profile (representative of the series) of Calloway silt loam, 0 to 1 percent slopes, in a moist, cultivated area (NW¼NE¼NW¼ sec. 29, T. 5 N., R. 3 E.):

Ap1—0 to 7 inches, brown (10YR 5/3) silt loam; weak, fine, granular structure; very friable; medium acid; clear, smooth boundary.

Ap2—7 to 13 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; upper part is a plowsole; common roots and pores; roots are nearly horizontal; lower 2 inches has platy structure; few, dark, soft concretions; slightly acid; abrupt, smooth boundary.

B21g—13 to 20 inches, grayish-brown (10YR 5/2) silt loam; few, fine, distinct, dark-brown (10YR 4/3) mottles; weak, fine, subangular blocky structure; friable; common fine roots; few pores; common, silt-filled root channels; common, fine, dark concretions, increasing in number with depth; slightly acid; clear, smooth boundary.

B22tx—20 to 36 inches, gray (10YR 6/1) silty clay loam; common, medium to coarse, distinct, dark yellowish-brown (10YR 4/4) mottles; massive (structureless); hard and brittle when dry, firm when moist; common patchy clay films; common, dark-brown concretions; few roots and pores; slightly acid; clear, smooth boundary.

B23tx—36 to 48 inches +, gray (10YR 6/1) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; weak, prismatic macrostructure that breaks into moderate, coarse, subangular blocky structure; very firm when moist, brittle when dry; common patchy clay films; few, small, dark concretions; slightly acid.

Crowley series.—This series consists of poorly drained soils developed in clayey material overlain by a thin mantle of loess.

These soils have an A horizon of dark grayish-brown or very dark grayish-brown silt loam. The IIB horizon is mottled gray, red, and yellowish-brown silty clay. This horizon is a claypan and is at a depth of 14 to 20 inches.

Crowley soils are medium to strongly acid. Their natural fertility and content of organic matter are moderate. They are level to nearly level; the gradient is less than 3 percent.

Crowley soils are in large areas in the western part of the county. They are associated with Hillemann and Stuttgart soils. Crowley soils are grayer and more poorly drained throughout than Stuttgart soils and have more clayey material in the subsoil than Hillemann soils.

Profile (representative of the series) of Crowley silt loam, 0 to 1 percent slopes, in a moist, cultivated area (SW¼SW¼NW¼ sec. 18, T. 4 N., R. 1 E.):

Ap1—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; abundant roots and few pores; neutral; abrupt, smooth boundary.

Ap2—6 to 9 inches, gray (10YR 5/1) silt loam; common, medium, distinct, yellowish-brown (10YR 5/4) and few, medium, distinct, dark-brown (10YR 3/3) mottles; weak, medium, subangular blocky structure; friable; plentiful roots and few pores; few, fine, dark, hard and soft concretions; medium acid; clear, smooth boundary.

B1—9 to 17 inches, light brownish-gray (10YR 6/2) silt loam; few, fine, distinct, yellowish-brown (10YR 5/8) and common, medium, distinct, yellowish-brown (10YR 5/4) mottles; very dark grayish-brown (10YR 3/2) stains around concretions; weak, medium, subangular blocky structure; friable; few, fine roots and plentiful pores; common, medium and coarse, dark, hard and soft concretions; slightly acid; abrupt, smooth boundary.

IIB21t—17 to 27 inches, gray (5Y 5/1) silty clay; many, medium, prominent, red (2.5YR 4/8) mottles; moderate, medium to coarse, prismatic structure that breaks to moderate, medium, angular blocky peds; very hard when dry, very firm when moist, plastic when wet; many patchy clay films; few roots and pores; few, small, dark, soft concretions; very strongly acid; clear, smooth boundary.

IIB22t—27 to 33 inches, grayish-brown (10YR 5/2) silty clay; few, fine, distinct, yellowish-brown (10YR 5/8) and few, coarse, distinct, yellowish-brown (10YR 5/4) mottles; weak, medium, prismatic structure that breaks to moderate, medium, angular blocky peds; firm; common patchy clay films; few roots and pores; common, fine, dark, soft concretions; strongly acid; clear, smooth boundary.

IIB3—33 to 46 inches +, grayish-brown (10YR 5/2) silty clay; few, fine, distinct, yellowish-brown (10YR 5/8), few, coarse, distinct, yellowish-brown (10YR 5/4), and common, medium, gray (5Y 5/1) mottles; moderate, medium, subangular blocky structure; firm; few roots and pores; common, small, dark, soft concretions; medium acid.

Henry series.—This series consists of poorly drained soils developed in thick loess.

These soils have a gray silt loam A horizon. The B horizon is gray silt loam mottled with yellowish brown, and it has a fragipan at a depth of 20 to 36 inches.

Henry soils are medium to very strongly acid and have moderate fertility. Their content of organic matter is low.

Henry soils are in small to medium areas in the loess plains west of Crowley Ridge. They are associated with Loring and Calloway soils, but they are grayer and more poorly drained than either of the associated soils.

Profile (representative of the series) of Henry silt loam, in a moist, wooded area (SE¼NE¼SE¼ sec. 22, T. 5 N., R. 1 E.):

O1—1 inch to 0, hardwood leaf and twig litter.

A1—0 to 2 inches, very dark-gray (10YR 3/1) silt loam; weak, medium, granular structure; apparently about 80 percent worm casts; very friable; matted with numerous roots; very porous; strongly acid; abrupt, wavy boundary.

A21g—2 to 6 inches, gray (10YR 6/1–5/1) silt loam with common, medium, distinct, dark-brown (7.5YR 4/4) mottles; weak, medium, subangular blocky structure; friable; many roots; common medium tubules; very strongly acid; gradual, wavy boundary.

A22g—6 to 14 inches, gray (10YR 6/1–5/1) silt loam with fine and medium, distinct, dark-brown (10YR 4/3) mottles; weak, fine, angular blocky structure; very friable; few firm masses appear to have been moved up from B2; many medium tubules; few, fine, hard, black concretions; very strongly acid; gradual, wavy boundary.

B1g—14 to 18 inches, gray (5Y 6/1) silt loam with few, medium, distinct, dark-brown (7.5YR 4/4) mottles; weak, medium, subangular blocky structure; very friable; slightly sticky; few roots; common medium tubules; very strongly acid; clear, wavy boundary.

B21xtg—18 to 28 inches, gray (5Y 6/1) light silty clay loam with few, medium, distinct, yellowish-brown (10YR 5/4) mottles; weak, coarse, subangular blocky structure; firm when moist, slightly sticky and plastic when wet; common clay films on coarse peds; few fine roots; several black or very dark brown, humified cortices of coarse roots, woody part of root not present and relict cortices without fill; few, vertical, gray silt veins, up to 2 inches in diameter; few medium tubules; very strongly acid; clear, wavy boundary.

B22xtg—28 to 51 inches +, grayish-brown (2.5Y 5/2) heavy silt loam with few, fine, faint, light brownish-gray (2.5Y 6/2) and few, fine, distinct, yellowish-brown (10YR 5/6) mottles; massive (structureless), breaks to coarse angular fragments; very firm when moist, brittle when dry; common patchy clay films; few fine tubules; strongly acid.

Hillemann series.—This series consists of somewhat poorly drained soils developed in loess.

These soils have a dark-gray silt loam A horizon. Their B horizon is mottled light yellowish-brown silt loam in the upper part. Below this is red and gray, mottled silty clay loam underlain by grayish-brown and brown, mottled silty clay loam or silt loam.

These soils have moderate natural fertility and organic matter. They are level or nearly level; their gradient is less than 3 percent.

Hillemann soils are in large areas in the western part of the county. They are associated with Crowley soils. Hillemann soils differ from Crowley soils in containing less clay through the B horizon and in having an acid natric horizon in the lower part of the B horizon.

Profile (representative of the series) of Hillemann silt loam, 0 to 1 percent slopes, in a cultivated area (NE¼NW¼NW¼ sec. 10, T. 4 N., R. 1 W.):

Ap1—0 to 4 inches, dark-gray (5Y 4/1) silt loam; few, fine, distinct, dark-brown (10YR 3/3) mottles; weak, medium, granular structure; friable; many roots; common, fine and medium, dark, soft concretions; mildly alkaline; abrupt, smooth boundary.

Ap2—4 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; many, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, medium, subangular blocky structure; friable; fine roots and pores common; slightly acid; abrupt, smooth boundary.

B1g—9 to 16 inches, light yellowish-brown (2.5Y 6/4) silt loam; many, medium, faint, light brownish-gray (2.5Y 6/2), common, medium, distinct, yellowish-brown (10YR 5/4), and few gray (5Y 5/1) mottles; moderate, medium, subangular blocky structure; friable; few, thin, patchy clay films; medium, soft, dark-brown concretions common; very strongly acid; clear, wavy boundary.

B21tg—16 to 23 inches, red (2.5YR 4/6) silty clay; many, fine and medium, prominent, gray (5Y 5/1) mottles; strong, medium, subangular blocky structure; firm; patchy clay films on ped faces common; silt coating on vertical faces of some peds; few pores; fine, soft, dark concretions common; very strongly acid; clear, wavy boundary.

B22t—23 to 27 inches, brown (10YR 5/3) silty clay loam; many, medium, faint, grayish-brown (10YR 5/2), common, medium, distinct, yellowish-brown (10YR 5/6), and few, very fine, prominent, red (2.5YR 4/6) mottles; moderate, medium, subangular blocky structure; firm; slightly plastic; patchy clay films common; pores common; soft, dark concretions common; strongly acid; clear, wavy boundary.

B3gsa—27 to 43 inches +, gray (10YR 5/1) silt loam; common, medium, distinct, yellowish-brown (10YR 5/4) and common, fine, distinct, yellowish-brown (10YR 5/8) mottles; moderate, medium, subangular blocky structure; firm, slightly plastic; few thin patchy clay films; few pores; many, medium, soft, black concretions and common, soft, dark-brown concretions; medium acid.

Stuttgart series.—This series consists of somewhat poorly drained to moderately well drained soils that developed in old clayey alluvium overlain by a thin mantle of loess.

These soils have an A horizon of dark-brown or dark grayish-brown silt loam. The upper part of the B horizon is mottled yellowish-brown, brown, and grayish-brown silty clay loam or silt loam. The lower part of the B horizon is a claypan mottled with red, yellow, and gray. The depth to the claypan ranges from 14 to 20 inches.

Stuttgart soils are slightly to strongly acid. Their natural fertility and content of organic matter are moderate. They are nearly level; their gradient is less than 3 percent.

Stuttgart soils are in small to medium areas in the western part of the county. They are associated with Crowley soils, but they are better drained than Crowley soils and have brown A and B horizons above the claypan.

Profile (representative of the series) of Stuttgart silt loam, 1 to 3 percent slopes, in a moist, cultivated area (NW¼SW¼NE¼ sec. 33, T. 4 N., R. 1 W.):

Ap1—0 to 5 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; very friable; abundant roots and few pores; few, small, dark, soft concretions; slightly acid; abrupt, smooth boundary.

Ap2—5 to 11 inches, dark grayish-brown (10YR 4/2) silt loam; common, medium, distinct, grayish-brown (10YR 5/2) and few, fine, prominent, yellowish-brown (10YR 5/6) mottles; weak, fine and medium, subangular blocky structure; friable; abundant roots and few pores; few, small, dark, soft concretions; slightly acid; clear, smooth boundary.

B21—11 to 19 inches, brown (10YR 5/3) silt loam; few, medium, faint, yellowish-brown (10YR 5/8) mottles; weak, medium and fine, subangular blocky structure; friable; plentiful roots and few pores; few, small, dark, soft concretions; slightly acid; abrupt, smooth boundary.

IIB22t—19 to 35 inches, red (2.5YR 4/6) silty clay; common, medium, distinct, grayish-brown (10YR 5/2) mottles; moderate, medium to coarse, prismatic structure that breaks to moderate, medium, angular blocky peds; very firm when moist, very hard when dry, plastic when wet; common patchy and continuous clay films on ped faces; few roots and few pores; few, small, dark, soft concretions; silt coatings in root channels; strongly acid; clear, smooth boundary.

IIB23t—35 to 48 inches +, light brownish-gray (10YR 6/2) silty clay; common, medium, dark yellowish-brown (10YR 4/4) and few, medium, distinct, dark-brown (10YR 4/3) mottles; moderate, medium, subangular blocky structure; friable; common patchy clay films; few roots; common, medium and coarse, hard and soft, dark concretions; medium acid.

Zachary series.—The Zachary series consists of poorly drained soils developed in sediments washed primarily from Memphis, Loring, and related soils that developed entirely in loess.

These soils have a gray to dark grayish-brown silt loam A horizon. The B horizon is gray, mottled silt loam and silty clay.

Zachary soils are strongly acid, have moderate natural fertility, and contain a medium amount of organic matter.

Zachary soils are in large areas with the Collins and Arkabutla soils, mainly along L'Anguille River. They are grayer and more poorly drained than either of those soils. Zachary soils are gray and mottled to the surface. Arkabutla soils are brown and mottle free to a depth of about 10 inches, and Collins soils are brown and free of mottles to about 20 inches.

Profile (representative of the series) of Zachary silt loam, in a moist, wooded area (NW¼NE¼NE¼ sec. 32, T. 5 N., R. 2 E.):

O1—¼ inch to 0, partly decayed leaves, grass, and small twigs.

A1—0 to 4 inches, grayish-brown (10YR 5/2) silt loam; few, fine, faint, dark-brown (10YR 4/3) mottles; weak, fine, granular structure; friable; abundant roots and few pores; few, dark, soft concretions; slightly acid; gradual, smooth boundary.

A21g—4 to 14 inches, gray (10YR 6/1) silt loam; common, medium, prominent, yellowish-brown (10YR 5/4) mottles; weak, fine, granular structure; friable; many roots and pores; common, fine, dark concretions; medium acid; gradual, wavy boundary.

A22g—14 to 23 inches, gray (10YR 6/1) silt loam; common, medium to coarse, prominent, dark yellowish-brown (10YR 4/4) mottles; weak, medium, subangular blocky structure; friable; many roots and few pores; common, coarse and fine, dark, soft concretions; strongly acid; clear, smooth boundary.

B1g—23 to 31 inches, gray (10YR 6/1) silt loam; many, medium to coarse, prominent, dark yellowish-brown (10YR 4/4) mottles; weak, medium, subangular blocky structure; friable; few, patchy clay films; few roots and pores; many, coarse and fine, dark, soft concretions; strongly acid; abrupt, smooth boundary.

B2tg—31 to 48 inches +, gray (10YR 6/1) silty clay; few, fine, distinct, brownish-yellow (10YR 6/8) mottles; weak, medium, subangular blocky structure; firm; common clay films on peds and in seams and pores; some root holes filled with gray (10YR 7/1) silt; few roots; few, small, dark, soft concretions; strongly acid.

SOLODIZED-SOLONETZ SOILS

Solodized-Solonetz soils have an accumulation of various kinds of sodium and magnesium salts (*10*). Their exchange complex is dominated by cations of sodium and magnesium. Where these salts occur in appreciable quantities, the soils are popularly known as "alkali soils." They have developed under poor drainage. The properties of Solodized-Solonetz soils are thought to have been caused by partial leaching but may have been caused, in part, by concentrations of cations through lateral or upward movement of ground water. These soils occur in small areas and occupy only a few acres in St. Francis County. They have a thin surface layer of light-colored, leached silty material over a darker colored, more clayey B horizon. The subsoil layer has columnar structure. The lower B horizon is light gray, strongly alkaline, and calcareous in places.

In St. Francis County only the Lafe series is in this great soil group.

Lafe series.—This series consists of poorly drained to somewhat poorly drained soils developed in thick loess.

These soils have an A horizon of very dark grayish-brown or grayish-brown silt loam. Their B horizon is mottled grayish-brown, light brownish-gray, olive-brown, and yellowish-brown silty clay loam.

These soils are strongly acid in the upper part of the profile. At a depth of 10 inches or less, their content of exchangeable sodium and magnesium is very high. Their content of organic matter and their natural fertility are low.

Lafe soils are associated with Calloway soils. The main differences between Lafe and Calloway soils are the high content of sodium and magnesium in the Lafe soil and the resulting physical characteristics. The B horizons of Lafe soils have moderate to strong, columnar and prismatic structure and extremely firm consistence. The B horizons of Calloway soils have angular blocky structure to massive, have firm or brittle consistence, and have fewer clay films.

Profile (representative of the series) of Lafe silt loam, acid, in a moist, wooded area (SW¼ SW¼ SE¼ sec. 8, T. 5 N., R. 2 E.):

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) silt loam; gray (10YR 5/1) when dry; weak, medium, granular structure; very friable; few roots; strongly acid; abrupt, wavy boundary.

A2—3 to 5 inches, grayish-brown (2.5Y 5/2) silt loam; white (10YR 8/1) when dry; weak, fine, granular structure, grading toward very weak, coarse, platy structure; very friable; few roots; strongly acid; abrupt, wavy boundary.

B21t—5 to 14 inches, pale-brown (10YR 6/3) silty clay loam; light brownish gray (10 YR 6/2) when dry; common, medium, faint, grayish-brown (10YR 5/2) mottles; moderate, coarse, columnar structure that breaks into strong, coarse, angular blocky structure; extremely firm, very hard; many tree roots; few root cortices filled with silt; thick, dark-brown clay films in pores and on peds; many peds coated with gray silt; many medium pores; strongly acid; gradual, smooth boundary.

B22t—14 to 30 inches, light brownish-gray (2.5Y 6/2) silty clay loam with few, fine, faint, yellowish-brown (10YR 5/4) mottles that, when wet, have an overall color of light brownish gray (2.5Y 6/2); weak, coarse, angular blocky structure; extremely firm when moist, very hard when dry; gray silt coatings on peds; pores and crevices lined with brown clay; many medium pores; root channels and crevices filled with gray silt; very strongly acid; gradual, smooth boundary.

B23t—30 to 38 inches, light brownish-gray (10YR 6/2) silt loam with common, medium, distinct, light olive-brown (2.5Y 5/6) mottles; massive (structureless); extremely firm when moist, very hard when dry; few root channels filled with gray silt; brown clay films in pores; many medium pores; few, fine, dark, hard concretions; moderately alkaline; gradual, smooth boundary.

B24t—38 to 48 inches +, light brownish-gray (10YR 6/2) silt loam with many, medium, faint, light yellowish-brown (10YR 6/4) mottles; massive (structureless); firm; many medium pores; clay films in most pores; few clay films on peds; few, fine, dark, hard concretions; strongly alkaline.

Azonal order

The azonal order consists of great soil groups that have little or no mature soil characteristics because of their youth or because the nature of their parent material or relief has prevented normal development (*10*). Where parent materials have been in place only a short time, as in areas where the material has been recently transported by wind or water, the soils have weakly defined or no genetic horizons. These soils are young. They have few or none of the properties of zonal soils and are therefore called azonal soils.

The azonal soils in St. Francis County have an A1 horizon that is normally dark colored and contains a fairly large amount of organic matter. The layer of illuviation, or B horizon, is slight or nonexistent. The A horizon normally is directly underlain by the C horizon. These soils are called A–C soils because of the absence of the B horizon. In this county the azonal soils are on the youngest part of the bottom lands.

The azonal soils in St. Francis County are in the Alluvial great soil group.

ALLUVIAL SOILS

The Alluvial soils in this county lack distinct horizons because the sediments in which they are developing are young. These water-laid materials have had little modification by the soil-forming processes. Their characteristics are determined largely by the nature of the materials from which they have been derived and the manner in which these materials have been sorted and deposited (*10*).

Alluvial soils in St. Francis County are on first bottoms. They are level or undulating and somewhat excessively drained to somewhat poorly drained. The Arkabutla, Beulah, Bowdre, Bruno, Collins, Earle, and Iuka series are in the Alluvial great soil group.

Arkabutla series.—This series consists of somewhat poorly drained soils in sediments washed primarily from Memphis, Loring, and related soils that developed entirely in loess.

They have a grayish-brown or dark grayish-brown silt loam A horizon. The C horizon is brown, light brownish-gray, and light-gray, mottled silt loam or silty clay loam.

Arkabutla soils are medium to strongly acid, have moderate natural fertility, and contain a medium amount of organic matter.

These soils are in small to medium areas along streams throughout the loess area of the county. Arkabutla soils are associated with Collins and Zachary soils, but they are intermediate in drainage between these associates. Arkabutla soils are brown and mottle free to a depth of about 10 inches, whereas Collins soils are brown and mottle free to a depth of about 20 inches. Zachary soils are gray and mottled throughout and have a moderately developed B horizon.

Profile (representative of the series) of Arkabutla silt loam, in a moist, cultivated area (NE¼NW¼NE¼ sec. 5, T. 5 N., R. 3 E.):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; abundant roots; pores common; medium acid; abrupt, smooth boundary.

C1—7 to 16 inches, brown (10YR 5/3) silt loam; common, fine, distinct, light brownish-gray (10YR 6/2) mottles; weak, medium, subangular blocky structure; friable; few roots and pores; few, small, dark, soft concretions; medium acid; clear, wavy boundary.

C2g—16 to 31 inches, light brownish-gray (10YR 6/2) silt loam; many, coarse, distinct, dark grayish-brown (10YR 4/2) and few, fine, distinct, light yellowish-brown (10YR 6/4) mottles; weak, coarse and medium, subangular blocky structure; friable; few, small, dark, soft concretions; few roots and pores; strongly acid; clear, wavy boundary.

C3g—31 to 48 inches +, light-gray (2.5Y 7/2) silt loam; common, fine, distinct, pale-brown (10YR 6/3) and few, fine, distinct, light yellowish-brown (10YR 6/4) mottles; weak, medium, subangular blocky structure; friable; strongly acid.

Beulah series.—The Beulah series consists of somewhat excessively drained soils in medium-textured or moderately coarse textured alluvium on natural levees of the Mississippi River and its tributaries.

Beulah soils have a dark-brown A horizon and a yellowish-brown B horizon. The texture of both horizons is fine sandy loam. The horizon differentiation is weak. The differences are mainly in color and in the development of structure in the A horizon and the C horizon.

Beulah soils are slightly to medium acid and have low to moderate natural fertility. They are gently undulating to undulating; their gradient is less than 8 percent.

Beulah soils are in small to medium areas along the St. Francis River and its former channels. They are associated with Bruno, Bosket, and Dubbs soils. Beulah soils are better drained than Dubbs soils. They have only faint evidence of a B horizon, whereas Dubbs and Bosket soils have an evident B horizon and have more clay in the lower layers than Beulah soils; Bruno soils are more sandy than Beulah soils and are excessively drained.

Profile (representative of the series) of Beulah fine sandy loam, gently undulating, in a moist, cultivated area (SW¼NE¼SE¼ sec. 9, T. 4 N., R. 6 E.):

Ap—0 to 10 inches, dark-brown (10YR 4/3) fine sandy loam; weak, fine, granular structure; very friable; lower 2 inches is a plowsole; many roots; common pores; medium acid; abrupt, smooth boundary.

B—10 to 30 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, medium, subangular blocky structure; very friable; many roots; common pores; medium acid; gradual, smooth boundary.

C—30 to 48 inches +, yellowish-brown (10YR 5/4) sandy loam; structureless; very friable; few roots; medium acid.

Bowdre series.—This series consists of somewhat poorly drained soils in thin beds of alluvial clay, 10 to 20 inches thick, deposited over coarser textured sediments. These soils have formed on bottom lands under a dense forest of hardwoods.

Bowdre soils have a surface layer and a B horizon of dark-brown or very dark grayish-brown silty clay. The C1 and C2 horizons are dark-brown to grayish-brown, mottled fine sandy loam, sandy clay loam, silt loam, or stratified beds of silty and sandy material.

These soils are slightly acid to medium acid. They have high natural fertility and contain a moderate amount of organic matter. They are level to undulating. Their slopes are short, and the steepest gradient is less than 8 percent.

Bowdre soils are in transition zones between areas of clayey Alligator, Sharkey, and Earle soils, and sandy Bosket, Dubbs, and Dundee soils. Bowdre soils are better drained than the clayey group and are in thinner beds of clay. They differ from the sandy group in having a clayey surface layer, and they do not have the illuvial B horizon typical of these soils.

Profile (representative of the series) of Bowdre silty clay, undulating, in a moist, cultivated area (NE¼NW¼SW¼ sec. 3, T. 4 N., R. 6 E.):

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) silty clay; moderate, fine to medium, granular structure; firm; abundant roots and few pores; few, small, dark, soft concretions; slightly acid; abrupt, smooth boundary.

B—7 to 13 inches, dark-brown (10YR 4/3) silty clay; common, fine to medium, distinct, grayish-brown (10YR 5/2) and few, fine, distinct, yellowish-brown (10YR 5/4) mottles; moderate, medium, subangular blocky structure; firm; few roots and pores; few, small, dark, soft concretions; slightly acid; clear, wavy boundary.

C1—13 to 18 inches, dark-brown (10YR 4/3) sandy clay loam; common, medium, faint, grayish-brown (10YR 5/2) mottles; weak, medium, subangular blocky structure; friable; few roots and pores; medium acid; abrupt, wavy boundary.

C2—18 to 48 inches +, yellowish-brown (10YR 5/4) sandy loam; massive (structureless); very friable; medium acid.

Bruno series.—This series consists of excessively drained soils derived from coarse-textured alluvium deposited by the Mississippi River and its tributaries.

They have a dark grayish-brown to light brownish-gray loamy sand A horizon. The C horizon is brown or light yellowish-brown loamy sand or sand.

Bruno soils are neutral to medium acid. They have very low natural fertility and contain a small amount of organic matter. They are unduluating; their gradient is less than 8 percent.

Bruno soils are in small areas bordering the St. Francis River and its tributaries. They are associated with Beulah and Dubbs soils. Bruno soils are more sandy and less brown throughout than either of the associates.

Profile (representative of the series) of Bruno loamy sand, undulating, in a moist, cultivated area (NW¼NE¼SW¼ sec. 24, T. 6 N., R. 4 E.):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) loamy sand; weak, fine, granular structure; very friable; few roots; slightly acid; clear, smooth boundary.

C1—8 to 34 inches, brown (10YR 5/3) loamy sand; very weak, medium, granular structure; nearly structureless; loose; few roots; slightly acid; diffuse boundary.

C2—34 to 48 inches +, brown (10YR 5/3) loamy sand; structureless; loose; few roots; slightly acid.

Collins series.—This series consists of moderately well drained alluvial soils in sediments that were washed primarily from Memphis, Loring, and related soils that developed entirely in loess.

Collins soils have a dark-brown or dark grayish-brown silt loam A horizon. Their C horizon is brown and light brownish-gray, mottled silt loam or silty clay loam.

These soils are slightly to very strongly acid, have moderately high natural fertility, and contain a moderate amount of organic matter.

Collins soils are in small areas along streams throughout the loess area of the county. They are associated with Arkabutla and Zachary soils but are browner and better drained. Collins soils are mottle free and brown to a depth of about 20 inches, whereas Arkabutla soils are brown and mottle free to a depth of about 10 inches and Zachary soils are gray and mottled throughout and have a moderately developed B horizon.

Profile (representative of the series) of Collins silt loam, in a moist, cultivated area (NE¼SW¼SW¼ sec. 17, T. 4 N., R. 4 E.):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; very friable; abundant roots and few pores; medium acid; abrupt, smooth boundary.

C1—7 to 26 inches, brown (10YR 5/3) silt loam; weak, medium, subangular blocky structure; friable; few roots and pores; few, small, dark, soft concretions; strongly acid; clear, wavy boundary.

C2g—26 to 48 inches +, light brownish-gray (10YR 6/2) silt loam; many, medium, distinct, brown (10YR 5/3) and few, fine, distinct, yellowish-brown (10YR 5/4) mottles; weak, medium, subangular blocky structure; friable; few pores; few, small, dark concretions; strongly acid.

Earle series.—This series consists of somewhat poorly drained soils in thin beds of alluvial clay in slack-water areas. These soils have formed under a dense forest of water-tolerant hardwoods.

Earle soils have an A horizon of grayish-brown to very dark grayish-brown clay. Their C horizon is gray or dark-gray mottled clay over coarser textured sediments at a depth of 20 to 36 inches.

These soils are medium to very strongly acid, have high natural fertility, and contain a moderate amount of organic matter. The clay contains a large amount of montmorillonite. The soils are level to undulating. Their slopes are short, and the steepest gradient is less than 8 percent. Earle soils occur in broad areas with Alligator, Sharkey, and Bowdre soils. They are better drained than Alligator and Sharkey soils and are in thinner beds of clay. Earle soils are not so well drained internally as Bowdre soils and are in thicker beds of clay.

Profile (representative of the series) of Earle clay, gently undulating, in a moist, cultivated area (NW¼NW¼NW¼ sec. 16, T. 4 N., R. 6 E.):

Ap—0 to 5 inches, very dark grayish-brown (10YR 3/2) clay; moderate, medium to fine, granular structure; hard when dry, firm when moist, plastic when wet; abundant roots and few pores; medium acid; abrupt, smooth boundary.

C1g—5 to 30 inches, dark-gray (10YR 5/1) clay with common, medium, distinct, yellowish-brown (10YR 5/4) and few, fine, distinct, dark-brown (10YR 3/3) mottles; moderate, medium, angular blocky structure; hard when dry, firm when moist, plastic when wet; common, dark, soft concretions; very strongly acid; clear, smooth boundary.

C2—30 to 37 inches, yellowish-brown (10YR 5/4) sandy clay loam with many, medium, distinct, grayish-brown (10YR 5/2) mottles; weak, medium, subangular blocky structure; firm; common, small, dark concretions; few roots and pores; strongly acid; diffuse boundary.

C3—37 to 50 inches+, yellowish-brown (10YR 5/4) fine sandy loam with many, medium, distinct, grayish-brown (10YR 5/2) mottles; structureless; very friable; common, small, dark concretions; few roots; few pores; medium acid.

Iuka series.—This series consists of moderately well drained alluvial soils. They have a brown silt loam, fine sandy loam, or sandy loam A horizon. Their C horizon is brown and grayish-brown silt loam, loam, and loamy sand and is mottled with yellowish brown.

Iuka soils are slightly acid to medium acid, have moderate natural fertility, and contain a moderate amount of organic matter. They are level to gently sloping; their gradient is less than 8 percent.

Iuka soils are in small to medium areas between Crowley Ridge and the St. Francis River. They are associated with Arkabutla soils. Iuka soils, however, have formed in erratically stratified sandy and silty sediments, whereas Arkabutla soils have formed in silty material.

Profile (representative of the series) of Iuka fine sandy loam, 1 to 3 percent slopes, in a moist, cultivated area (SE¼SW¼SE¼ sec. 7, T. 5 N., R. 4 E.):

Ap1—0 to 3 inches, brown (10YR 5/3) fine sandy loam; weak, fine, granular structure; very friable; few roots and pores; from 0 to ½ inch is a layer of recently deposited material that has platy structure; very thin lenses of loamy sand; neutral; abrupt, smooth boundary.

Ap2—3 to 8 inches, brown (10YR 5/3) loam; weak, medium, subangular blocky structure; very friable; few roots and pores; few, small, dark, soft concretions; some fine gravel; slightly acid; abrupt, smooth boundary.

C1—8 to 20 inches, grayish-brown (10YR 5/2) loam; few, medium, distinct, dark yellowish-brown (10YR 4/4) and few, fine, distinct, light brownish-gray (10YR 6/2) mottles; weak, coarse, subangular blocky structure; friable; few roots and pores; few, small, dark, soft concretions; medium acid; abrupt, smooth boundary.

C2—20 to 27 inches, brown (10YR 5/3) loamy sand; structureless; loose; some fine gravel; medium acid; abrupt, smooth boundary.

C3—27 to 39 inches, grayish-brown (10YR 5/2) silt loam; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; weak, coarse, subangular blocky structure; friable; few roots and pores; few, small, dark, soft concretions; common worm casts; medium acid; clear, smooth boundary.

C4g—39 to 46 inches +, gray (10YR 5/1) loam; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; weak, coarse, subangular blocky structure; very friable; few, small, dark, soft concretions; medium acid.

General Nature of the County

In this section the physical features of the county—the geology, relief, and drainage—are described. Information is also given about the climate, the natural resources, the kind of farming, and the industry.

Geology, Relief, and Drainage

St. Francis County is about 40 miles long from east to west and about 16 miles from north to south. The county has two main geological areas—the alluvium in the eastern part, which comprises about 44 percent of the county, and the loess in the central and western parts, which comprise about 56 percent. The relief, or topography, of the county can be divided into three main areas (see fig. 2, p. 2). These are the level to undulating Mississippi River bottom land, the nearly level to steep Crowley Ridge, and the level to sloping plain west of Crowley Ridge.

Alluvial sediments laid down by the Mississippi River are the parent materials of soils on the Mississippi River bottom land. The thickness of these deposits ranges from about 100 to 180 feet.

The alluvium of the bottom land originates in the wide reaches of the upper Mississippi River Basin and thus has a mixed lithology. Sedimentary rocks are most extensive in the upper Basin, which extends from Montana to Pennsylvania, but other kinds of rocks are also exposed and are sources of sediment in many places. Immense areas in the upper Basin are mantled by recent glacial drift and loess. The alluvium along the lower stretches of the Mississippi, including the bottom land of St. Francis County, has come from the great variety of soils, rocks, and unconsolidated sediments of more than 24 States. As a result, the alluvium consists of a mixture of minerals (*15*).

There were four major advances and four retreats of the Pleistocene continental glaciers that covered the northern part of the United States. Each glacier deposited a layer of drift over the land. The fourth glacier deposited the Wisconsin drift (*17*), which was washed down by streams flowing to the Gulf of Mexico. During dry periods, the fine materials were picked up from streambeds by wind and deposited as loess on higher elevations. By this process, the soil material was deposited on the loessal uplands of St. Francis County.

That part of St. Francis County west of the Mississippi River bottom land consists of loess deposits 2 feet to 30 feet thick. These soils are fine grained, poorly stratified, and light brown to yellowish brown. They are unconsolidated and readily eroded. Because of their fine texture and their wealth of soluble plant foods, loessal soils are very fertile.

The loess that covers much of St. Francis County is underlain at a depth of 2 to 30 feet by old alluvium consisting of clay, sand, and gravel.

The level to undulating Mississippi River bottom land, one of the three main topographic areas, is part of an immense deltaic flood plain that reaches from Cairo, Ill., to the Gulf of Mexico. The relief ranges from broad flat areas of slack-water clay to a succession of swales and gently sloping ridges. Elevations range from 175 to 205 feet above sea level, and slopes are generally less than 3 percent. Some slopes on a few streambanks are as steep as 15 percent, but the total area of strong slopes is very small.

Crowley Ridge traverses the county from north to south. It is 6 miles wide at the northern line of the county and tapers to a width of 3 miles at the southern line. The relief is characterized by short slopes between long ridges and streams. The highest point above sea level is about 400 feet, and the lowest about 200 feet.

That part of St. Francis County west of Crowley Ridge is level to sloping. Most of it is level or nearly level. This area is interspersed with poorly drained level areas and low ridges. The highest elevation is about 240 feet, and the lowest about 165 feet.

The drainage in St. Francis County is generally southward. Three main streams, the Flat Fork of the Little River, L'Anguille River, and the St. Francis River are the major natural drainageways in the county. The Flat Fork of Little River drains the westernmost part of the county, and empties through Big Creek into the White River. L'Anguille River drains the middle part of the county west from the drainage divide of Crowley Ridge and empties into the St. Francis River through a watergap in Crowley Ridge near Marianna in Lee County to the south. The St. Francis River drains all of the county east of the drainage divide of Crowley Ridge, and empties into the Mississippi River near Helena in Phillips County, Ark.

Climate [6]

The humid, temperate, continental climate of St. Francis County is characterized by hot, humid summers and short, mild winters. The county is a part of the Mississippi River Delta and is lowland except for Crowley Ridge, which crosses north to south near the middle of the county. The range in elevation, from about 165 feet to a little more than 400 feet above sea level, does not materially affect the climate of the county. Crowley Ridge, having good air drainage, is less susceptible to frost than the adjoining lowland and is better suited to peaches and other crops sensitive to frost.

[6] WALTER C. HICKMON, meteorologist in charge, U.S. Weather Bureau, Little Rock, Ark., assisted in preparing this section.

In table 12 the annual and monthly temperatures and precipitation in St. Francis County are summarized from records of local weather stations. The precipitation is generally ample for the needs of an agricultural area; the average is about 51 inches annually. The greatest precipitation occurs during winter and early in spring, and the least late in summer and early in fall. The average is 14.98 inches for the winter months—December, January, and February; 14.59 inches for the spring—March, April, and May; 10.54 inches for the summer—June, July, and August; and 10.83 inches for the fall—September, October, and November.

TABLE 12.—*Temperature and precipitation*

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1954)	Wettest year (1957)	Snowfall
	°F.	°F.	°F.	Inches	Inches	Inches	Inches
January	41. 6	81	−11	5. 39	8. 61	7. 58	1. 8
February	45. 0	86	−11	4. 88	3. 88	4. 96	1. 4
March	52. 8	90	8	5. 25	1. 53	3. 03	. 2
April	61. 3	91	26	4. 74	3. 06	9. 58	0
May	70. 0	98	36	4. 60	4. 38	6. 75	0
June	78. 1	106	45	3. 29	2. 29	3. 13	0
July	81. 0	109	48	4. 24	. 47	3. 17	0
August	80. 3	109	50	3. 01	2. 19	3. 79	0
September	74. 2	108	34	3. 09	. 58	5. 39	0
October	63. 2	96	22	3. 05	1. 28	7. 88	0
November	51. 5	87	11	4. 69	. 85	10. 98	. 1
December	43. 1	80	−10	4. 71	4. 80	4. 51	. 7
Year	61. 9	109	−11	50. 94	33. 92	70. 75	4. 2

[1] Temperature based on 48 years of record through 1961, at Wynne, Cross County, Ark., adjacent on the north, and at Marianna, Lee County, Ark., adjacent on the south.

[2] Precipitation based on 31 years of record through 1961, at Madison, St. Francis County, Ark.

Some months have had more than 10 inches of rainfall, and in the driest years a few months have had less than an inch, but these are rare occurrences. The driest year of record was 1954, when the total precipitation was only 33.92 inches. During that year, July, September, and November each had less than an inch of rainfall. The wettest year of record was 1957 when the total was 70.75 inches. During that year November had 10.98 inches and was the wettest month.

Despite the generally abundant rainfall, short droughts occur frequently in small areas. Occasional droughts of a month or more have occurred. Severe droughts, though infrequent, have occurred within the period of record. Crops were damaged extensively by droughts in 1930 and 1954, the driest years of record. Drought days—days when well-drained soils have little or no available moisture in the upper 12 inches—are most common in August, September, and October. Some drought days also can be expected in July, and in some years seedlings and shallow-rooted crops are injured by drought in April, May, and June. In most years, one or more droughts of 15 days or more can be expected from June through September.

The average annual snowfall is slightly more than 4 inches. It is generally of little consequence and does not remain on the ground for more than a few days. The average snowfall in January is 1.8 inches, and in February 1.4 inches. The average for the winter is 3.9 inches. March and November sometimes have 0.2 and 0.1 inch of snowfall. The soil commonly freezes to a depth of 1 to 4 inches several times during the winter, but seldom remains frozen longer than a week.

The summers are warm and long. July and August have average temperatures of 81.0° F and 80.3°. January is the coldest month; the average temperature is 41.6°. Temperatures seldom rise above 100° and rarely fall below 10°. Temperatures of 100° or higher have occurred in June, July, August, and September, and below 0° in December, January, and February. Extremes range from 109° in July and August to −11° in January and February.

Bright sunshine and high temperatures, broken by short periods of cloudy, rainy, and cooler weather, are typical in summer. Winters are characterized by cool, cloudy, wet weather followed by clear, cold periods. These periods are followed by warmer weather, increased cloudiness, and rain. The humidity is fairly high during much of the year.

Wet soil is common in the spring, but in most years wetness does not interfere greatly with spring planting. The normally dry weather of late summer and fall is favorable for harvesting, but is less favorable for fall seeding and for the growth of the common pasture grasses and legumes. Plant growth almost stops during the colder part of winter, but small grain sown in fall remains vigorous enough for grazing.

Severe local hailstorms and tornadoes occur infrequently. Although a few tornadoes have been recorded in the county, there is no record of deaths or extensive damage caused by them.

The last killing frost in spring occurs about March 26, and the first in fall occurs about November 2. Thus, the growing season is about 221 days. Late frosts in spring may damage such crops as cotton, peaches, and pecans; cotton may have to be replanted. Early frosts in fall may damage rice, cotton, and late-planted soybeans.

Natural Resources

Soil, water, forest, and gravel are the four main natural resources of St. Francis County. The soil and forest resources are discussed in other sections of this report.

St. Francis County has many streams, bayous, and lakes, but some are dry part of the year. The principal streams are Flat Fork of Little River, St. Francis River, L'Anguille River, Crow Creek, Fifteen Mile Bayou, Blackfish Bayou, and Cutoff Bayou. The main lakes are the Burnt Cane, Mud, Horseshoe, Beaty, Kiethley, Nichols, Long, and Big Lakes. Many of the lakes are oxbows of the St. Francis River.

Except in Crowley Ridge there is an abundant supply of underground water in St. Francis County. Eight-inch wells, drilled to a depth of 110 feet, furnish about 1,500 to 1,800 gallons of water per minute. Water from the wells is of poor to good quality and is used to irrigate rice, pasture, and the commonly grown row crops.

Shallow wells in Crowley Ridge furnish an unreliable supply of water for household use and for livestock. To obtain an ample supply of well water in this area, it is usually necessary to drill about 125 feet. A few springs on the east slope of Crowley Ridge furnish water for household use and for livestock.

With the assistance of the St. Francis County Soil and Water Conservation District, farmers have built 270 ponds and reservoirs. These impound an average of about 3 acre-feet of water.

Stratified layers of sand and waterworn gravel underlie the loess cap on Crowley Ridge. The deposits of gravel range from a few feet to more than 40 feet in thickness. The loess material is stripped off, and the exposed gravel is mined by the open pit method. The gravel is used in road construction and in concrete.

Farming in the County

The people of St. Francis County depend mainly on farming for a living. The early economy of the county was based on the plantation system, and cotton and rice were the main cash crops. In 1933 the first government restrictions were placed on cotton acreage, and in 1950 on rice acreage. Since then the importance of these crops has declined, and farming has become diversified. The acreage of soybeans and small grain has increased.

The total land area of St. Francis County is about 404,000 acres. About 90 percent of this acreage is in farms, and the rest is mainly in large wooded tracts. The total cleared area in the county in 1959 was about 331,850 acres.

According to the U.S. Census of Agriculture, between 1954 and 1959 the number of farms in the county decreased, but the size of farms increased. The greatest decrease in number was in farms that were less than 100 acres, and the greatest increase in size was in farms of 100 to 499 acres. The average size in 1954 was 86.1 acres. In 1959 the average size was 177.9 acres.

The following is a comparison of the number of farms of specified sizes for the years 1954 and 1959.

Size in acres:	Number of farms: 1954	1959
1 to 9	532	327
10 to 19	1, 397	543
20 to 29	606	250
30 to 49	427	192
50 to 99	250	164
100 to 199	115	111
200 to 499	120	129
500 or more acres	57	101

Most farms in St. Francis County are of the general type that produce cotton, soybeans, corn, and small grain. Many farms west of Crowley Ridge and a few on the Mississippi River bottom lands produce rice along with the generally grown crops. On some general farms a fairly large number of livestock are raised. According to the U.S. Census of Agriculture, in 1954 and 1959 the acreages of the principal crops and pasture were:

Crops:	1954	1959
Soybeans	26, 445	90, 652
Cotton	79, 270	66, 573
Rice	31, 576	16, 259
Corn for all purposes	17, 761	8, 779
Peaches (number of trees of all ages)	30, 751	71, 264
Wheat	(1)	5, 654
Hay (excluding soybean, cowpea, peanut, and sorghum hay)	4, 724	3, 208

Pasture:	1954	1959
Cropland used only for pasture	19, 896	18, 613
Other pasture (not cropland and not woodland)	11, 639	9, 851

[1] Not reported for 1954.

The number of livestock in St. Francis County, with the exception of hogs, has been decreasing for several years. Most beef cattle are of very good grade. Dairy cattle are generally of poor quality and are kept principally for home use. The number of horses and mules has decreased since the mechanization of farms. The kind and number of principal livestock in the county in 1954 and 1959 were:

Livestock:	1954	1959
Cattle and calves	15, 981	13, 761
Milk cows	1, 800	631
Horses and/or mules	2, 828	1, 403
Hogs and pigs	8, 624	10, 488

In 1959, 537 farm operators were full owners, 275 were part owners, 11 were managers, and 1,113 were tenants.

Most of the farms are family-sized units, on which the family does most of the work with the help of occasional day labor. 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. In recent years the trend is to operate the farms with day labor.

The amount of equipment and the facilities available on the farms in the county vary widely. The larger farms are highly mechanized, and most of the other farms are mechanized to a considerable extent. Many farms use chemicals for weed control in order to reduce the expense of hand labor. According to the census, in 1954 and 1959 the number of farms that had the following equipment and facilities were:

Equipment or facilities:	1954	1959
Telephones	346	430
Electricity	3, 009	(1)
Running water	510	(1)
Tractors	2, 006	2, 444
Automobiles	1, 266	977

Not reported.

Nitrogen is the fertilizer most needed for most locally grown crops. Phosphate, potash, and lime are needed on the majority of crops. The following census figures show the amount of fertilizer used in 1959 on specific acreages of crops.

Crop:	Tons of fertilizer	Acres
Cotton	7, 310	61, 995
Corn	535	4, 567
Soybeans	527	5, 861
Hay and cropland pasture	73	955
Other pasture	62	680
Other crops	1, 319	17, 677

Industry

St. Francis County has 2 lumber mills, 3 handle and furniture mills, and a small plant that makes golf club heads; 1 cottonseed oil mill, 28 cotton gins, and 2 cotton compresses; 2 large commercial rice dryers; 2 gravel processing plants and 2 ready-mix cement plants; 2 ice plants and 3 soft drink bottling plants; and 6 manufacturing plants. A few farmers make railroad crossties from trees in their woodlots during slack farming periods.

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Glossary

Acidity. 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. In words the degrees of acidity or alkalinity are expressed thus:

	pH		pH
Extremely acid	Below 4. 5	Neutral	6. 6 to 7. 3
Very strongly acid	4. 5 to 5. 0	Mildly alkaline	7. 4 to 7. 8
Strongly acid	5. 1 to 5. 5	Moderately alkaline	7. 9 to 8. 4
Medium acid	5. 6 to 6. 0	Strongly alkaline	8. 5 to 9. 0
Slightly acid	6. 1 to 6. 5	Very strongly acid	9. 1 and higher

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 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.

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

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

Cemented.—Hard and brittle; little affected by moistening.

Contour tillage. Tillage at right angles to the direction of the slope or parallel to terrace grades.

Cropping system. A systematic changing of crops grown on the same land to help prevent soil exhaustion. A cropping plan.

Cropland. Areas used regularly for crops, except forest crops. Cropland includes fields in rotation pasture or summer fallow, as well as fields that are temporarily idle.

Drainage, soil. The rapidity and extent of the removal of water from the soil by runoff and flow through the soil to underground spaces. See also *Natural drainage.*

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

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; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

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. In St. Francis County some of the soils have a fragipan in the B horizon.

Green-manure crop. A crop grown for the purpose of being turned under in an early stage of maturity or soon after maturity for soil improvement.

Horizon, soil. A layer of soil, approximately parallel to the soil surface, with characteristics produced by soil-forming processes. Horizons are identified by letters of the alphabet and may be subdivided.

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, soil. The removal of soluble materials from soils or other material by percolating water.

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

Loess. Fine-grained soil material, dominantly of silt-sized particles, deposited by wind.

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 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Natural drainage. Refers to the conditions 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.

Imperfectly or somewhat poorly drained soils are wet for significant periods but not all the time, and podzolic soils in this drainage class 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, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from soil, as well as carbon, hydrogen, and oxygen obtained largely from air and water, are plant nutrients.

Parent material. The horizon of weathered rock or partly weathered soil material from which soil has formed; horizon C in the soil profile.

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

Percolation. The downward movement of water through the soil.

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

Presumptive bearing value. This factor represents the calculated maximum allowable load for a compacted soil. Most building codes use presumptive bearing values to determine soil stability in connection with building foundations. Houses, on the average, require 4,200 pounds of presumptive bearing value (PBV) per square foot.

pH. See *Acidity.*

Plowsole. A compacted layer formed in the soil immediately below the plowed layer. Also called plowpan.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material. See *Horizon, soil.*

Reaction, soil. See *Acidity.*

Row direction. Plowing rows in a direction that obtains maximum benefit from the natural gradient and drains excess water from a field. Practiced, according to or in conjunction with a designed drainage system, on slopes of less than 1 percent.

Runoff. The surface flow of water from an area; or the total volume of surface flow during a specified time. Runoff is classified as follows:

Ponded.—None of the water added to the soil as precipitation or by flow from surrounding higher areas escapes as runoff. Removal is by movement through the soil or by evaporation.

Very slow.—Surface water flows away so slowly that free water lies on the surface for long periods or enters immediately into the soil. Very little of the water is removed by runoff.

Slow.—Surface water flows away so slowly that free water covers the soil for significant periods or enters the soil so rapidly that only a small amount is removed as runoff. Normally, there is little or no erosion hazard.

Medium.—Surface water flows away at such a rate that a moderate proportion of the water enters the soil profile, and free water lies on the surface for only short periods. The loss of water over the surface does not reduce seriously the supply available for plant growth. This commonly is considered good external drainage. The erosion hazard may be slight to moderate if soil of this class is cultivated.

Rapid.—A large part of the surface water moves rapidly over the surface of the soil, and a small part moves through the soil profile. The erosion hazard commonly is moderate to high.

Very rapid.—A very large part of the water moves rapidly over the surface of the soil, and a very small part goes through the profile. The erosion hazard is commonly high or very high.

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

Sandy loam. Soil material that contains 20 percent or less clay, 52 percent or more sand, and a percentage of silt that, added to twice the percentage of clay, exceeds 30; or soil material that contains less than 7 percent clay, less than 50 percent silt, and between 43 and 52 percent sand.

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

Silt loam. Soil material that contains 50 percent or more silt and 12 to 27 percent clay; or soil material that contains 50 to 80 percent silt and less than 12 percent clay.

Silty clay. Soil material that contains 40 percent or more clay and 40 percent or more silt.

Silty clay loam. Soil material that contains 27 to 40 percent clay and less than 20 percent sand.

Slope classes. As used in this report, they are as follows:

	Percent of slope
Level	0 to 1
Nearly level	1 to 3
Gently sloping	3 to 8
Moderately sloping	8 to 12
Moderately steep	12 to 20
Steep	More than 20
Gently undulating	Steepest slope is 3 percent.
Undulating	Steepest slope is 8 percent.

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* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter). The separates recognized by the International Society of Soil Science are as follows: I (2.0 millimeters to 0.2 millimeter); II (0.2 to 0.02 millimeter); III (0.02 to 0.002 millimeter); IV (less than 0.002 millimeter).

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. Soil structure is designated by grade (distinctness), class (size), and type (shape or form). The principal forms 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.

Substratum. Any layer beneath the solum, or true soil; the C or D horizon.

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

Terrace, agricultural. 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."

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. 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.

Woodland. Land bearing a stand of trees of any age or size, including seedlings, of species that average at least 6 feet in height at maturity; or land from which such a stand has been removed, but which has been put to no other use.

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