SOIL SURVEY OF

Red River Parish, Louisiana

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

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

Major fieldwork for this soil survey was completed in the period 1966-71. Soil names and descriptions were approved in 1972. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1972. This survey was made cooperatively by the Soil Conservation Service and the Louisiana Agricultural Experiment Station. It is part of the technical assistance furnished to the Saline Soil and Water Conservation District.

HOW TO USE THIS SOIL SURVEY

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

Locating Soils

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

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

Finding and Using Information

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

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

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the descriptions of the capability units.

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

Wildlife managers and others can find information about soils and wildlife in the section "Wildlife Habitat."

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

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

Scientists and others can read about the soils in the section "Formation and Classification of the Soils."

Newcomers in the parish may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information in the section "General Nature of the Parish."

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SOIL SURVEY OF RED RIVER PARISH, LOUISIANA

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RED RIVER PARISH is in the northwestern part of Louisiana, about 30 miles southeast of Shreveport (fig. 1). Coushatta is the parish seat. The parish covers a land area of 253,037 acres, or 395 square miles. The Red River meanders across the western part of the parish, flowing from the northwest to the southeast.

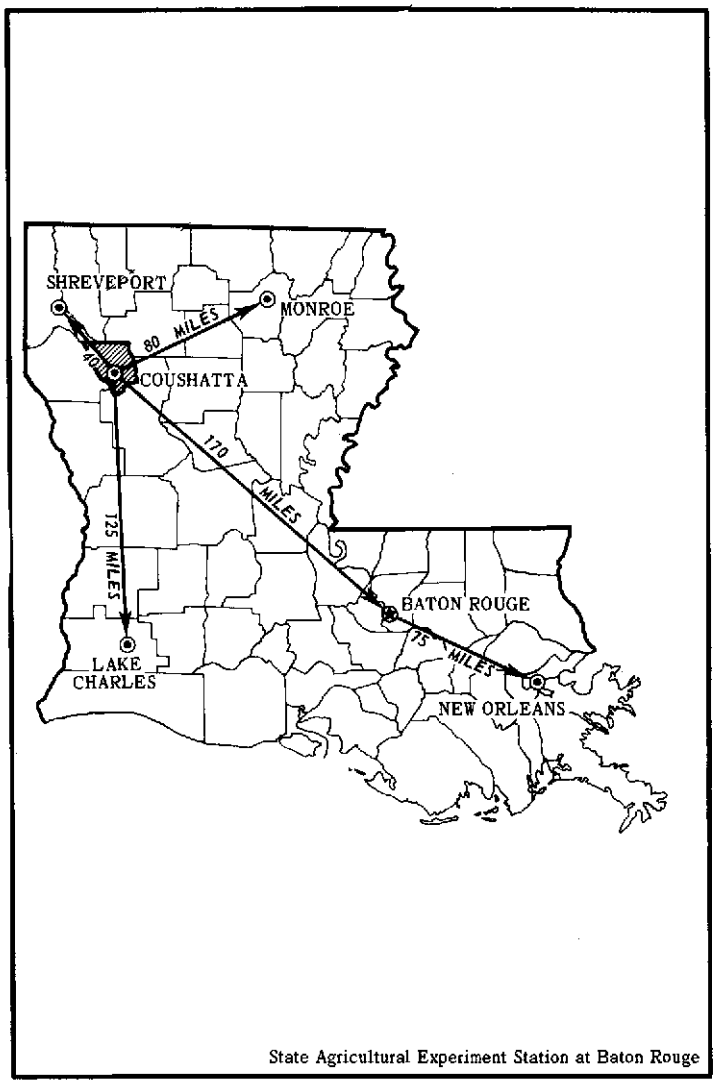

Figure 1.—**The location of Red River Parish in Louisiana.**

The Red River alluvial plain includes about 39 percent of the parish. Elevation ranges from about 147 feet on the natural levees to about 129 feet above sea level on the broad, level areas adjacent to the natural levees. Most of the Red River alluvial plain is protected from flooding by a manmade levee.

The nearly level natural levees on the Red River alluvial plain consist of soils that formed in loamy and clayey sediment deposited by the Red River and its distributaries. The major distributaries, now inactive, are Coushatta Bayou, Bayou Pierre, Watson Bayou, and Prairie River. All except Coushatta Bayou are west of the Red River. Nearly all of the acreage of the natural levees has been cleared and is used for crops and pasture. The soils are high in natural fertility and are the most productive soils in the parish.

The broad, level areas of the Red River alluvial plain are mostly west of the river. The soils there formed in clayey sediment deposited by the Red River and its tributaries. Most of the acreage has been cleared and is used for crops and pasture. Excess surface water is the main limitation.

The rest of the parish consists mainly of nearly level to strongly sloping soils on uplands *(5)*.[1] These uplands are dissected to various degrees by drainageways. The north-central and northeastern parts of the parish are dissected to a greater degree than the south-central and southeastern parts. Slopes are steep along the escarpment adjacent to the Red River alluvial plain in the north-central part of the parish. The soils range from poorly drained to well drained. Fertility is low to moderate, but most of the soils respond fairly well to fertilizer. Most of the acreage is pine woodland.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Red River Parish, where they are located, and how they can be used. The soil scientists went into the parish knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes; the size and speed of streams; the kinds of native plants or crops; and many facts about the soils.

[1] Italic numbers in parentheses refer to Literature Cited, page 65.

They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

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

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or for a geographic feature near the place where a soil of that series was first observed and mapped. Armistead and Caspiana, for example, are the names of two soil series. All the soils in the United States that have the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer and in slope, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Severn very fine sandy loam, occasionally flooded, is one of several phases within the Severn series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

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

Some mapping units are made up of soils of different series or of different phases within one series. Three such kinds of mapping units are shown on the soil map of Red River Parish: soil complexes, soil associations, and undifferentiated groups.

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

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

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

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kind of soil in other places are also assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kind of soil. Yields under defined management are estimated for all the arable soils.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this failure to the slow permeability of the soil or to a high water table. They see that streets, road pavements, and foundations for houses are cracked on a named kind of soil, and they relate this failure to the high shrink-swell potential of the soil material. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of soils for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soils. They test these groups by further study and by consultation with farmers, agronomists, engineers and others. They then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Red River Parish. A soil association is a landscape that has a distinctive pattern of soils in defined proportions. 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 can occur in another, but in a different pattern.

A map that shows soil associations is useful to people who want a general idea of the soils in a parish, who want to compare different parts of a parish, or who

want to locate large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area or in planning engineering works, recreation facilities, and community developments. It is not a suitable map for planning the management of a farm or field or for selecting a site for a road or building or other structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The soil associations in this survey have been grouped into four general kinds of landscapes for broad interpretative purposes. Each of the broad groups and the soil associations in each group are described in the following pages. The terms for texture used in the title of several of the associations apply to the texture of the subsoil of the major soils. For example, in the title of association 1, loamy refers to the texture of the subsoil (family texture class) of the Coushatta soils.

Soils on the Red River Alluvial Plain

In this group are level or nearly level, loamy and clayey soils on the Red River alluvial plain. These soils formed in sediment deposited by the Red River and its distributaries. Slopes range from 0 to 3 percent but are mostly less than 1 percent. A manmade levee protects most of the area from flooding, but the area between the river and the levee is occasionally to frequently flooded.

The nearly level, loamy soils are at the highest elevation along the Red River and its distributaries. Natural levees slope away from the stream channels. The level, clayey soils are mostly on the broad areas next to the natural levees and at the greatest distance from the stream channel.

Four soil associations are in this group. They make up 39 percent of the parish.

1. Coushatta association

Nearly level, well-drained, loamy soils

This association consists of soils that are loamy throughout. These soils occupy the highest areas on the natural levees of the Red River alluvial plain. The natural levees are not more than 15 feet above the adjacent broad, level areas. The soils are drained mainly by manmade ditches that drain away from the river. Slopes are mostly less than 1 percent, and direction of slope is typically away from the river.

This association makes up about 5 percent of the parish. It is about 56 percent Coushatta soils and 44 percent minor soils.

Coushatta soils are well drained and moderately permeable. They have a surface layer of reddish-brown silt loam about 8 inches thick. The subsoil, which extends to a depth of 27 inches, is reddish-brown silt loam and silty clay loam. The underlying material is reddish-brown stratified silt loam, silty clay loam, very fine sandy loam, and loamy very fine sand.

The minor soils in this association are Severn and Moreland soils and Udifluvents. The Severn soils are at the highest elevation in the association, and the Moreland soils typically are at the lowest elevation. Udifluvents are at the same elevation as the Coushatta soils.

Most of the acreage is used for crops, mainly cotton. Some is in homesites, and a small acreage is used for pasture. Most of the farms are large and are privately owned.

Because of their loamy texture, nearly level slopes, high fertility, and relatively good surface drainage, the soils of this association are choice land for farming. Some of the most productive soils in the parish are in this association.

The soils of this association are generally moderately well suited to nonfarm use. Low strength is the main limitation.

2. Moreland-Buxin association

Level and nearly level, somewhat poorly drained and poorly drained, clayey soils

This association consists of soils that are clayey throughout. These soils occupy broad, level areas of the Red River alluvial plain that are 10 to 15 feet lower than the natural levee adjacent to the Red River. Most of the acreage is in the western part of the parish. The soils are drained mainly by manmade ditches and canals. Slopes are mostly less than 1 percent.

This association makes up about 20 percent of the parish. It is about 57 percent Moreland soils, 30 percent Buxin soils, and 13 percent minor soils.

Moreland soils are somewhat poorly drained and very slowly permeable. They are at the slightly higher elevation in the association, generally in broad, level areas adjacent to natural levees. They have a surface layer of dark reddish-brown clay about 6 inches thick. The subsoil is mostly reddish-brown clay.

Buxin soils are poorly drained and very slowly permeable. They are in broad, level areas and slightly depressed backswamp areas that are generally the most distant from the natural levees. They have a surface layer of dark reddish-brown clay about 20 inches thick. The subsurface layer is dark-gray clay about 11 inches thick. The subsoil is reddish-brown clay.

The minor soils in this association are Armistead, Latanier, and Perry soils. The Armistead and Latanier soils are at about the same elevation as the Moreland soils. The Perry soils are at a lower elevation than the Buxin soils.

Most of the acreage is used for pasture and crops, mainly soybeans and grain sorghum. A very small acreage is woodland. Most of the farms are large and are privately owned.

Because of their level to nearly level slopes and high fertility, the soils of this association are well suited to farming. The soils are somewhat difficult to work, however, and they need to be drained if used for crops and pasture.

The soils of this association are generally poorly suited to nonfarm uses. The shrink-swell potential, low strength, and wetness are the main limitations.

3. Caspiana-Gallion association

Level and nearly level, well-drained, loamy soils

This association consists of loamy soils. These soils

are in a narrow band on the older natural levees on the Red River alluvial plain. Slopes are mostly 0 to 1 percent, and direction of slope is generally away from the natural levees. The soils are drained mainly by man-made ditches.

This association makes up about 8 percent of the parish. It is about 56 percent Caspiana soils, 17 percent Gallion soils, and 27 percent minor soils.

Caspiana soils are well drained and moderately permeable. They are at high and intermediate elevations in the association. The surface layer is dark-brown silt loam about 11 inches thick. The subsoil is reddish-brown silt loam.

Gallion soils are well drained and moderately permeable. They are at about the same elevation as the Caspiana soils, but they are typically adjacent to the stream channels. They have a surface layer of brown silt loam about 10 inches thick. The subsoil is yellowish-red silt loam. The underlying material is reddish and brownish stratified loam and silt loam.

The minor soils in this association are Sterlington and Armistead soils. The Sterlington soils are at the highest elevation on the natural levees, and the Armistead soils typically are in the low depressions.

Most of the acreage is used for crops, mainly cotton and soybeans. Some is in homesites, and a small acreage is used for pasture. Most of the land adjacent to the roads that traverse the association is used for homesites. Most of the farms are large and are privately owned.

Because of their loamy texture, nearly level slopes, high fertility, and relatively good surface drainage, the soils of this association are choice land for farming. Some of the most productive soils in the parish are in this association.

The soils of this association are generally moderately well suited to nonfarm use. Low strength is the main limitation.

4. *Severn association*

Gently undulating, well-drained, loamy soils

This association consists of loamy soils that are subject to flooding. These soils are on the Red River alluvial plain in a narrow band between the river and the levees on both sides of the river. Scouring and deposition by floodwaters have resulted in a series of narrow ridges and swales. No defined drainage pattern exists. Slopes of the ridges are mostly less than 3 percent.

This association makes up about 6 percent of the parish. It is about 94 percent Severn soils and 6 percent minor soils.

Severn soils are well drained and moderately rapidly permeable. They have a surface layer of reddish-brown very fine sandy loam about 9 inches thick. The underlying material is reddish-brown stratified very fine sandy loam, silt loam, loam, and loamy very fine sand.

The minor soils in this association are Udifluvents. They are at the highest elevation in the association and generally do not flood.

Most of the acreage is used for pasture and woodland, but many small areas are used as a source of borrow material.

Flooding, scouring, and deposition by floodwaters of the Red River severely restricts both farm and nonfarm uses of the soils of this association.

Soils in Upland Drainageways

In this group are nearly level, poorly drained, acid, loamy soils on alluvial plains of the uplands. These soils are subject to frequent flooding. Slopes are less than 3 percent.

One soil association is in this group. It makes up 7 percent of the parish.

5. *Guyton association*

Nearly level, poorly drained, frequently flooded soils

This association consists of loamy soils that are subject to flooding. These soils are mostly on the nearly level alluvial plains of Black Lake Bayou and Grand Bayou and their tributaries. Slopes are mostly less than 1 percent.

This association makes up about 7 percent of the parish. It is about 80 percent Guyton soils and 20 percent minor soils.

Guyton soils are poorly drained and slowly permeable. They are on broad flats of the alluvial plains. They have a surface layer of dark grayish-brown silt loam about 3 inches thick. The subsurface layer is light brownish-gray silt loam about 11 inches thick. The subsoil is light brownish-gray silt loam mottled with brown.

The minor soils in this association are better drained and are at a slightly higher elevation on the flood plain, generally adjacent to the stream channel.

Most of the acreage is woodland, but a very small acreage is native pasture. Most of this association is owned by large timber companies.

The hazard of flooding severely restricts farming. The soils of this association are generally very poorly suited to nonfarm uses. Flooding and wetness are the main limitations.

Nearly Level to Gently Sloping Soils on Uplands

In this group are nearly level to gently sloping, poorly drained to moderately well drained, loamy and clayey soils on uplands. Slopes are mostly 1 to 2 percent. Low areas in drainageways are subject to flooding.

Three soil associations are in this group. They make up about 22 percent of the parish.

6. *Guyton-Messer association*

Level and nearly level, poorly drained and moderately well drained soils

This association consists of loamy soils. It is on uplands, mainly in the extreme eastern part of the parish on terraces that border Black Lake Bayou and in the central part of the parish on terraces that border Grand Bayou, and it is dissected by natural drainageways. The soils are on nearly level areas and in depressions. Slopes are mostly less than 1 percent.

This association makes up about 8 percent of the parish. It is about 60 percent Guyton soils, 20 percent Messer soils, and 20 percent minor soils.

Guyton soils are poorly drained and slowly perme-

able. They are on the nearly level areas. They have a surface layer of dark grayish-brown silt loam about 3 inches thick. The subsurface layer is light brownish-gray silt loam about 11 inches thick. The subsoil is light brownish-gray silt loam mottled with shades of brown.

Messer soils are moderately well drained and slowly permeable. They are on convex, circular or oblong mounds. They have a surface layer of brown silt loam about 7 inches thick. The upper part of the subsoil, about 33 inches thick, is yellowish-brown silt loam. The lower part is brownish and grayish clay loam and silty clay loam.

The minor soils in this association are Shatta and Bonn soils and wet soils along drainageways. The Shatta soils are on short, nearly level side slopes along some streams. The Bonn soils are high in content of extractable sodium. They are in small areas scattered throughout the association.

Most of the acreage is woodland, but some is in homesites, and a small acreage is used for pasture. Most of this association is owned by large timber companies.

Wetness and low fertility somewhat limit the soils in this association for farming. They need to be drained if used for crops and pasture.

The soils of this association are generally poorly suited to nonfarm use. Wetness is the main limitation.

7. *Kolin-Wrightsville association*

Nearly level to gently sloping, moderately well drained to poorly drained soils

This association consists of soils that have a clayey subsoil. It is on uplands, mainly in the south-central part of the parish, and is dissected by natural drainageways. The soils are on broad, nearly level areas and gentle side slopes along drainageways. Slopes are mostly less than 3 percent.

This association makes up about 6 percent of the parish. It is about 40 percent Kolin soils, 22 percent Wrightsville soils, and 38 percent minor soils.

Kolin soils are moderately well drained and very slowly permeable. They are on broad, nearly level and convex ridges and side slopes. They have a surface layer of brown silt loam about 3 inches thick. The subsurface layer is brown silt loam 5 inches thick. The upper part of the subsoil, to a depth of 33 inches, is strong-brown silt loam. The lower part is strong-brown and yellowish-brown silty clay loam mottled with red and gray. The underlying material is red clay.

Wrightsville soils are poorly drained and very slowly permeable. These level or depressional soils are on broad interstream divides. They have a surface layer of gray silt loam about 14 inches thick. The subsoil is light browinsh-gray silty clay. The underlying material is dark-red clay.

The minor soils in this association are Shatta, Gore, and McKamie soils and wet soils along drainageways. The Shatta soils are nearly level to gently sloping and are in the central part of the parish west of Grand Bayou. The Gore and McKamie soils are on short side slopes next to drainageways.

Most of the acreage is woodland, but some areas are used for pasture and others for homesites. The woodland is mainly in broad, level areas and in drainageways. About half of the town of Coushatta is in this association.

Because they are level or nearly level and have a loamy surface layer, these soils are suited to farming. The Wrightsville soils, however, are somewhat limited for farming by their low fertility and wetness. They need to be drained if used for crops and pasture.

The soils of this association are generally poorly suited to nonfarm use. The shrink-swell potential, low strength, and wetness of the Wrightsville soils are the main limitations.

8. *Shatta association*

Gently sloping, moderately well drained soils

This association consists of loamy soils. It is on uplands in the south-central part of the parish on the west side of Grand Bayou and is dissected by numerous small drainageways. The soils are on broad ridgetops and gentle side slopes between drainageways. Slopes are mostly 1 to 3 percent.

This association makes up about 8 percent of the parish. It is about 70 percent Shatta soils and 30 percent minor soils.

Shatta soils are moderately well drained and slowly permeable. They are on the broad ridgetops and very gentle side slopes between drainageways. The surface layer is dark grayish-brown silt loam about 6 inches thick. The upper 24 inches of the subsoil is strong-brown or yellowish-brown clay loam and loam. The lower part is a fragipan of yellowish-brown loam.

The minor soils in this association are Kolin, Malbis, Wrightsville, Beauregard, and Guyton soils and wet soils along the small drainageways. The Kolin soils are at the same elevation as the Shatta soils. The Malbis soils typically are at a slightly higher elevation and are on side slopes next to drainageways. The Wrightsville soils are in depressions. The Beauregard soils are on broad, nearly level ridgetops. The Guyton soils are in depressions and on alluvial plains.

Most of the acreage is used for pasture and crops, and the rest is woodland and homesites. The woodland is mainly along drainageways and in depressions. Many of the farms are small, less than 50 acres in size. Part of the town of Coushatta is in this association.

Because they are gently sloping and have a loamy texture and good drainage, these soils are fairly well suited to farming. Low fertility and erosion are concerns of management.

The soils of this association are generally well suited to nonfarm use. Slope and low strength are limitations for a few uses.

Gently Sloping and Sloping Soils on Uplands

In this group are gently sloping to moderately sloping, well-drained to somewhat poorly drained, loamy and clayey soils on uplands. Slopes are mostly 1 to 5 percent, but they are as much as 30 percent on the escarpment to the Red River alluvial plain.

Three soil associations are in this group. They make up about 32 percent of the parish.

9. *Falkner-Boswell association*

Gently sloping and sloping, somewhat poorly drained and moderately well drained soils

This association consists of soils that have a clayey subsoil. It is on uplands, mainly in the central and eastern parts of the parish, and is dissected by numerous small drainageways. The soils are on broad ridges and drainage divides. Slopes are mostly 1 to 5 percent.

This association makes up about 7 percent of the parish. It is about 40 percent Falkner soils, 30 percent Boswell soils, and 30 percent minor soils.

Falkner soils are somewhat poorly drained and slowly permeable, They are on broad, nearly level ridgetops and drainage divides. They have a surface layer of brown silt loam about 6 inches thick. The upper part of the subsoil, about 21 inches thick, is mostly yellowish-brown silt loam. The lower part is gray clay mottled with shades of red, yellow, and brown.

Boswell soils are moderately well drained and very slowly permeable. They are on gently sloping uplands. They have a surface layer and subsurface layer of dark-brown fine sandy loam about 10 inches thick. The upper 12 inches of the subsoil is red clay. The lower part is gray and light brownish-gray clay.

The minor soils in this association are Meth, Malbis, and Beauregard soils and wet soils along small drainageways. The Meth and Malbis soils are on the long, gentle side slopes and typically at a slightly higher elevation than the Falkner and Boswell soils. The Beauregard soils are on broad, nearly level ridgetops and flat toe slopes.

Most of the acreage is woodland, but some is used for homesites, and a small acreage is in pasture. Most of this association is owned by timber companies. There are a few small farms, less than 40 acres in size.

Because of the gentle to moderate slopes and good surface drainage, the soils of this association are suited to farming. Low fertility and erosion are serious concerns of management.

The soils of this association are generally poorly suited to nonfarm use. Low strength, the shrink-swell potential, and wetness on the Falkner soils are the main limitations.

10. *Ruston association*

Gently sloping and sloping, well-drained soils

This association consists of loamy soils. It is on uplands, mainly in the eastern part of the parish, and is dissected by numerous small drainageways. The soils are on ridgetops and side slopes. Slopes are mostly 3 to 5 percent.

This association makes up about 19 percent of the parish. It is about 88 percent Ruston soils and 12 percent minor soils.

Ruston soils are well drained and moderately permeable. They are on broad ridgetops and upper side slopes. They have a surface layer of yellowish-brown fine sandy loam about 9 inches thick. The upper 18 inches of the subsoil is yellowish-red loam. The lower part is mainly yellowish-red sandy clay loam.

The minor soils in this association are Meth and Malbis soils and wet soils along small drainageways. The Meth soils are on side slopes next to drainageways and on steep escarpments in the north-central part of the parish adjacent to the Red River alluvial plain. The Malbis soils are on some of the broad gently sloping ridgetops.

Most of the acreage is pasture and woodland, but a small acreage is used for cultivated crops and some for housing development. About half of this association is owned by timber companies. Most of the farms are small, less than 100 acres in size. A few small villages are in this association.

Because of their gentle to moderate slopes, the loamy texture, and good surface drainage, these soils are suited to farming. Low fertility and erosion are moderate concerns of management.

The soils of this association are generally well suited to nonfarm use. Slope is the main limitation.

11. *Meth-Malbis association*

Gently sloping and sloping, well drained and moderately well drained soils

This association consists of loamy soils and soils that have a clayey subsoil. It is on uplands, mainly in the northeastern part of the parish, and is dissected by numerous small drainageways that drain mostly to the south into Grand Bayou. The soils are on broad ridgetops and long side slopes. Slopes are mostly 3 to 5 percent.

This association makes up about 6 percent of the parish. It is about 50 percent Meth soils, 20 percent Malbis soils, and 30 percent minor soils.

Meth soils are well drained and moderately slowly permeable. They are on long side slopes and narrow ridgetops. The surface layer is dark grayish-brown fine sandy loam about 9 inches thick. The subsurface layer is yellowish-brown fine sandy loam about 9 inches thick. The upper 16 inches of the subsoil is red sandy clay. The lower part is yellowish-red sandy loam.

Malbis soils are moderately well drained and moderately slowly permeable. They are on the broader ridgetops and upper side slopes. They have a surface layer of dark-brown fine sandy loam about 5 inches thick. The subsurface layer is yellowish-brown fine sandy loam 5 inches thick. The upper 28 inches of the subsoil is yellowish and brownish sandy clay loam. The lower part is red, brown, and gray sandy clay loam.

The minor soils in this association are Ruston and Beauregard soils and wet soils along small drainageways. The Ruston soils are on narrow ridgetops and upper side slopes. The Beauregard soils are on broad, nearly level, low ridges and flat toe slopes.

Most of the acreage is woodland, but some areas are used for pasture and others for homesites. The village of Hall Summit is in this association. Most of the farms are small, less than 50 acres in size.

Because of their gentle to moderate slopes, loamy texture, and good surface drainage, these soils are suited to farming. Low fertility and erosion are moderate concerns of management.

The soils of this association are generally well suited to nonfarm use. Slope and low strength limit some uses.

Descriptions of the Soils

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

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second is much more detailed and is for those who need to make thorough and precise studies of soils. Color terms are for moist soil unless otherwise stated. The profile described in the series is representative of mapping units in that series. If the profile of a given mapping unit is different from the one described for the series, these differences are stated in describing the mapping unit, or they are differences that are apparent in the name of the mapping unit.

Not all mapping units are members of a soil series. Udifluvents, for example, do not belong to a soil series but, nevertheless, are listed in alphabetic order along with the soil series.

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

The acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils are in the Glossary at the back of this survey, and detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*6*).

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

Soil	Area	Extent
	Acres	*Percent*
Armistead clay	7,214	3.0
Bonn complex	541	0.2
Boswell-Falkner association, sloping	4,691	1.9
Buxin clay	14,953	6.2
Caspiana silt loam	4,658	1.9
Caspiana silty clay loam	6,179	2.6
Coushatta silt loam	4,811	2.0
Coushatta silty clay loam	1,598	.7
Falkner-Boswell association, gently sloping	7,730	3.2
Gallion silt loam	2,459	1.0
Gallion silty clay loam	592	.2
Gore-McKamie association, sloping	5,150	2.1
Guyton association, frequently flooded	18,172	7.5
Guyton-Messer association	18,837	7.8
Kolin-Wrightsville association	9,672	4.0
Latanier clay	1,599	.7
Malbis-Beauregard association, gently sloping	16,506	6.9
Meth-Malbis association, sloping	11,106	4.6
Meth-Ruston association, steep	2,853	1.2
Moreland silt loam, overwash, 0 to 1 percent slopes	2,612	1.1
Moreland clay, 0 to 1 percent slopes	24,225	10.1
Moreland clay, gently undulating	3,652	1.5
Perry clay	1,726	.7
Ruston association, sloping	38,633	16.2
Severn very fine sandy loam	1,834	.8
Severn very fine sandy loam, occasionally flooded	6,994	2.9
Severn soils, frequently flooded	5,715	2.4
Shatta association, gently sloping	13,128	5.5
Sterlington silt loam, 1 to 3 percent slopes	1,220	.5
Udifluvents	1,506	.6
Total area of mapped soils	240,566	100.0
Gravel Pits	461	
Small Water Areas	12,010	
Total Land Area	253,037	
Large Water Areas	5,071	
Total Area	258,108	

Armistead Series

The Armistead series consists of somewhat poorly drained, slowly permeable soils that are clayey in the upper part and loamy in the lower part. These soils formed in alluvial sediment. They are on the older natural levees on the Red River alluvial plain.

In a representative profile the surface layer is dark reddish-brown clay about 13 inches thick. Below this is very dark gray silty clay loam 8 inches thick. The subsoil is yellowish-red silt loam 33 inches thick. The underlying material is yellowish-red silt loam.

Most of the acreage is used for pasture and crops. A small acreage is in woodland and used for homesites.

Representative profile of Armistead clay, in a cotton field 1 mile west of Williams, 960 feet north of the center of south section line, and 1,560 feet west of local road, in sec. 16, T. 14 N., R. 11 W.

Ap—0 to 7 inches, dark reddish-brown (5YR 3/3) clay; weak, medium, subangular blocky structure; firm; mildly alkaline; abrupt, smooth boundary.

A1—7 to 13 inches, dark reddish-brown (5YR 3/3) clay; moderate, coarse, prismatic structure; firm; mildly alkaline; clear, smooth boundary.

IIA—13 to 21 inches, very dark gray (5YR 3/1) silty clay loam; few, fine, faint, gray mottles; moderate, medium, subangular blocky structure; firm; common pores; dark reddish-brown clay films on vertical faces of some peds; mildly alkaline; gradual, smooth boundry.

IIB21t—21 to 33 inches, yellowish-red (5YR 5/6) silt loam; weak, coarse, prismatic structure parting to moderate, coarse, subangular blocky; friable; common fine pores; very dark gray stains in pores and root channels; distinct continuous clay films; mildly alkaline; clear, wavy boundary.

IIB22t—33 to 54 inches, yellowish-red (5YR 5/6) silt loam; moderate, medium, subangular blocky structure; friable; common pores; dark stains along root channels; thin discontinuous clay films; mildly alkaline; clear, wavy boundary.

IIC—54 to 62 inches, yellowish-red (5YR 5/6) silt loam; massive; friable; common fine pores; common medium lime concretions; few, fine, black concretions; pockets and streaks of light reddish-brown silt loam; moderately alkaline; strongly effervescent.

The AP or A1 horizon is dark reddish brown, dusky red, or dark brown and ranges from slightly acid to moderately alkaline. The IIA horizon is very dark gray, dusky-

red, dark reddish-brown, or dark-brown silt loam or silty clay loam that is mottled in shades of gray and is neutral to moderately alkaline.

The IIBt horizon is yellowish-red, red, or reddish-brown silty clay loam or silt loam that ranges from slightly acid to moderately alkaline.

The IIC horizon is silt loam or silty clay loam. It has the same color and reaction as the IIBt horizon, but in places it is calcareous.

Armistead soils are associated with Caspiana, Gallion, and Moreland soils. They are more poorly drained and more clayey than Caspiana and Gallion soils. They are less clayey in the lower part than Moreland soils.

Ar—Armistead clay. This is a nearly level, somewhat poorly drained soil that is clayey in the upper part and loamy in the lower part. It is in areas of 25 to several hundred acres on the older natural levees on the Red River alluvial plain. Slopes are less than 1 percent.

Included with this soil in mapping are small areas of Caspiana, Gallion, Buxin, and Moreland soils.

Fertility is moderately high to high. Surface runoff is slow. Water moves slowly through the upper part of the soil and moderately slowly through the lower part. This soil has a seasonal high water table at a depth of 1½ to 3 feet from December to April. Plants may be damaged by a lack of moisture during dry periods in summer and fall. The shrink-swell potential of the upper layers is high. Cracks as wide as ½ inch occur in dry periods; they seal over during wet weather. The soil is hard when dry and sticky when wet, and it is difficult to work. The lower layers are loamy and are easily worked.

Wetness is the main limitation for most uses. Low strength and the high shrink-swell potential limit the use of this soil for foundations and construction material.

Most of the acreage is used for pasture and crops. The rest is mostly woodland, but a very small acreage is used for pecan orchards (fig. 2). Suitable crops are grain sorghum, wheat, oats, soybeans, rice, and cotton.

Figure 2.—Pecan orchard on Armistead clay.

Suitable pasture plants are common bermudagrass, dallisgrass, tall fescue, Pensacola bahiagrass, white clover, ryegrass, johnsongrass, southern wild winter pea, and vetch.

Good tilth is difficult to maintain because of the high content of clay in the surface layer. This soil can be worked only within a fairly narrow range of moisture content, and it generally becomes cloddy when worked. A surface drainage system may be needed if cultivated crops or pasture plants are grown. Land smoothing and leveling improve surface drainage and permit the efficient use of farm equipment. Crops other than legumes generally respond well to nitrogen fertilizer. Other fertilizers and lime should be applied according to soil tests. Capability unit IIw-1; woodland suitability group 2w5.

Beauregard Series

The Beauregard series consists of moderately well drained, slowly permeable soils that are loamy throughout. These soils formed in loamy sediment of Pleistocene age. They are on gently sloping uplands.

In a representative profile the surface layer is brown silt loam about 5 inches thick. The subsoil, in the upper 30 inches, is yellowish-brown silt loam. In the lower part it is gray silty clay loam.

Most of the acreage is woodland and pasture. A small acreage is used for cultivated crops and homesites.

Representative profile of Beauregard silt loam, in an area of the Malbis-Beauregard association, gently sloping, 7 miles northeast of Coushatta, 1,000 feet north of intersection of State Highways 7 and 786, and 150 feet east of the center of State Highway 7, in the NW¼-NW¼ sec. 16, T. 13 N., R. 9 W.

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

B21t—5 to 14 inches, yellowish-brown (10YR 5/4) silt loam; few, medium, prominent, red (2.5YR 4/6) mottles; weak, medium, subangular blocky structure; friable; common pores; thin patchy clay films; root channels filled with material from Ap horizon; strongly acid; clear, smooth boundary.

B22t—14 to 28 inches, yellowish-brown (10YR 5/4) silt loam; common, medium, distinct, strong-brown (7.5YR 5/6) and light brownish-gray (10YR 6/2) mottles and few, fine, prominent, red mottles; moderate, medium, subangular blocky structure; friable; thin discontinuous clay films; few fine concretions; common fine pores; thin coatings of light brownish-gray (10YR 6/2) silt loam on peds; very strongly acid; clear, wavy boundary.

B23t—28 to 35 inches, yellowish-brown (10YR 5/6) silt loam; common, medium, distinct, light brownish-gray (10YR 6/2) mottles and few, fine, prominent, red mottles; moderate, medium, subangular blocky structure; friable; thin patchy clay films; common fine pores; 5 percent primary peds surrounded by light brownish-gray (10YR 6/2) silt loam; very strongly acid; clear, irregular boundary.

B24t—35 to 63 inches, gray (10YR 6/1) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles and common, medium, prominent, red (2.5YR 4/6) mottles; moderate, medium, subangular blocky structure; firm; about 10 percent plinthite; thin patchy clay films; few pockets of gray silt loam; very strongly acid.

The Ap or A1 horizon is dark gray, grayish brown, dark grayish brown, or brown. The A2 horizon, where present, is

pale brown, yellowish brown, or very dark grayish brown. The A horizon ranges from slightly acid to strongly acid.

The upper part of the B2t horizon is yellowish-brown, brownish-yellow, brown, or light yellowish-brown silt loam or silty clay loam. The lower part of the B2t horizon is gray, light brownish-gray, grayish-brown, or light-gray silty clay loam or silt loam and is highly mottled in shades of brown and red. The lower part of the Bt horizon is more than 5 percent, by volume, nodules of plinthite. The Bt horizon is very strongly acid or strongly acid.

Beauregard soils are associated with Malbis, Guyton, Ruston, and Shatta soils. They have gray mottles in the upper part of the B horizon, which Malbis soils do not. They are better drained than Guyton soils and are more poorly drained than Ruston soils. They do not have the fragipan that is characteristic of Shatta soils.

Beauregard soils in Red River Parish are mapped only with Malbis soils.

Bonn Series

The Bonn series consists of poorly drained, very slowly permeable soils that are loamy throughout and have a high content of sodium in the subsoil. These soils formed in loamy sediment of Pleistocene age. They are on nearly level terraces in the uplands.

In a representative profile the surface layer is brown silt loam about 8 inches thick. Below this, to a depth of 27 inches, is light brownish-gray and grayish-brown silty clay loam that has tongues of grayish-brown or light brownish-gray silt loam. The subsoil is grayish-brown or yellowish-brown silt loam mottled with strong brown.

Most of the acreage is unimproved woodland. Some is pasture.

Representative profile of Bonn silt loam, in an area of Bonn complex, in woodland 1 mile northeast of Hall Summit, SE¼NW¼ sec. 16, T. 14 N., R. 9 W.

A1—0 to 8 inches, brown (10YR 4/3) silt loam; few, fine, faint, gray mottles; weak, medium, subangular blocky structure; friable; strongly acid; clear, wavy boundary.

A2—8 to 17 inches, light brownish-gray (10YR 6/2) silt loam; few, fine, distinct, yellowish-brown mottles; massive; firm, brittle; many pores; many, hard, black concretions; medium acid; abrupt, clear boundary.

B&A—17 to 27 inches, grayish-brown (10YR 5/2) silty clay loam; weak, medium, subangular blocky structure; 45 percent tongues of grayish-brown or light brownish-gray silt loam from A2 horizon as much as 3 inches wide; massive; firm; dark-gray and dark grayish-brown clay films; common bands and streamers of dark-gray clay as much as 1 centimeter thick; many medium concretions; moderately alkaline; abrupt boundary.

B21t—27 to 43 inches, yellowish-brown (10YR 5/4) silty clay loam; common, medium, distinct, strong-brown (7.5YR 5/6) mottles; moderate, medium, prismatic structure; firm; common pores; tongues and silt coatings as much as 1 inch wide; thin discontinuous clay films; moderately alkaline; clear, wavy boundary.

B22t—43 to 60 inches, grayish-brown (10YR 5/2) silt loam; common, medium, distinct, strong-brown (7.5YR 5/6) mottles; weak, coarse, prismatic structure parting to weak, fine, subangular blocky; very firm; thin patchy clay films; pockets and coatings of light brownish-gray silt loam; moderately alkaline.

The A horizon ranges from very strongly acid to neutral. Horizons that are more than 15 percent exchangeable sodium are within 16 inches of the surface. The A1 or Ap horizon is brown, dark grayish brown, grayish brown, or dark gray. The A2 horizon is light brownish gray, light gray, gray, or grayish brown.

The B horizon is silt loam or silty clay loam and ranges from medium acid to strongly alkaline. The Bt horizon is yellowish brown, gray, olive gray, light olive gray, grayish brown, or light grayish brown and is mottled in shades of yellow, brown, and gray. In places, subhorizons of the B horizon are 1 to 10 percent carbonate concretions that are as much as 3 centimeters in diameter. Tongues of material from the A2 horizon extend into the lower part of the B horizon. These tongues have a few accumulations of very dark gray or dark-gray clay, typically on discontinuous varve-like horizontal bands or as coating on the tops and sides of columns and prisms. Biscuit-shaped caps on the tops of columns are weakly expressed or lacking in some profiles.

Bonn soils are associated with Guyton and Wrightsville soils. They have a higher content of sodium and are more alkaline than Guyton and Wrightsville soils. Also, they are less clayey than Wrightsville soils.

Bc—Bonn complex. This complex consists of nearly level, poorly drained soils in areas of 5 to 50 acres on terraces in the uplands. These soils are loamy throughout and have a high content of sodium in the subsoil. The complex is about 55 percent Bonn silt loam and 45 percent soils that are variable in depth to sodium, in texture, and in wetness. These soils are closely intermingled and are therefore mapped as one unit. Slickspots that are almost devoid of vegetation are common (fig. 3).

Included with these soils in mapping are small areas of Guyton and Wrightsville soils. Also included are small areas of soils that are similar to Bonn soils but do not have the high content of sodium in the subsoil.

The Bonn soils in this complex generally are at a lower elevation than the other soils. Fertility is low in these soils. Surface runoff is slow. Air and water move very slowly into the lower part of the subsoil, and the soils generally remain dry in wet periods. They have a perched seasonal high water table within 2 feet of the surface from December to April. Dryness restricts the growth of plant roots in the lower part of the subsoil. Plants are damaged by a lack of water in summer and fall in most years. The soils are hard when dry.

Wetness is the main limitation for most uses. Low strength, piping, and erosion limit the use of these soils for foundations and construction material.

Most of the acreage is woodland. Suitable crops are soybeans and grain sorghum, and suitable pasture plants are common bermudagrass, Pensacola bahiagrass, and carpetgrass.

These soils are fairly easy to work, but they are difficult to keep in good tilth and tend to form a crust if clean tilled. Seasonal wetness and the sodium in the subsoil limit the choice of crops. Deep-rooted plants produce fast early growth until the roots reach the horizons that are high in content of exchangeable sodium. Plant response to fertilizer is only fair. Capability unit IVs-1; woodland suitability group 5t0.

Boswell Series

The Boswell series consists of moderately well drained, very slowly permeable soils that have a clayey subsoil. These soils formed in clayey sediment of Tertiary age. They are on gently sloping uplands.

In a representative profile the surface layer is dark-brown fine sandy loam about 4 inches thick. The sub-

Figure 3.—Slickspot on typical landscape of the Bonn complex.

surface layer is brown fine sandy loam 6 inches thick. The subsoil, in the upper 12 inches, is red clay. In the lower part, it is gray and light brownish-gray clay that is mottled with red and yellow.

Most of the acreage is woodland. A small acreage is used for pasture, and some is used for homesites.

Representative profile of Boswell fine sandy loam, in an area of Boswell-Falkner association, sloping, in woodland 6 miles northeast of Coushatta on State Highway 155, in the SW¼NW¼ sec. 36, T. 13 N., R. W.

A1—0 to 4 inches, dark-brown (10YR 4/3) fine sandy loam; weak, fine, granular structure; friable; medium acid; abrupt, wavy boundary.

A2—4 to 10 inches, brown (10YR 5/3) fine sandy loam; weak, fine, subangular blocky structure; friable; worm casts filled with dark brown fine sandy loam from A1 horizon; strongly acid; clear, wavy boundary.

B21t—10 to 19 inches, red (2.5YR 4/6) clay; weak, medium, angular blocky structure parting to moderate, fine, subangular blocky; firm; thin discontinuous clay films; strongly acid; clear, wavy boundary.

B22t—19 to 22 inches, red (2.5YR 4/6) clay; common, fine, prominent, pale-brown mottles; moderate, medium, subangular blocky structure; firm; thin discontinuous clay films; very strongly acid; clear, wavy boundary.

B23t—22 to 33 inches, gray (10YR 6/1) clay; many, medium, prominent, red (10YR 4/6) mottles and few, fine, distinct, reddish-yellow mottles; moderate, medium, subangular blocky structure; firm; few fine pores; few, fine, black concretions; thin patchy clay films; very strongly acid; clear, wavy boundary.

B31t—33 to 42 inches, gray (10YR 6/1) clay; common, medium, prominent, red (10R 4/6) mottles and few, medium, distinct, reddish-yellow (7.5YR 6/6) mottles; moderate, medium, subangular blocky structure; firm; few fine pores; thin patchy clay films; very strongly acid; clear, wavy boundary.

B32t—42 to 48 inches, light brownish-gray (2.5Y 6/2) clay; common, medium, distinct, reddish-yellow (7.5YR 6/6) mottles; moderate, medium, subangular blocky structure; firm; few fine pores; thin patchy clay films; very strongly acid; abrupt, wavy boundary.

B33—48 to 64 inches, light brownish-gray (2.5Y 6/2) silty clay thinly stratified with gray (10YR 6/1) silt loam 1/32 to 1/16 inch thick and interbedded with coarse aggregates of clay; thin, platy structure; firm; very strongly acid.

The A horizon is 5 to 11 inches thick and ranges from slightly acid to strongly acid. The A1 or Ap horizon is dark brown, dark grayish brown, grayish brown, very dark grayish brown, or brown. The A2 horizon is brown, yellowish brown, pale brown, or light yellowish brown.

The Bt horizon is clay or silty clay that is strongly acid or very strongly acid. The lower part of the Bt horizon is gray, light brownish gray, or light gray and is mottled in shades of red, yellow, or brown.

Boswell soils are associated with Falkner, Meth, and Malbis soils. They are better drained and more clayey than Falkner soils. They do not have the loamy underlying material as do Meth soils. They are more clayey than Malbis soils.

BFC—Boswell-Falkner association, sloping. This association consists of moderately well drained and somewhat poorly drained soils. It is on uplands dissected by numerous small drainageways that are in areas of 200 to 1,500 acres. It is about 52 percent Boswell soils, 13 percent Falkner soils, and 35 percent mostly Meth and

Malbis soils and wet soils along small drainageways that are subject to flooding.

The composition of this mapping unit is more variable and areas are generally larger than those of most other mapping units in the parish, but mapping has been controlled well enough for interpretations for the expected uses of the soils.

The Boswell soils in this association are on narrow ridgetops and upper side slopes. Slopes range from 2 to 8 percent but are mostly 2 to 5 percent. Fertility is low, and air and water move very slowly through these soils. The soils dry out fairly quickly after rain, but water is perched above the clayey subsoil for a short period. Plants generally are damaged by a lack of moisture during dry periods in summer and fall. These soils erode easily unless protected by a vegetative cover. The high shrink-swell potential and low strength of the subsoil limit the use of these soils for foundations and construction material.

The Falkner soils in this association have the profile described as representative of the Falkner series. They are on broad ridgetops and drainage divides. Slopes range from 1 to 5 percent but are mostly 1 to 3 percent. Fertility is low, and air and water move slowly through the lower part of the soils. The soils remain wet for a significant time after rain. They have a seasonal high water table at a depth of 1.5 to 3 feet from December to April. Plants generally are damaged by a lack of moisture during dry periods in summer and fall. These soils erode easily unless protected by a vegetative cover. Moderate wetness is a limitation for most uses. The high shrink-swell potential and the low strength of the lower part of the subsoil limit the use of these soils for foundations and construction material.

The Meth soil in this association is well drained and has a clayey subsoil, and the Malbis soil is moderately well drained and is loamy throughout. These soils are in small areas and do not significantly affect the overall use and management of the association. They generally have fewer limitations for most uses than the Boswell and Falkner soils. The soils along the small drainageways are more poorly drained than the Boswell and Falkner soils and are subject to flooding.

Most of the acreage of this association is woodland, mainly loblolly and shortleaf pine. Hardwood species are dominant along the small drainageways. A small acreage is used for pasture and homesites.

Suitable crops for the Boswell soils are cotton, grain sorghum, and soybeans. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, Pensacola bahiagrass, ryegrass, and weeping lovegrass. Proper management of crop residue, terracing, and planting grasses in rotation with crops help control erosion in areas that are used for cultivated crops.

Suitable crops for the Falkner soils are cotton, corn, grain sorghum, and soybeans. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, Pensacola bahiagrass, ryegrass, and crimson clover. Wetness may delay planting in spring. Proper management of crop residue and terracing help control erosion in areas that are used for cultivated crops.

Lime is generally needed on both the Boswell and Falkner soils, and crops and pasture plants respond well to fertilizer. Boswell soils in capability unit IIIe-4 and woodland suitability group 3c2; Falkner soils in capability unit IIIe-1 and woodland suitability group 2w8.

Buxin Series

The Buxin series consists of poorly drained, very slowly permeable soils that are clayey throughout. These soils formed in clayey alluvial sediment. They are on the lower part of level areas adjacent to the older natural levees on the Red River alluvial plain.

In a representative profile the surface layer is dark reddish-brown clay about 20 inches thick. The next lower layer is dark gray clay 11 inches thick. The subsoil and underlying material are reddish-brown clay.

Most of the acreage is used for pasture, but a small acreage is used for crops and some is woodland.

Representative profile of Buxin clay, in a pasture 0.8 mile north of Harmon and one-fourth mile north of State Highway 1 on field road, in the SW¼NW¼ sec. 31, H. 13 N., R. 10 W.

Ap—0 to 5 inches, dark reddish-brown (5YR 3/3) clay; common, fine, faint, dark reddish-brown mottles; weak, medium, subangular blocky structure; firm, plastic; common fine charcoal fragments; neutral; abrupt, smooth boundary.

A1—5 to 20 inches, dark reddish-brown (5YR 3/3) clay; weak, medium, subangular blocky structure; firm, plastic; pressure faces; neutral; clear, wavy boundary.

Ab—20 to 31 inches, dark-gray (10YR 4/1) clay; common, medium, distinct, reddish-brown (5YR 4/3) and dark-brown (7.5YR 4/4) mottles; weak, medium, subangular blocky structure; firm, plastic; dark reddish-brown (5YR 3/3) material in vertical cracks; neutral; clear, wavy boundary.

Bb—31 to 47 inches, reddish-brown (5YR 4/4) clay; common, fine, distinct, dark-gray mottles; weak, medium, subangular blocky structure; firm, very plastic; a few slickensides that do not intersect; few fine calcium carbonate concretions; neutral; clear, wavy boundary.

C—47 to 65 inches, reddish-brown (2.5YR 4/4) clay; massive; many medium calcium carbonate concretions; common black stains; strongly effervescent.

The Ap or A1 horizon is dark reddish brown, reddish brown, or dusky red. It ranges from slightly acid to mildly alkaline. There are buried horizons at a depth of 20 to 36 inches. The Ab horizon is dark-gray, very dark gray, very dark grayish-brown, or dark grayish-brown clay or silty clay. It ranges from neutral to moderately alkaline.

The Bb horizon is reddish-brown or dark reddish-brown clay or silty clay. It ranges from neutral to moderately alkaline.

The C horizon has colors in shades of red or brown. It is clay, silty clay, or silty clay loam and ranges from neutral to moderately alkaline.

In Red River Parish the Buxin soils are outside the range of the Buxin series in that they have a few calcium carbonate concretions in the Bb horizon. This difference does not affect their use, behavior, and management.

Buxin soils are associated with Moreland, Perry, Caspiana, and Gallion soils. They do not have the strongly acid, low-chroma upper layers that are characteristic of Perry soils. They are more clayey and more poorly drained than Caspiana and Gallion soils. They differ from Moreland soils in having dark-gray buried layers within 36 inches of the surface.

Bx—Buxin clay. This is a poorly drained, clayey soil on broad, level areas adjacent to old natural levees on

the Red River alluvial plain. Areas cover several hundred acres. Slopes are less than 1 percent.

Included with this soil in mapping are small areas of Caspiana, Gallion, Moreland, and Perry soils and large areas of soils that have only 15 to 20 inches of reddish clay over gray clay.

Fertility is high. Surface runoff is slow. Air and water move very slowly through the soil. This soil has a perched water table within 3 feet of the surface from December to April. Plants generally are damaged by a lack of moisture during dry periods in summer and fall. The shrink-swell potential is high, and cracks ½ inch wide form during dry periods. When the soil is wet, it swells and the cracks seal over. It is hard when dry and sticky when wet, and it is difficult to work.

Wetness is the main limitation for most uses. Low strength and the high shrink-swell potential limit the use of this soil for foundations and construction material.

Most of the acreage is used for pasture. The rest is mainly in crops and woodland. Suitable crops are grain sorghum, oats, soybeans, rice, and cotton. Suitable pasture plants are common bermudagrass, dallisgrass, tall fescue, ryegrass, Pensacola bahiagrass, johnsongrass, white clover, southern wild winter pea, and vetch.

Good tilth is difficult to maintain because of the high content of clay in the surface layer. This soil can be worked only within a narrow range of moisture content, and it generally becomes cloddy when worked. A surface drainage system may be needed if cultivated crops or pasture plants are grown. Crops other than legumes generally respond well to nitrogen fertilizer. Other fertilizers and lime should be applied according to soil tests. Capability unit IIIw-1; woodland suitability group 2w6.

Caspiana Series

The Caspiana series consists of well-drained, moderately permeable soils that are loamy throughout. These soils formed in loamy sediment. They are on the older natural levees on the Red River alluvial plain.

In a representative profile the surface layer is dark-brown and very dark brown silt loam about 11 inches thick. The subsoil and underlying material are reddish-brown silt loam.

Most of the acreage is used for pasture and crops. A small acreage is used for homesites.

Representative profile of Caspiana silt loam, in a cotton field 1.7 miles southwest of Gahagan and 580 feet northwest of the center of State Highway 177, in the SE¼SE¼ sec. 18, T. 12 N., R. 10 W. (Sample S65La-41-6 in laboratory analysis tables.)

AP—0 to 6 inches, dark-brown (7.5YR 3/2) silt loam; few, fine, reddish-brown mottles; weak, very fine, granular structure; friable; slightly acid; clear, smooth boundary.

A12—6 to 11 inches, very dark brown (10YR 2/2) silt loam; weak, fine, granular structure; firm; neutral; clear, smooth boundary.

B1—11 to 15 inches, dark-brown (7.5YR 3/2) and reddish-brown (5YR 4/4) silt loam, dark brown (7.5YR 3/2) crushed; weak, coarse, subangular blocky structure parting to weak, fine, subangular blocky; friable; neutral; gradual, smooth boundary.

B21t—15 to 21 inches, reddish-brown (5YR 4/4) silt loam; weak, coarse, subangular blocky structure parting to moderate, medium, subangular blocky; firm; patchy clay films; few dark-brown streaks; neutral; gradual, smooth boundary.

B22t—21 to 27 inches, reddish-brown (5YR 4/4) loam; common, medium, distinct, dark-brown coatings on prisms; moderate, medium, prismatic structure parting to weak, medium, subangular blocky; firm; thin patchy clay films; neutral; gradual, smooth boundary.

B3—27 to 52 inches, reddish-brown (5YR 4/4) silt loam; few, medium, distinct, dark-brown (7.5YR 3/2) mottles; weak, coarse, prismatic structure parting to weak, coarse, subangular blocky; firm; neutral; abrupt, wavy boundary.

C—52 to 60 inches, reddish-brown (5YR 4/4) silt loam; few, medium, distinct, dark-brown (7.5YR 3/2) mottles; massive; firm; common fine carbonate concretions; moderately alkaline; strongly effervescent.

The Ap or A1 horizon is 7 to 15 inches thick. It is dark-brown, very dark grayish-brown, very dark brown, very dark gray, or dark reddish-brown silt loam or silty clay loam. It ranges from medium acid to moderately alkaline.

The B horizon is reddish-brown, dark reddish-brown, yellowish-red, brown, or strong-brown silt loam, loam, or silty clay loam. It ranges from medium acid to moderately alkaline.

The C horizon has the same color range as the B horizon. It is very fine sandy loam, silt loam, loam, or silty clay loam that ranges from neutral to moderately alkaline. In places it is calcareous.

Caspiana soils are associated with Armistead, Coushatta, Gallion, Moreland, and Sterlington soils. They are better drained and less clayey than Armistead and Moreland soils. They are more strongly developed than Coushatta soils. They have a thicker, darker colored A horizon than Gallion and Sterlington soils.

Ca—Caspiana silt loam. This is a nearly level, well-drained, loamy soil on the older natural levees on the Red River alluvial plain. Areas cover 25 to several hundred acres. This soil has the profile described as representative of the series. Slopes are less than 1 percent.

Included with this soil in mapping are small areas of Armistead, Gallion, Coushatta, and Sterlington soils.

Fertility is moderately high. Surface runoff is slow. Plant roots penetrate the soil easily, and air and water move through it at a moderate rate. A seasonal high water table is typically below a depth of 6 feet, but in places it is at a depth of 4 to 6 feet from December to April. Plants occasionally are damaged by a lack of moisture during dry periods in summer and fall. Low strength limits the use of this soil for foundations and construction material.

Most of the acreage is used for crops and pasture. Suitable crops are cotton, soybeans, corn, wheat, oats, and grain sorghum. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, dallisgrass, ryegrass, Pensacola bahiagrass, johnsongrass, white clover, southern wild winter peas, and vetch.

This soil is friable and easy to keep in good tilth. It can be worked throughout a wide range of moisture content. A traffic pan may form if the soil is under continuous cultivation, but it can be broken by chiseling or deep plowing. Land smoothing and leveling improve surface drainage and increase the efficiency of farm equipment. Crops other than legumes generally respond well to nitrogen fertilizer. Other fertilizers and lime should be applied according to soil tests. Capability unit I-1; woodland suitability group 2o4.

Cn—Caspiana silty clay loam. This is a nearly level, well-drained, loamy soil on the older natural levees on the Red River alluvial plain. Areas cover 25 to 500 acres. This soil has a profile similar to the one described as representative of the series, but its surface layer is silty clay loam. Slopes are less than 1 percent.

Included with this soil in mapping are small areas of Caspiana silt loam and Gallion, Coushatta, and Armistead soils.

Fertility is moderately high. Surface runoff is slow. Plant roots penetrate the soil fairly easily, and air and water move through it at a moderate rate. A seasonal high water table is typically below a depth of 6 feet, but in places it is at a depth of 4 to 6 feet from December to April. This soil dries out more slowly than most of the surrounding soils, but plants occasionally are damaged by a lack of moisture during dry periods in summer and fall. Water stands in depressions and on the lower, more nearly level areas for short periods after heavy rain. Low strength limits the use of this soil for foundations and construction material.

Most of the acreage is used for crops and pasture. Suitable crops are cotton, soybeans, corn, wheat, oats, and grain sorghum. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, dallisgrass, Pensacola bahiagrass, ryegrass, johnsongrass, white clover, southern wild winter pea, and vetch.

Good tilth is somewhat difficult to maintain because of the silty clay loam surface layer. The moderately high content of clay in the surface layer somewhat restricts the use of farm equipment during wet periods. Surface drainage is needed for crops and pasture. Land smoothing and leveling improve surface drainage and permit more efficient use of farm equipment. Crops other than legumes generally respond well to nitrogen fertilizer. Other fertilizers and lime should be applied according to soil tests. Capability unit IIw-2; woodland suitability group 2o4.

Coushatta Series

The Coushatta series consists of well-drained, moderately permeable soils that are loamy throughout. These soils formed in loamy sediment. They are on the nearly level natural levees on the Red River alluvial plain.

In a representative profile the surface layer is reddish-brown silt loam about 8 inches thick. The subsoil, which extends to a depth of 27 inches, is reddish-brown silt loam and silty clay loam. The underlying material is reddish-brown stratified silt loam, silty clay loam, very fine sandy loam, and loamy very fine sand.

Most of the acreage is used for crops and pasture. A small acreage is used for homesites.

Representative profile of Coushatta silt loam, in a cotton field 1.1 miles southeast of Armistead, 0.6 mile east of State Highway 1 on farm road, and 200 feet south of the farm road, in the SW¼SE¼ sec. 26, T. 12 N., R. 10 W. (Sample S65 La-41-5 in laboratory analysis tables.)

Ap—0 to 8 inches, reddish-brown (5YR 4/4) silt loam; weak, medium, granular structure to a depth of 5 inches and weak, thin, platy structure between depths of 5 and 8 inches; friable; slightly acid; abrupt, smooth boundary.

B21—8 to 15 inches, reddish-brown (5YR 4/4) silt loam; weak, medium, subangular blocky structure; friable; many fine pores; slightly acid; abrupt, smooth boundary.

B22—15 to 27 inches, reddish-brown (5YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; common fine pores; dark reddish-brown (5YR 3/3) ped surfaces; neutral; abrupt, smooth boundary.

IIC1—27 to 38 inches, reddish-brown (5YR 4/4) silt loam; massive; friable; common fine pores; calcareous matrix; mildly alkaline; abrupt, smooth boundary.

IIC2—38 to 44 inches, reddish-brown (5YR 5/4) silt loam; massive; very friable; calcareous matrix; moderately alkaline; abrupt, smooth boundary.

IIC3—44 to 61 inches, reddish-brown (5YR 4/4) silt loam; few thin strata, 1/16 to 1 inch thick, of reddish-brown (5YR 4/3) heavy silt loam; massive; friable; moderately alkaline; strongly effervescent.

The Ap or A1 horizon is reddish-brown, brown, or dark-brown silt loam or silty clay loam. It ranges from slightly acid to neutral.

The B horizon is light reddish-brown, reddish-yellow, or reddish-brown silt loam or silty clay loam that ranges from slightly acid to moderately alkaline.

The C horizon has the same color range as the B horizon. It is stratified silt loam, silty clay loam, very fine sandy loam, or loamy very fine sand that ranges from neutral to moderately alkaline.

Coushatta soils are associated with Severn, Moreland, and Latanier soils and Udifluvents. They are less sandy than Severn soils. They are better drained and less clayey than Moreland and Latanier soils. They are more strongly developed than Udifluvents.

Cs—Coushatta silt loam. This is a nearly level, well-drained, loamy soil. It is in areas of 10 to 200 acres on natural levees on the Red River alluvial plain. It has the profile described as representative of the series. Slopes are less than 1 percent.

Included with this soil in mapping are small areas of Severn, Moreland, and Latanier soils.

Fertility is high. Surface runoff is slow. Plant roots penetrate the soil easily, and air and water move through it at a moderate rate. A seasonal high water table is typically below a depth of 6 feet, but in places it is at a depth of 4 to 6 feet from December to April. The soil is not wet, and because of its position on the landscape, does not receive runoff from the surrounding area. Plants occasionally are damaged by a lack of moisture during dry periods in summer and fall. Low strength limits the use of this soil for foundations and construction material.

Most of the acreage is used for crops. A small acreage is used for pasture and homesites. Suitable crops are cotton (fig. 4), soybeans, corn, wheat, oats, and grain sorghum. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, ryegrass, Pensacola bahiagrass, johnsongrass, white clover, southern wild winter pea, and vetch.

This soil is friable, and good tilth is easy to maintain. A traffic pan forms easily, but it can be broken by chiseling or deep plowing. The soil can be worked throughout a wide range of moisture content. Land smoothing and leveling improve surface drainage and increase the efficiency of farm equipment. Crops other than legumes generally respond well to nitrogen fertilizer. Other fertilizers and lime generally are not

Figure 4.—Cotton on Coushatta silt loam.

needed. Capability unit I-1; woodland suitability group 1o4.

Ct—Coushatta silty clay loam. This is a nearly level, well-drained, loam soil. It is in areas of 10 to 100 acres on natural levees on the Red River alluvial plain. It has a profile similar to the one described as representative of the series, but its surface layer is silty clay loam. Slopes are 0 to 1 percent.

Included with this soil in mapping are small areas of Coushatta silt loam and Moreland and Latanier soils.

Fertility is high. Surface runoff is slow. Plant roots penetrate the soil fairly easily, and air and water move through it at a moderate rate. A seasonal high water table is typically below a depth of 6 feet, but in places it is at a depth of 4 to 6 feet from December to April. Water stands in depressions for short periods after heavy rains. This soil dries out more slowly than most of the surrounding soils, but plants occasionally are damaged by a lack of moisture during dry periods in summer and fall. Low strength limits the use of this soil for foundations and construction material.

Most of the acreage is used for crops. A small acreage is used for pasture. Suitable crops are cotton, soybeans, corn, wheat, oats, and grain sorghum. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, ryegrass, Pensacola bahiagrass, johnsongrass, white clover, southern wild winter pea, vetch, and tall fescue.

Good tilth is somewhat difficult to maintain because of the silty clay loam surface layer. The moderately high content of clay in the surface layer somewhat restricts the use of farm equipment during wet periods. Surface drainage is needed for crops and pasture. Land smoothing and leveling improve surface drainage and increase the efficiency of farm equipment. Crops other than legumes generally respond well to nitrogen fertilizer. Other fertilizers and lime generally are not needed. Capability unit IIw-2; woodland suitability group 1o4.

Falkner Series

The Falkner series consists of somewhat poorly drained, slowly permeable soils that have a subsoil that is loamy in the upper part and clayey in the lower part. These soils formed in clayey sediment of Tertiary age. They are on gently sloping uplands.

In a representative profile the surface layer is brown silt loam about 6 inches thick. The subsoil, in the upper 21 inches, is mainly yellowish-brown silt loam. In the

lower part it is gray clay that is mottled with red, brown, and yellow.

Most of the acreage is woodland. A small acreage is used for pasture, and some is used for homesites.

Representative profile of Falkner silt loam, in an area of Boswell-Falkner association, sloping, in woodland 4 miles northwest of Hall Summit, 0.3 mile west of road, and 50 feet south of access road, in the NW¼ sec. 11, T. 14 N., R. 10 W.

A1—0 to 6 inches, brown (10YR 4/3) silt loam; weak, granular structure; friable; strongly acid; gradual, smooth boundary.

B21t—6 to 11 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, subangular blocky structure; friable; thin patchy clay films; few, fine, black concretions; many worm casts; very strongly acid; gradual, smooth boundary.

B22t—11 to 19 inches, yellowish-brown (10YR 5/6) silt loam; moderate, medium, subangular blocky structure; friable; thin discontinuous clay films; few, fine, black concretions; very strongly acid; gradual, smooth boundary.

B23t—19 to 27 inches, brownish-yellow (10YR 6/6) silty clay loam; common, medium, prominent, red (2.5YR 4/6) mottles; moderate, fine and medium, subangular blocky structure; slightly firm; many, fine, black concretions and few chert pebbles; thin patchy clay films; very strongly acid; clear, smooth boundary.

IIB24t—27 to 31 inches, mottled gray (10YR 6/1), yellowish-brown (10YR 5/4), and red (2.5YR 4/6) clay; moderate, medium, subangular blocky structure; firm; few chert pebbles; thin patchy clay films; very strongly acid; gradual, wavy boundary.

IIB25t—31 to 46 inches, gray (10YR 6/1) clay; many medium, prominent, red (2.5YR 4/6) mottles and few, fine, faint, brownish-yellow mottles; moderate, medium, subangular blocky structure; firm; thin patchy clay films; few slickensides that do not intersect; very strongly acid; gradual, wavy boundary.

IIB3t—46 to 64 inches, gray (5Y 6/1) sandy clay; common, fine, distinct, brownish-yellow and red mottles; moderate, medium, subangular blocky structure; firm; very strongly acid.

The A horizon is 4 to 11 inches thick and ranges from medium acid to very strongly acid. The A1 to Ap horizon is brown, dark grayish brown, or yellowish brown. The A2 horizon, where present, is pale brown, light yellowish brown, or yellowish brown.

The Bt horizon is strongly acid or very strongly acid. The upper part of the Bt horizon is yellowish-brown or brownish-yellow silt loam or silty clay loam that is mottled in shades of red, brown, yellow, or gray. The IIBt horizon is gray silty clay, clay, or sandy clay that is mottled in shades of red, brown, or yellow.

In Red River Parish the Falkner soils have slightly less silt and slightly more very fine sand than is defined in the range for the Falkner series. This difference does not affect their use, behavior, and management.

Falkner soils are associated with Boswell, Malbis, and Meth soils. They are less clayey than Boswell soils. They are more poorly drained than Malbis, Boswell, and Meth soils.

FBB—Falkner-Boswell association, gently sloping. This association consists of somewhat poorly drained and moderately well drained soils in areas of 200 to 800 acres on uplands. It is dissected by numerous small drainageways. The association is about 40 percent Falkner soils, 30 percent Boswell soils, and 30 percent Beauregard, Malbis, and Meth soils and wet soils along small drainageways that are subject to flooding.

The composition of this mapping unit is more variable than that of most other mapping units in the parish, but mapping has been controlled well enough for interpretations for the expected uses of the soils.

The Falkner soils in this association have a profile similar to the one described as representative of the Falkner series, but their surface layer is dark grayish brown and the layer of silty clay in the subsoil is at a depth of 28 inches. These soils are on broad, nearly level ridgetops and drainage divides. Slopes range from 1 to 5 percent, but they are mostly 1 to 3 percent. Fertility is low, and air and water move very slowly through the lower part of the soils. These soils have an apparent seasonal high water table at a depth of 1.5 to 3 feet from December to April. Plants generally are damaged by a lack of water during dry periods in summer and fall. The soils erode easily unless protected by a vegetative cover. Wetness is a limitation for most uses. The high shrink-swell potential and low strength of the lower part of the subsoil limit the use of these soils for foundations and construction material.

The Boswell soils in this association have a profile similar to the one described as representative of the Boswell series, but their surface layer is dark grayish brown and is only about 8 inches thick. These soils are on narrow ridgetops and upper side slopes. Slopes are mostly 2 to 5 percent. Fertility is low, and air and water move very slowly through the soils. Water is perched above the clayey subsoil for short periods from December to April. Plants generally are damaged by a lack of water during dry periods in summer and fall. These soils erode easily unless protected by a vegetative cover. The high shrink-swell potential and low strength of the subsoil limit the use of these soils for foundations and construction material.

Most of the acreage of this association is woodland. A small acreage is used for pasture and homesites. Suitable crops for the Falkner soils are cotton, corn, grain sorghum, and soybeans. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, Pensacola bahiagrass, ryegrass, vetch, and southern wild winter peas. Wetness sometimes delays planting in spring. Proper management of crop residue, terracing, and growing grasses in rotation with crops may be necessary to help control erosion in areas of Falkner soils that are used for cultivated crops. Crops and pasture plants respond well to fertilizer. Lime is generally needed.

Suitable crops for the Boswell soils are cotton and grain sorghum, and suitable pasture plants are common bermudagrass, Coastal bermudagrass, Pensacola bahiagrass, and ryegrass. Proper management of crop residue, terracing, and growing grasses in rotation with crops help control erosion in areas of Boswell soils that are used for cultivated crops. Crops and pasture plants respond well to fertilizer. Lime is generally needed. Falkner soils in capability unit IIIe-1 and woodland suitability group 2w8; Boswell soils in capability unit IIIe-4 and woodland suitability group 3c2.

Gallion Series

The Gallion series consists of well-drained, moderately permeable soils that are loamy throughout. These

soils formed in loamy sediment. They are on the nearly level older natural levees on the Red River alluvial plain.

In a representative profile the surface layer is brown silt loam about 10 inches thick. The subsoil is yellowish-red silt loam 34 inches thick. The underlying material is reddish-brown and yellowish-red stratified loam and silt loam.

Most of the acreage is used for crops and pasture. A small acreage is used for homesites.

Representative profile of Gallion silt loam, in a cotton field 2.7 miles west of Westdale, 300 feet west of Watson Bayou, and 400 feet north of farm road, in the NW¼NE¼ sec. 29, T. 14 N., R. 11 W. (Sample S65 La-41-2 in laboratory analysis tables.)

Ap—0 to 10 inches, brown (7.5YR 4/2) silt loam; weak, fine and medium, granular structure; friable; many fine pores; medium acid; abrupt, smooth boundary.

B21t—10 to 22 inches, yellowish-red (5YR 4/6) silt loam; weak, coarse, prismatic structure parting to moderate, medium and coarse, subangular blocky; firm; many very fine pores; thin; discontinuous, dark reddish-brown clay films; slightly acid; gradual, smooth boundary.

B22t—22 to 33 inches, yellowish-red (5YR 4/6) silt loam; weak, coarse, prismatic structure parting to weak, coarse, subangular blocky; firm; many fine pores; thin, discontinuous, dark reddish-brown clay films on peds and in root channels and pores; few, fine, black concretions; slightly acid; clear, smooth boundary.

B3—33 to 44 inches, yellowish-red (5YR 4/6) silt loam; weak, medium and coarse, subangular blocky structure; slightly hard; thin patchy clay films in pores; few, fine, black concretions; mildly alkaline; clear, wavy boundary.

C1—44 to 49 inches, reddish-brown (5YR 4/4) loam that has lenses of silt loam about 2 inches thick; weak, medium and coarse, subangular blocky structure; friable; many fine pores; slightly acid; abrupt, smooth boundary.

C2—49 to 60 inches, yellowish-red (5YR 4/6) silt loam in 2- to 3-inch strata; weak, medium, subangular blocky structure; very friable; many fine pores; common fine carbonate concretions; moderately alkaline; strongly effervescent.

The Ap or A1 horizon is brown, dark grayish-brown, or grayish-brown silt loam or silty clay loam. It ranges from medium acid to neutral.

The B2t horizon is reddish-brown, dark reddish-brown, yellowish-red, brown, or strong-brown silt loam or silty clay loam. It ranges from medium acid to mildly alkaline. The B3 horizon has the same color range as the B2t horizon. It is very fine sandy loam, silt loam, loam, or silty clay loam that ranges from slightly acid to moderately alkaline. In places it has carbonate concretions.

The C horizon has the same color and texture range as the B3 horizon. It is typically stratified and ranges from slightly acid to moderately alkaline. In places it has carbonate concretions.

Gallion soils are associated with Armistead, Sterlington, and Caspiana soils. They are better drained and less clayey than Armistead soils. They do not have the thick, dark-colored surface layer that is typical of Caspiana soils. They are more clayey than Sterlington soils.

Ga—Gallion silt loam. This is a well-drained, loamy soil on the older natural levees on the Red River alluvial plain. Areas are 5 to 100 acres in size. This soil has the profile described as representative of the series. Slopes are 0 to 1 percent.

Included with this soil in mapping are small areas of Gallion silty clay loam and Caspiana and Sterlington soils.

Fertility is moderately high. Surface runoff is slow. Plant roots penetrate the soil easily, and air and water move through it at a moderate rate. A seasonal high water table is typically below a depth of 6 feet, but in places it is at a depth of 4 to 6 feet from December to April. The soil is not wet, and because of its position on the landscape it does not receive runoff from the surrounding area. Plants occasionally are damaged by a lack of moisture during dry periods in summer and fall. Low strength limits the use of this soil for foundations and construction material.

Most of the acreage is used for crops. A small acreage is used for pasture and home sites. Suitable crops are cotton, soybeans, corn, wheat, oats, and grain sorghum. Suitable pasture plants are common bermudagrass, ryegrass, Pensacola bahiagrass, johnsongrass, white clover, southern wild winter pea, and vetch.

This soil is friable, and good tilth is easy to maintain. A traffic pan forms easily, but it can be broken by chiseling or deep plowing. The soil can be worked throughout a wide range of moisture content. Land smoothing and leveling improve surface drainage and permit more efficient use of farm equipment. Crops generally respond well to fertilizer. Lime may be needed. Capability unit I-2; woodland suitability group 2o4.

Gn—Gallion silty clay loam. This is a nearly level, well-drained, loamy soil on the lower parts of the older natural levees on the Red River alluvial plain. Areas are 10 to 50 acres in size. This soil has a profile similar to the one described as representative of the series, but its surface layer is silty clay loam. Slopes are 0 to 1 percent.

Included with this soil in mapping are small areas of Gallion silt loam and Caspiana and Sterlington soils.

Fertility is moderately high. Surface runoff is slow. Plant roots penetrate the soil fairly easily, and air and water move through it at a moderate rate. A seasonal high water table is typically below a depth of 6 feet, but in places it is at a depth of 4 to 6 feet from December to April. Water stands in depressions for short periods after heavy rain. This soil dries out more slowly than most of the surrounding soils, but plants occasionally are damaged by a lack of moisture during dry periods in summer and fall. Low strength limits the use of this soil for foundations and construction material.

Most of the acreage is used for crops. A small acreage is used for pasture. Suitable crops are cotton, soybeans, corn, wheat, oats, and grain sorghum. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, Pensacola bahiagrass, ryegrass, johnsongrass, white clover, southern wild winter pea, and vetch.

Good tilth is somewhat difficult to maintain because of the silty clay loam surface layer. The moderately high content of clay in the surface layer somewhat restricts the use of farm equipment during wet periods. Surface drainage is needed for crops and pasture. Land smoothing and leveling improve surface drainage and permit more efficient use of farm equipment. Crops generally respond well to fertilizer. Lime may be needed. Capability unit IIw-3; woodland suitability group 2o4.

Gore Series

The Gore series consists of moderately well drained, very slowly permeable soils that have a loamy surface layer and a clayey subsoil. These soils formed in clayey sediment of Pleistocene age. They are on moderately sloping uplands, mostly on the escarpment adjacent to the Red River alluvial plain in the central part of the parish.

In a representative profile the surface layer is dark grayish-brown and brown silt loam about 5 inches thick. The subsoil is red clay and silty clay that is mottled with gray, yellow, and brown.

Most of the acreage is woodland. A small acreage is used for pasture.

Representative profile of Gore silt loam, in an area of Gore-McKamie association, sloping, in woodland 7 miles southeast of Coushatta and 200 feet south of State Highway 480, in the NW¼NE¼ sec. 14, T. 11 N., R. 9 W.

A11—0 to 2 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; very friable; strongly acid; clear, wavy boundary.

A12—2 to 5 inches, brown (10YR 5/3) silt loam; weak, fine, granular structure; very friable; strongly acid; clear, wavy boundary.

B21t—5 to 13 inches, red (2.5YR 4/6) clay; common, medium, prominent, reddish-yellow (7.5YR 6/6) mottles; moderate, medium, subangular blocky structure; firm; thin discontinuous clay films; strongly acid; clear, wavy boundary.

B22t—13 to 27 inches, mottled red (2.5YR 4/8), light brownish-gray (10YR 6/2), and pale-brown (10YR 6/3) clay; weak, medium, subangular blocky structure; firm; thin patchy clay films; very strongly acid; clear, smooth boundary.

B23t—27 to 40 inches, red (2.5YR 4/6) silty clay; few, medium, prominent, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; firm; thin discontinuous clay films; very strongly acid; gradual, smooth boundary.

B24t—40 to 70 inches, red (2.5YR 4/6) silty clay; moderate, medium, subangular blocky structure; firm; thin discontinuous clay films; common thin lenses of yellowish-red silt loam; few slickensides that do not intersect; strongly acid.

The Ap or A1 horizon is 2 to 9 inches thick. It is dark grayish brown, grayish brown, light grayish brown, or brown and ranges from medium acid to very strongly acid.

The B2t horizon is red or yellowish-red clay or silty clay that is mottled in shades of brown and gray in the upper part and grades to reddish clay or silty clay in the lower part. It is strongly acid to very strongly acid in the upper part and very strongly acid to neutral in the lower part.

The C horizon, where present, is medium acid to mildly alkaline, reddish silty clay or clay.

Gore soils are associated with Shatta, Kolin, Wrightsville, and McKamie soils. They are more clayey than Shatta soils. They do not have the loamy layers in the upper part of the B horizon that are characteristic of Kolin soils. They are better drained than Wrightsville soils. They are more clayey in the lower layers than McKamie soils.

GSC—Gore-McKamie association, sloping. This association consists of moderately well drained and well drained soils on the escarpment on the uplands along the Red River alluvial plain. It is dissected by numerous small drainageways. Areas range from 160 to several hundred acres in size. The association is about 39 percent Gore soils, 30 percent McKamie soils, and 31 percent mostly Kolin and Shatta soils and wet soils along small drainageway that are subject to flooding.

The composition of this mapping unit is more variable than that of most other mapping units in the parish, but mapping has been controlled well enough for interpretations for the expected uses of the soils.

The Gore soils in this association are on ridgetops and upper side slopes. Slopes range from 1 to 5 percent, but they are mostly 1 to 3 percent. Fertlity is low, and air and water move very slowly through the soil. Water is perched above the clayey subsoil for short periods after rain, but the soils dry out fairly quickly after rain, and plants generally are damaged by a lack of moisture during dry periods in summer and fall. The soils erode easily unless protected by a vegetative cover. The high shrink-swell potential and low strength of the subsoil limit the use of these soils for foundations and construction material.

The McKamie soils in this association have the profile described as representative of the McKamie series. These soils are in sloping areas that border drainageways. Slopes range from 3 to 8 percent but are mostly 3 to 5 percent. Fertility is low, and air and water move very slowly through the soil. These soils dry out fairly quickly after rain, and plants generally are damaged by a lack of moisture during dry periods in summer and fall. The seasonal high water table is at a depth of more than 6 feet. The soils erode easily unless protected by a vegetative cover. The high shrink-swell potential and low strength of the subsoil limit the use of these soils for foundations and construction material.

The Kolin soils in this association are moderately well drained and are loamy in the upper part of the subsoil and clayey in the lower part. The Shatta soils are moderately well drained and loamy. These soils are in small areas and do not significantly affect the overall use and management of the association. They generally have fewer limitations for most uses than the Gore and McKamie soils. The soils along the small drainageways are more poorly drained than the Gore and McKamie soils and are subject to flooding.

Most of the acreage of this association is woodland. A small acreage is used for pasture. Suitable crops are grain sorghum and soybeans, and suitable pasture plants are common bermudagrass and Pensacola bahiagrass. Proper management of crop residue, terracing, and growing grasses in rotation with crops help control erosion in areas used for cultivated crops. Crops and pasture plants respond well to fertilizer. Lime is generally needed. Capability unit IVe-1; woodland suitability group 3c2.

Guyton Series

The Guyton series consists of poorly drained, slowly permeable soils that are loamy throughout. These soils formed in sediment that has a high content of silt. They are on uplands in drainageways and in broad, nearly level areas.

In a representative profile the surface layer is dark grayish-brown silt loam about 3 inches thick. The sub-

surface layer is light brownish-gray silt loam 14 inches thick. The subsoil is light brownish-gray silt loam that is mottled in shades of brown.

Most of the acreage is woodland. A small acreage is used for pasture.

Representative profile of Guyton silt loam, in an area of Guyton association, frequently flooded, in woodland 1.2 miles north of Wommack and 1,200 feet east of access road, in the SW¼SW¼ sec. 8, T. 14 N., R. 8 W.

A1—0 to 3 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; friable; strongly acid; clear, wavy boundary.

A21g—3 to 9 inches, light brownish-gray (10YR 6/2) silt loam; common, medium and fine, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, medium, subangular blocky structure; friable; common fine and medium pores; strongly acid; clear, wavy boundary.

A22g—9 to 17 inches, light brownish-gray (10YR 6/2) silt loam; common, medium, distinct, yellowish-brown (10YR 5/4 and 5/6) mottles; weak, medium, granular structure; friable; many fine and medium pores; tongues 3 to 5 inches wide extend to a depth of 34 inches; strongly acid; abrupt, irregular boundary.

B21tg—17 to 29 inches, light brownish-gray (10YR 6/2) silt loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles and few, medium, distinct, strong-brown (7.5YR 5/6) mottles; weak, coarse, prismatic structure parting to moderate, medium, subangular blocky; friable; common patchy clay films; very strongly acid; clear, smooth boundary.

B22tg—29 to 48 inches, light brownish-gray (10YR 6/2) silt loam; common, fine, distinct, strong-brown (7.5YR 5/6) mottles; weak, coarse, prismatic structure parting to moderate, medium, subangular blocky; friable; common patchy clay films on peds and in pores and root channels; common black stains and fine, soft, black accumulations; very strongly acid; clear, smooth boundary.

B3g—48 to 60 inches, light brownish-gray (10YR 6/2) silt loam; common, fine and medium, distinct, strong-brown (7.5YR 5/6) mottles; weak, coarse, subangular blocky structure; many black stains along root channels; very strongly acid.

The A horizon is 16 to 30 inches thick. It ranges from medium acid to very strongly acid. The A1 to Ap horizon is brown, grayish brown, or dark grayish brown. The A2 horizon is gray or light brownish gray and is mottled in shades of brown. The lower boundary is clear and irregular to abrupt and irregular. Tongues of material from the A2 horizon extend into the Bt horizon.

The Btg horizon is gray, light brownish gray, or grayish brown and is mottled in shades of brown. It is silt loam, silty clay loam, or loam and ranges from medium acid to very strongly acid.

In Red River Parish, the Guyton soils in the Guyton-Messer association have slightly less clay than is defined in the range for the Guyton series. This difference does not affect their use, behavior, and management.

Guyton soils are associated with Messer, Bonn, Beauregard, and Shatta soils. They are more poorly drained than Messer soils. Guyton soils do not have the high content of exchangeable sodium that is characteristic of Bonn soils. They are more poorly drained than Beauregard and Shatta soils, and they do not have the fragipan that is characteristic of Shatta soils.

GU—Guyton association, frequently flooded. This association consists of nearly level, poorly drained, loamy soils on alluvial plains of streams that drain the uplands. Areas range from 50 to several hundred acres in size. This association is about 80 percent Guyton soils and 20 percent better drained soils that are at a higher elevation on natural levees and other better drained soils that have a high content of sand.

The composition of this mapping unit is more variable than that of most other mapping units in the parish, but mapping has been controlled well enough for interpretations for the expected uses of the soils.

The Guyton soils in this association are on nearly level or level areas and in depressions on the alluvial plains. Fertility is low in these soils. Surface runoff is slow. Air and water move slowly through the soils. The soils have an apparent seasonal high water table within 2 feet of the surface from December to April. They are subject to frequent flooding, mostly in winter, in spring, and early in summer (fig. 5). Flooding and wetness are the main limitations for most uses.

Most of the acreage is woodland. Most areas of these soils are not suited to cultivated crops because of flooding. Common bermudagrass and Pensacola bahiagrass are suitable pasture plants, but flooding limits the grazing time. Capability unit Vw-2; woodland suitability group 2w9.

GY—Guyton-Messer association. This association consists of poorly drained and moderately well drained soils. It is on uplands dissected by small drainageways. It is about 60 percent Guyton soils, 20 percent Messer soils, and 20 percent mostly Shatta and Bonn soils and wet soils along small drainageways that are subject to flooding.

The composition of this mapping unit is more variable than that of most other mapping units in the parish, but mapping has been controlled well enough for interpretations for the expected uses of the soils.

The Guyton soils in this association are on broad, nearly level areas. Slopes are less than 1 percent. Fertility is low, and air and water move slowly through the soils. The soils have an apparent seasonal high water table within 2 feet of the surface from December to April. Wetness is the cause of poor aeration, and it restricts the growth of plant roots. Water stands in depressions for short periods after heavy rain. These soils dry out more slowly than most of the surrounding soils and are hard when dry. Plants generally are damaged by a lack of moisture in summer and fall, but wetness is the main limitation for most uses.

The Messer soils in this association have the profile described as representative of the Messer series. These soils are on convex, circular to oblong mounds. Slopes range from 3 to 10 percent but are mostly 3 to 5 percent. Fertility is low, and air and water move slowly through the lower part of the subsoil. These soils have an apparent seasonal high water table at a depth of 1.5 to 3 feet from December to April. In some years plants are damaged by a lack of moisture during dry periods in summer and fall. Low strength limits the use of these soils for foundations and construction material.

The Shatta soils in this association are moderately well drained and loamy. The Bonn soils have high saturations of sodium. These soils are in small areas and do not significantly affect the overall use and management of the association. They generally have fewer limitations for most uses than the Guyton soils. The

Figure 5.—**Flooding on the Guyton association, frequently flooded.**

soils along the small drainageways are more poorly drained than the Messer soils and are subject to flooding.

Most of the acreage of this association is woodland. A small acreage is used for pasture. Suitable crops for the Guyton soils are cotton and soybeans, and suitable pasture plants are common bermudagrass, Pensacola bahiagrass, and ryegrass. It is somewhat difficult to keep the Guyton soils in good tilth and to prevent surface crusting. Tilth can be improved and surface crusting reduced by planting green-manure crops and plowing under crop residue. Surface drainage is needed for cultivated crops and pasture. Lime is generally needed also, and crops respond fairly well to fertilizer.

Suitable crops for the Messer soils are cotton and soybeans, and suitable pasture plants are common bermudagrass and Pensacola bahiagrass. The Messer soils are friable and fairly easy to keep in good tilth. Tilth can be improved by plowing under crop residue and green-manure crops. Land smoothing and leveling increase the efficiency of farm equipment. Lime is genrally needed, and crops respond well to fertilizer. Guyton soils in capability unit IIIw-5 and woodland suitability group 2w9; Messer soils in capability unit IIIe-3 and woodland suitability group 2w8.

Kolin Series

The Kolin series consists of moderately well drained, very slowly permeable soils that are loamy in the upper part of the subsoil and clayey in the lower part of the subsoil. These soils formed in alluvial sediment of Pleistocene age. They are on gently sloping terraces in the uplands in the south-central part of the parish.

In a representative profile the surface layer is dark grayish-brown silt loam about 3 inches thick. The subsurface layer is brown silt loam 5 inches thick. The subsoil, in the upper 15 inches, is strong-brown silt loam; in the middle part it is strong brown and yellowish-brown silty clay loam that is mottled with red and gray; and in the lower part it is strong-brown silty clay and red clay.

Most of the acreage is woodland and pasture. A small acreage is used for homesites.

Representative profile of Kolin silt loam, in an area of Kolin-Wrightsville association, in woodland 2 miles north of Fairview Alpha, 740 feet southeast of local road, and 900 feet northeast of logging road, in the NE¼SE¼ sec. 7, T. 12 N., R. 8 W.

A1—0 to 3 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; slightly acid; clear, smooth boundary.

A2—3 to 8 inches, brown (10YR 5/3) silt loam; weak, medium, granular structure; very friable; common, fine dark-brown concretions; slightly acid; clear, wavy boundary.

B21t—8 to 16 inches, strong-brown (7.5YR 5/6) silt loam; weak, medium, subangular blocky structure; friable, sticky; few, fine, dark-brown concretions; thin patchy clay films; medium acid; clear, smooth boundary.

B22t—16 to 23 inches, strong-brown (7.5YR 5/6) silt loam; common, medium, distinct, red (2.5YR 5/6) mottles; moderate, medium, subangular blocky structure; friable; distinct discontinuous clay films; few, fine, dark-brown concretions; medium acid; abrupt, wavy boundary.

B23t—23 to 27 inches, strong-brown (7.5YR 5/6) silty clay loam; common, medium, distinct, yellowish-red (5YR 5/6) mottles; moderate, medium, subangular blocky structure; firm; thin patchy clay films; common, fine, brown and black concretions; thin pale-brown silt coatings, as much as 1 millimeter thick, on peds; strongly acid; clear, wavy boundary.

B24t—27 to 30 inches, yellowish-brown (10YR 5/6) silty clay loam; common, fine, faint, light brownish-gray (10YR 6/2) mottles and common, fine, prominent, yellowish-red mottles; moderate, medium, subangular blocky structure; firm; thin patchy clay films; about 15 percent pale-brown silt coatings, 2 to 10 millimeters thick, surrounding peds; very strongly acid; clear, irregular boundary.

IIB25t—30 to 44 inches, strong-brown (7.5YR 5/6) silty clay; many, coarse, distinct, gray (10YR 6/1) and red (2.5YR 4/8) mottles; moderate, medium, subangular blocky structure; firm; thin patchy clay films; medium acid; gradual, wavy boundary.

IIB3—44 to 63 inches, red (2.5YR 4/6) clay; few, fine, distinct, gray and yellowish-brown mottles; weak, coarse, angular blocky structure; firm; black stains on peds; common, fine, black concretions; mildly alkaline.

The Ap or A1 horizon is dark grayish brown, dark gray, dark brown, very dark gray, or very dark grayish brown. The A2 horizon, where present, is pale brown, brown, gray, or grayish brown. The A horizon ranges from strongly acid to slightly acid.

The B2t horizon is yellowish-brown, reddish-yellow, or strong-brown silty clay loam or silt loam. It ranges from very strongly acid to medium acid. At the contact between the Bt horizon and the IIB horizon is a subhorizon that has silt coatings, 2 to 10 millimeters thick, surrounding peds. The IIB horizon is strong-brown, yellowish-red, or red clay or silty clay that is mottled in shades of red and gray. It ranges from very strongly acid to mildly alkaline.

Kolin soils are associated with Shatta, Wrightsville, Gore, and McKamie soils. They are more clayey in the lower layers than Shatta soils. They are better drained than Wrightsville soils. They are less clayey in the upper part of the B horizon than Gore and McKamie soils.

KW—Kolin-Wrightsville association. This association consists of moderately well drained and poorly drained soils in areas of 50 to several hundred acres on uplands. It is dissected by small drainageways. The association is about 45 percent Kolin soils, 30 percent Wrightsville soils, and 25 percent mostly Shatta and Gore soils and wet soils along small drainageways that are subject to flooding.

The composition of this mapping unit is more variable than that of most other mapping units in the parish, but mapping has been controlled well enough for interpretations for the expected uses of the soils.

The Kolin soils in this association are on convex ridges and side slopes that border drainageways. Slopes are mostly 1 to 3 percent. Fertility is low, and air and water move slowly through the subsoil. Water is perched above the clayey subsoil for short periods after rain from December to April. Plants generally are damaged by a lack of moisture during dry periods in summer and fall. Wetness is a limitation for most uses. The high shrink-swell potential and low strength limit the use of these soils for foundations and construction material.

The Wrightsville soils in this association have the profile described as representative of the Wrightsville series. These soils are in level to depressional positions on broad interstream divides. Slopes are less than 1 percent. Fertility is low, and air and water move slowly through the soil. These soils have a perched seasonal high water table within 1.5 feet of the surface from December to April. Plants generally are damaged by a lack of moisture during dry periods in summer and fall, but wetness is a limitation for most uses. The high shrink-swell potential and low strength limit the use of these soils for foundations and construction material.

The Shatta soils in this association are moderately well drained and loamy. The Gore soils are moderately well drained and have a clayey subsoil. These soils are in small areas and do not significantly affect the overall use and management of the association. The Shatta soils generally have fewer limitations for most uses than the Kolin and Wrightsville soils. The soils along the small drainageways are more poorly drained than the Kolin soils and are subject to flooding.

Most of the acreage of this association is woodland. A small acreage is used for homesites and pasture.

Suitable crops for the Kolin soils are cotton, corn, oats, and soybeans. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, Pensacola bahiagrass, dallisgrass, carpetgrass, ryegrass, and southern wild winter pea. These Kolin soils are fairly easy to work. Wetness sometimes delays planting in spring. Proper management of crop residue, terracing, and growing grasses in rotation with crops helps control erosion in areas of Kolin soils that are used for cultivated crops.

Suitable crops for the Wrightsville soils are grain sorghum and soybeans, and suitable pasture plants are common bermudagrass, Pensacola bahiagrass, and white clover. It is somewhat difficult to keep the Wrightsville soils in good tilth and to prevent surface crusting. Tilth can be improved and surface crusting reduced by planting green-manure crops and plowing under crop residue. Surface drainage is needed for cultivated crops and pasture. Crops and pasture plants respond well to fertilizer. Lime is generally needed. Kolin soils in capability unit IIe-2 and woodland suitability group 3w8; Wrightsville soils in capability unit IIIw-5 and woodland suitability group 3w9.

Latanier Series

The Latanier series consists of somewhat poorly drained, very slowly permeable soils that are clayey in the upper part and loamy in the lower part. These soils formed in alluvial sediment. They are on natural levees on the Red River alluvial plain.

In a representative profile the surface layer is dark

reddish-brown clay about 5 inches thick. The subsoil is dark reddish-brown clay that extends to a depth of 23 inches. The underlying material is reddish-brown stratified silt loam, silty clay loam, and silty clay.

Most of the acreage is used for pasture and crops. A small acreage is woodland.

Representative profile of Latanier clay, in a pasture 3 miles northeast of East Point, 0.5 mile north of access road, and 100 feet east of field road, in the SW¼NW¼ sec. 13, T. 14 N., R. 11 W.

A1—0 to 5 inches, dark reddish-brown (5YR 3/3) clay; moderate, fine, granular structure; firm; moderately alkaline; clear, smooth boundary.
B2—5 to 23 inches, dark reddish-brown (5YR 3/3) clay; strong, medium, subangular blocky structure; firm; moderately alkaline; strongly effervescent; abrupt, wavy boundary.
IIC1—23 to 40 inches, reddish-brown (5YR 4/4) silt loam; weak, medium, subangular blocky structure; friable; moderately alkaline; strongly effervescent; abrupt, wavy boundary.
IIIC2—40 to 42 inches, reddish-brown (5YR 4/3) silty clay loam; weak, medium, subangular blocky structure; firm; moderately alkaline; strongly effervescent; abrupt, wavy boundary.
IVC3—42 to 60 inches, reddish-brown (5YR 4/4) silt loam; massive; distinct lamellae; friable; moderately alkaline; strongly effervescent.

The Ap or A1 horizon is 4 to 8 inches thick. It is dark brown or dark reddish brown and ranges from neutral to moderately alkaline.

The B horizon is dark reddish brown in the upper part and ranges to reddish brown in the lower part. It is clay or silty clay that ranges from neutral to moderately alkaline and is typically calcareous.

The C horizon is stratified very fine sandy loam, silt loam, silty clay loam, or silty clay. It ranges from neutral to moderately alkaline and is calcareous within a depth of 36 inches.

Latanier soils are associated with Moreland, Coushatta, and Severn soils. They are less clayey in the lower layers than Moreland soils. They are more poorly drained and more clayey than Coushatta and Severn soils.

La—Latanier clay. This is a nearly level, somewhat poorly drained soil. It is in areas of 20 to 100 acres on the natural levees on the Red River alluvial plain. The soil is clayey in the upper part and loamy in the lower part. Slopes are 0 to 1 percent.

Included with this soil in mapping are small areas of Moreland, Coushatta, and Armistead soils.

Fertility is high. Surface runoff is slow. Air and water move very slowly through the upper part of the soil and moderately slowly through the lower part. This soil has an apparent seasonal high water table 1.5 to 3.0 feet below the surface from December to April. Plants occasionally are damaged by a lack of moisture during dry periods in summer and fall. The shrink-swell potential of the upper layers is high, and cracks as much as ½ inch wide form during dry periods. These cracks seal over during wet weather. The soil is hard when dry and sticky when wet, and it is difficult to work. Low strength and the high shrink-swell potential of the upper layers limit the use of this soil for foundations and construction material.

Most of the acreage is used for pasture and crops. The rest is mainly woodland. Suitable crops are grain sorghum, wheat, oats, soybeans, and cotton. Suitable pasture plants are common bermudagrass, Pensacola bahiagrass johnson grass, tall fescue, ryegrass, and southern wild winter pea.

Good tilth is difficult to maintain because of the high content of clay in the surface layer. This soil can be worked only within a narrow range of moisture content, and it generally becomes cloddy when worked. A surface drainage system is needed if cultivated crops or pasture plants are grown. Crops other than legumes generally respond well to nitrogen fertilizer. Other fertilizers and lime generally are not needed. Capability unit IIIw-1; woodland suitability group 2w5.

Malbis Series

The Malbis series consists of moderately well drained, moderately slowly permeable soils that are loamy throughout. These soils formed in loamy sediment. They are on gently sloping uplands.

In a representative profile the surface layer is dark-brown fine sandy loam about 5 inches thick. The subsurface layer is yellowish-brown fine sandy loam 5 inches thick. The subsoil, in the upper 28 inches, is strong-brown, yellowish-brown, and brownish-yellow sandy clay loam. In the lower part it is red, brown, and gray sandy clay loam.

Most of the acreage is woodland. A small acreage is used for pasture, and some is used for homesites.

Representative profile of Malbis fine sandy loam, in an area of Meth-Malbis association, sloping, in woodland 10.5 miles northeast of Coushatta and 200 feet north of State Highway 788, in the NW¼SE¼, sec. 34, T. 14 N., R. 9 W.

A1—0 to 5 inches, dark-brown (10YR 4/3) fine sandy loam; weak, fine and medium, granular structure; very friable; medium acid; clear, smooth boundary.
A2—5 to 10 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, fine and medium, granular structure; very friable; strongly acid; clear, smooth boundary.
B21t—10 to 19 inches, strong brown (7.5YR 5/6) sandy clay loam; weak, medium, subangular blocky structure; friable; common fine pores; thin patchy clay films; strongly acid; clear, smooth boundary.
B22t—19 to 28 inches, yellowish-brown (10YR 5/6) sandy clay loam; common, medium, prominent, red (2.5YR 4/8) mottles; moderate, medium, subangular blocky structure; friable; few fine pores; common patchy clay films; about 5 to 8 percent plinthite nodules; strongly acid; clear, smooth boundary.
B23t—28 to 38 inches, brownish-yellow (10YR 6/6) sandy clay loam; common, medium, prominent, brittle, red (2.5YR 4/8) mottles; moderate and coarse, subangular blocky structure; friable; few fine pores; patchy clay films; a few chert pebbles; about 10 percent plinthite nodules; about 35 percent of a horizontal cross section is firm and brittle peds that are 1 inch to 3 inches in diameter; very strongly acid; clear, smooth boundary.
B24t—38 to 57 inches, mottled red (10R 4/6), light-gray (10YR 7/1), and yellowish-brown (10YR 5/6) sandy clay loam; moderate, medium, angular blocky structure; firm; distinct discontinuous clay films; a few chert pebbles; very strongly acid; clear, smooth boundary.
B25t—57 to 67 inches, mottled red (10R 4/6) and light-gray (10YR 7/1) sandy clay loam; moderate, medium angular blocky structure; firm; common fine pores; distinct discontinuous clay films; a few chert pebbles; very strongly acid.

The Ap or A1 horizon is very dark grayish brown, dark

grayish brown, grayish brown, or dark brown. The A2 horizon, where present, is dark brown, yellowish brown, or light yellowish brown. The A horizon is medium acid or strongly acid.

The upper part of the Bt horizon is yellowish brown, dark yellowish brown, strong brown, or brown. The lower part has colors similar to the upper part but includes brownish yellow. It is mottled in shades of brown, yellow, and red. Gray mottles commonly occur below a depth of 30 inches. The lower part of the Bt horizon is strongly acid and it is 5 to 15 percent, by volume, plinthite nodules.

Malbis soils are associated with Beauregard, Boswell, Meth, Falkner, and Ruston soils. They do not have the gray mottles in the upper part of the B horizon that are characteristic of Beauregard soils. They are less clayey than Boswell and Meth soils. They are better drained than Falkner soils and are more poorly drained than Ruston and Meth soils.

MAB—Malbis-Beauregard association, gently sloping. This association consists of moderately well drained soils in areas of 800 to 2,000 acres on uplands. It is dissected by numerous small drainageways. The association is about 50 percent Malbis soils, 25 percent Beauregard soils, and 25 percent mostly Meth and Ruston soils and wet soils along small drainageways that are subject to flooding.

The composition of this mapping unit is more variable than that of most other mapping units in the parish, but mapping has been controlled well enough for interpretations for the expected uses of the soils.

The Malbis soils in this association have profiles similar to the one described as representative of the Malbis series, but the surface layer is about 13 inches thick and the subsoil is brownish yellow. These soils are on ridge crests and gentle side slopes. Slopes range from 1 to 5 percent but are mostly 1 to 3 percent. Fertility is low, and air and water move at a moderate rate through the upper part of the subsoil and at a moderately slow rate through the lower part of the subsoil. The soils have a seasonal high water table at a depth of more than 6 feet. The soils dry out quickly after rain, and plants generally are damaged by a lack of moisture during dry periods in summer and fall. The soils erode easily unless protected by a vegetative cover. The low strength of the subsoil limits the use of these soils for foundations and construction material.

The Beauregard soils in this association have the profile described as representative of the Beauregard series. They are on broad, nearly level ridgetops and smooth foot slopes. Slopes are mostly 1 to 3 percent. Fertility is low, and air and water move slowly through the soils. The soils have an apparent seasonal high water table at a depth of 1.5 to 3 feet from December to April. Plants generally are damaged by a lack of moisture during dry periods in summer and fall, but wetness is a limitation for most uses.

The Meth soils in this association are well drained and have a clayey subsoil. The Ruston soils are well drained and loamy. These soils are in small areas and do not significantly affect the overall use and management of the association. The Ruston soil generally has fewer limitations for most uses than the Malbis and Beauregard soils. The soils along the small drainageways are more poorly drained than the Malbis and Beauregard soils and are subject to flooding.

Most of the acreage of this association is woodland (fig. 6) and pasture. A small acreage is used for crops and homesites. Suitable crops for the Malbis and Beauregard soils are cotton, corn, and soybeans. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, Pensacola bahiagrass, ryegrass, and crimson clover. Wetness sometimes delays planting in spring.

These soils are fairly easy to work. Proper management of crop residue is needed to help control erosion if the soils are used for cultivated crops. Lime is generally needed, and crops and pasture plants respond well to fertilizer. Capability unit IIe-2; Malbis soils in woodland suitability group 2o1 and Beauregard soils in woodland suitability group 2w8.

McKamie Series

The McKamie series consists of well-drained, very slowly permeable soils that have a loamy surface layer and a clayey subsoil. These soils formed in clayey sediment of Pleistocene age. They are on moderately sloping uplands, mostly on the escarpment adjacent to the alluvial plain of the Red River.

In a representative profile the surface layer is brown silt loam about 5 inches thick. The subsoil is

Figure 6.—**Pine plantation on Malbis soils in the Malbis-Beauregard association, gently sloping.**

red clay 41 inches thick. The underlying material is red very fine sandy loam.

Most of the acreage is woodland. A small acreage is used for pasture.

Representative profile of McKamie silt loam, in an area of Gore-McKamie association, sloping, in a pasture 6 miles southeast of Coushatta and 1,000 feet southeast of the end of access road, in the SW¼NW¼ sec. 14, T. 11 N., R. 9 W.

Ap—0 to 5 inches, brown (10YR 4/3) silt loam; weak, granular structure; very friable; slightly acid; clear, smooth boundary.

B21t—5 to 20 inches, red (2.5YR 4/6) clay; common, fine, faint, yellowish-red mottles; moderate, medium, subangular blocky structure; very firm; distinct discontinuous clay films; strongly acid; gradual, wavy boundary.

B22t—20 to 41 inches, red (2.5YR 4/6) clay; moderate, medium, subangular blocky structure; very firm; thin discontinuous clay films; strongly acid; gradual, smooth boundary.

IIB3—41 to 46 inches, red (2.5YR 4/6) silty clay loam; moderate, medium, subangular blocky structure; firm pockets and streaks of red silt loam; medium acid; gradual, smooth boundary.

IIC—46 to 65 inches, red (2.5YR 4/6) very fine sandy loam; weak, medium, subangular blocky structure; friable lenses and pockets of red clay; few black stains along root channels; slightly acid.

The Ap or A1 horizon is dark grayish brown, dark brown, or brown. The A2 horizon, where present, is brown, light brown, or pale brown. The A horizon ranges from slightly acid to strongly acid.

The B2t horizon is red, dark-red, reddish-brown, or yellowish-red clay. It ranges from medium acid to very strongly acid.

The IIC horizon is silty clay loam, silt loam, or very fine sandy loam that ranges from medium acid to moderately alkaline. In places the IIB3 and IIC horizons are calcareous below a depth of 30 inches.

McKamie soils are associated with Shatta, Kolin, Wrightsville, and Gore soils. They are more clayey than Shatta and Kolin soils. They are better drained than Wrightsville soils. They are less clayey in the lower layers than Gore soils.

McKamie soils in Red River Parish are mapped only with Gore soils.

Messer Series

The Messer series consists of moderately well drained, slowly permeable soils that are loamy throughout. These soils formed in sediment of Pleistocene age. They are on circular mounds in the uplands within areas of Guyton soils.

In a representative profile the surface layer is brown silt loam about 7 inches thick. The upper part of the subsoil, to a depth of 40 inches, is yellowish-brown silt loam. The lower part is yellowish-brown and light brownish-gray clay loam and silty clay loam.

Most of the acreage is woodland. A small acreage is used for pasture.

Representative profile of Messer silt loam, in an area of Guyton-Messer association, in woodland 6 miles north of Coushatta and 1,125 feet east of access road, in the SW¼ sec. 17, T. 13 N., R. 9W.

A1—0 to 7 inches, brown (10YR 5/3) silt loam; weak, fine, granular structure; very friable; few concretions; strongly acid; clear, wavy boundary.

B1—7 to 20 inches, light yellowish-brown (10YR 6/4) silt loam; weak, medium, subangular blocky structure; very friable; common fine pores; few fine concretions; very strongly acid; clear, wavy boundary.

B21t—20 to 40 inches, yellowish-brown (10YR 5/6) silt loam; moderate, medium, subangular blocky structure; friable; many fine pores; common fine concretions; distinct patchy clay films; about 10 percent pockets and ped coatings of light-brown silt loam; very strongly acid; clear, wavy boundary.

B&A—40 to 51 inches, yellowish-brown (10YR 5/4) clay loam; common, medium, distinct, strong-brown (7.5YR 5/6) mottles; medium, subangular blocky structure; friable; common fine pores; few fine concretions; about 20 percent tongues of pale-brown silt loam about 2 centimeters wide; thin discontinuous clay films; very strongly acid; clear, wavy boundary.

B22t—51 to 60 inches, light brownish-gray (10YR 6/2) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/8) mottles and few, medium, prominent, red (2.5YR 4/8) mottles; moderate, medium, subangular blocky structure; firm; few fine pores; common fine concretions; thin patchy clay films; strongly acid.

The Ap or A1 horizon is dark grayish brown, brown, or pale brown. It ranges from medium acid to very strongly acid.

The B1 horizon is light yellowish brown, yellowish brown, brown, or pale brown. It ranges from medium acid to very strongly acid. The Bt horizon is yellowish brown and brownish yellow in the upper part and yellowish brown, light brownish gray, and pale brown in the lower part. The lower part is mottled in shades of brown and red. This horizon ranges from medium acid to very strongly acid. The A horizon part of the B&A horizon is tongues of pale-brown light silt loam that make up as much as 50 percent of the mass.

Messer soils are associated with Guyton, Shatta, Kolin, and Beauregard soils. They are better drained than Guyton soils. They are less clayey than Shatta, Kolin, and Beauregard soils. They are on convex mounds, whereas the Shatta, Kolin, and Beauregard soils are between the mounds.

Messer soils in Red River Parish are mapped only with Guyton soils.

Meth Series

The Meth series consists of well-drained, moderately slowly permeable soils that are loamy in the upper part and clayey in the lower part. These soils formed in clayey and loamy sediment of Tertiary age. They are on gently sloping and steep uplands.

In a representative profile the surface layer is dark grayish-brown fine sandy loam about 9 inches thick. The subsurface layer is yellowish-brown fine sandy loam 9 inches thick. The subsoil, in the upper 16 inches, is yellowish-red and red sandy clay. In the lower part it is yellowish-red and brownish-yellow sandy loam.

Most of the acreage is woodland. A small acreage is used for pasture, and some is used for homesites.

Representative profile of Meth fine sandy loam, in an area of Meth-Malbis association, sloping, in woodland 7 miles north of Edgefield and 300 feet east of State Highway 7, in the SE¼SE¼ sec. 4, T. 13 N., R. 9 W.

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine and medium, granular structure; very friable; medium acid; clear, smooth boundary.

A2—9 to 18 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, fine and medium, granular structure; very friable; strongly acid; clear, smooth boundary.

B21t—18 to 27 inches, yellowish-red (5YR 5/6) sandy clay; few, fine, distinct, yellowish-brown and red mottles; moderate, medium, subangular blocky structure; firm; distinct, continuous, yellowish-red clay films; very strongly acid; clear, smooth boundary.

B22t—27 to 34 inches, red (2.5YR 4/8) sandy clay; many, coarse, distinct, yellowish-brown (10YR 5/4) mottles; weak, medium, subangular blocky structure; firm; distinct discontinuous clay films; few fine pores; few pockets and streaks of light-gray uncoated sand grains; strongly acid; gradual, smooth boundary.

B23t—34 to 60 inches, yellowish-red (5YR 5/6) sandy loam; weak, coarse, subangular blocky structure; friable; thin, discontinuous, yellowish-red clay films; few streaks and ped coatings of light-gray clean sand grains; strongly acid; clear, smooth boundary.

B3—60 to 70 inches, brownish-yellow (10YR 6/6) sandy loam; weak, coarse, subangular blocky structure; friable; common streaks of light-gray clean sand grains; very strongly acid.

The Ap or A1 horizon is dark grayish brown, brown, dark brown, dark yellowish brown, or yellowish brown. The A2 horizon is pale brown, light yellowish brown, brown, or yellowish brown. The A horizon ranges from medium acid to very strongly acid.

The B2t horizon ranges from medium acid to very strongly acid. The upper part of the B2t horizon is yellowish-red, reddish-brown, red, or dark reddish-brown clay loam, sandy clay, or clay that is mottled in shades of brown, red, or yellow. The lower part has colors similar to the upper part but has few to many streaks or pockets of grayish uncoated sand grains. It is sandy clay loam, fine sandy loam, or sandy loam. The B3 horizon is shades of red, yellow, or gray and has pockets and streaks of uncoated sand grains. It has the same range of texture and reaction as the lower part of the B2t horizon.

In Red River Parish the Meth soils in the Meth-Ruston association, steep, have a slightly lower base saturation that is defined in the range for the Meth series. This difference does not affect their use, behavior, and management.

Meth soils are associated with Boswell, Falkner, Malbis, and Ruston soils. They are better drained than Boswell and Falkner soils. They are more clayey than Malbis and Ruston soils.

MLC—Meth-Malbis association, sloping. This association consists of well drained and moderately well drained soils in areas of 300 to 1,000 acres on uplands that are dissected by numerous small drainageways. It is about 50 percent Meth soils, 20 percent Malbis soils, and 30 percent mostly Ruston and Beauregard soils and wet soils along small drainageways that are subject to flooding.

The composition of this mapping unit is more variable than that of most other mapping units in the parish, but mapping has been controlled well enough for interpretations for the expected uses of the soils.

The Meth soils in this association have the profile described as representative of the Meth series. These soils are on the side slopes. Slopes range from 3 to 8 percent but are mostly 3 to 5 percent. Fertility is low, and air and water move moderately slowly through the soils. The soils have a seasonal high water table at a depth of more than 6 feet. Plants generally are damaged by a lack of moisture during dry periods in summer and fall. The soils erode easily unless protected by a vegetative cover. The low strength of the subsoil limits the use of these soils for foundations and construction material.

The Malbis soils in this association have the profile described as representative of the Malbis series. These soils are on the broader ridgetops and upper side slopes. Slopes range from 3 to 8 percent but are mostly 3 to 5 percent. Fertility is low, and air and water move at a moderate rate through the upper part of the subsoil and at a moderately slow rate through the lower part of the subsoil. The soils have a seasonal high water table at a depth of more than 6 feet. Most crops and pasture plants are damaged by a lack of moisture during dry periods in summer and fall. The soils erode easily unless protected by a vegetative cover. The low strength of the subsoil limits its use as construction material.

The Ruston soils in this association are well drained and loamy. The Beauregard soils are moderately well drained, slightly wet, and loamy. These soils are in small areas and do not significantly affect the overall use and management of the association. The Ruston soils generally have fewer limitations for farm and nonfarm uses than the Meth and Malbis soils. The soils along the small drainageways are more poorly drained than the Meth and Malbis soils and are subject to flooding.

Most of the acreage of this association is woodland. A small acreage is used for pasture, and some is used for homesites. Suitable crops for the Meth and Malbis soils are cotton, corn, and soybeans. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, Pensacola bahiagrass, ryegrass, and crimson clover. Proper management of crop residue and terracing help control erosion if the soils are used for cultivated crops. Lime is generally needed, and crops and pasture plants respond well to fertilizer. Capability unit IIIe-3; Meth soils in woodland suitability group 3o1 and Malbis soils in woodland suitability group 2o1.

MME—Meth-Ruston association, steep. This association consists of well-drained soils in one area of about 3,400 acres on uplands on the escarpment along Toulon Bayou and the Red River alluvial plain. The association is dissected by numerous small drainageways. It is about 45 percent Meth soils, 30 percent Ruston soils, and 25 percent mostly sandy soils and wet soils along small drainageways that are subject to flooding.

The composition of this mapping unit is more variable than that of most other mapping units in the parish, but mapping has been controlled well enough for interpretations for the expected use of the soils.

The Meth soils in this association have a profile similar to the one described as representative of the Meth series, but their surface layer is about 9 inches thick and their subsoil is red. These soils are on short, steep side slopes. Slopes are mostly 12 to 30 percent. Some of the higher hillsides are 600 to 800 feet long and have slopes of 5 to 12 percent. Fertility is low, and air and water move moderately slowly through the soils. The soils have a seasonal high water table at a depth of more than 6 feet. These soils dry out quickly after rain, and plants generally are damaged by a lack of moisture during dry periods in summer and fall. The soils erode easily unless protected by a vegetative cover. Slope is a limitation for some uses. Low strength limits the use of these soils for foundations and construction material.

The Ruston soils in this association have a profile similar to the one described as representative of the Ruston series, but their surface layer is brown fine sandy loam about 6 inches thick and their subsoil is red. These soils are on long, narrow ridgetops and

upper side slopes. Slopes range from 3 to 8 percent but are mostly 3 to 5 percent. Fertility is low, and air and water move at a moderate rate through the soils. The soils have a seasonal high water table at a depth of more than 6 feet. The soils dry out quickly after rain, and plants generally are damaged by a lack of moisture during dry periods in summer and fall. The soils erode easily unless protected by a vegetative cover. Slope is a limitation for some uses.

The sandy soils on the ridges and the wet soils along the narrow drainageways cover only a small acreage and do not significantly affect the overall use of the association.

Most of the acreage of this association is woodland. The Meth soils are generally not suited to clean-tilled crops because of rapid runoff, the hazard of erosion, and steep slopes. Suitable pasture plants for the Meth soils are common bermudagrass, Coastal bermudagrass, and Pensacola bahiagrass. Lime is generally needed, and pasture plants respond well to fertilizer.

Suitable crops for the Ruston soils are cotton, corn, grain sorghum, and soybeans. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, Pensacola bahiagrass, ryegrass, and crimson clover. These soils are friable and fairly easy to keep in good tilth. Tilth can be improved by planting green-manure crops and plowing under crop residue. Proper management of crop residue and terracing help control erosion. Lime is generally needed, and crops and pasture plants respond well to fertilizer. Meth soils in capability unit VIe-1 and woodland suitability group 3o1; Ruston soils in capability unit IIIe-2 and woodland suitability group 2o1.

Moreland Series

The Moreland series consists of somewhat poorly drained, very slowly permeable soils that have a clayey subsoil. These soils formed in clayey alluvial sediment. They are on the lower part of natural levees on the Red River alluvial plain.

In a representative profile the surface layer is dark reddish-brown clay about 6 inches thick. The subsoil is mainly dark reddish-brown clay and extends to a depth of 50 inches. The underlying material is gray clay.

Most of the acreage is used for pasture and crops.

Representative profile of Moreland clay, 0 to 1 percent slopes, in a pasture 0.7 mile west of Armistead and 375 feet north of access road, in the SE¼SE¼ sec. 21, T. 12 N., R. 10 W.

Ap—0 to 6 inches, dark reddish-brown (5YR 3/3) clay; weak, medium, subangular blocky structure; firm; neutral; clear, smooth boundary.

B21—6 to 22 inches, dark reddish-brown (5YR 3/3) clay; weak, medium, subangular blocky structure; firm; mildly alkaline; clear, smooth boundary.

B22—22 to 32 inches, dark reddish-brown (5YR 3/4) clay; few, fine, faint, gray mottles; moderate, medium, subangular blocky structure; firm; common black stains; few, fine, soft carbonate masses; mildly alkaline; strongly effervescent; clear, smooth boundary.

IIAb—32 to 36 inches, dark-gray (10YR 4/1) clay; few fine, prominent, reddish-brown mottles; moderate, medium, subangular blocky structure; firm; distinct slickensides; mildly alkaline; clear, smooth boundary.

IIBb—36 to 50 inches, dark reddish-brown (5YR 3/3) clay; common, medium, prominent, dark-gray (10YR 4/1) mottles; weak, medium, subangular blocky structure; firm; few medium carbonate concretions; mildly alkaline; strongly effervescent; clear, smooth boundary.

IICg—50 to 70 inches, gray (10YR 5/1) clay; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; massive; firm; few medium carbonate concretions; moderately alkaline; strongly effervescent.

The Ap or A1 horizon is 5 to 10 inches thick. It is dark reddish-brown or dark-brown clay or silt loam and is neutral or mildly alkaline.

The B horizon ranges from neutral to moderately alkaline. It is dark reddish-brown, dark-brown, or reddish-brown clay or silty clay to a depth of 20 inches or more. Few to common grayish mottles are within 30 inches of the surface. Some subhorizons of the B horizon have few to common carbonate accumulations. There are buried A and B horizons in some places and layers of silt loam or silty clay loam below a depth of 40 inches in other places.

Moreland soils are associated with Armistead, Latanier, Perry, and Coushatta soils. They are clayey throughout and do not have loamy underlying layers as do Armistead and Latanier soils. Moreland soils are better drained than Perry soils. They are more clayey and more poorly drained than Coushatta soils.

MnA—Moreland silt loam, overwash, 0 to 1 percent slopes. This is a somewhat poorly drained soil in areas of 10 to 100 acres on the Red River alluvial plain. It has a profile similar to the one described as representative of the series, but its surface layer is reddish-brown silt loam about 10 inches thick.

Included with this soil in mapping are small areas of Moreland clay and Coushatta soils.

Fertility is high. Surface runoff is slow. Air and water move very slowly through the soil. This soil has a perched water table at a depth of 1 foot to 3 feet from December to April. Wetness is the cause of poor aeration, and it restricts the growth of plant roots. This soil dries out slowly, but plants generally are damaged by a lack of moisture during dry periods. The shrink-swell potential of the subsoil is very high, and cracks about ½ inch wide and 20 inches or more deep form in dry periods. The clayey subsoil is hard when dry and sticky when wet, and it is difficult to work.

Wetness is the main limitation in most years. Low strength and the very high shrink-swell potential of the subsoil limit the use of this soil for foundations and construction material.

Most of the acreage is used for crops and pasture. Suitable crops are cotton, grain sorghum, oats, wheat, and soybeans. Suitable pasture plants are common bermudagrass, Pensacola bahiagrass, johnsongrass, tall fescue, white clover, and southern wild winter pea.

Good tilth is easy to maintain. Wetness restricts the use of farm equipment after heavy rain. A surface drainage system is needed if cultivated crops are grown. Crops other than legumes generally respond well to nitrogen fertilizer. Other fertilizer and lime generally are not needed. Capability unit IIIw-3; woodland suitability group 2w6.

MoA—Moreland clay, 0 to 1 percent slopes. This is a nearly level, somewhat poorly drained soil on the lower slopes of the natural levees on the Red River alluvial plain. Areas cover 50 to several hundred acres. This soil has the profile described as representative of the series.

Included with this soil in mapping are small areas of Latanier, Armistead, and Perry soils.

Fertility is high. Surface runoff is slow. Air and water move very slowly through the soil. This soil has a perched seasonal high water table at a depth of 1 foot to 3 feet from December to April. Wetness is the cause of poor aeration, and it restricts the growth of plant roots. Some areas are flooded after heavy rain, mostly by runoff from higher areas. This soil dries out slowly, but plants generally are damaged by a lack of moisture during dry periods in summer and fall. The soil has a very high shrink-swell potential; cracks ½ inch wide and 20 inches or more deep form in dry periods. When the soil is wet, it swells and the cracks seal over. It is hard when dry and sticky when wet, and it is difficult to work.

Wetness is the main limitation for most uses. The very high shrink-swell potential and low strength limit the use of this soil for foundations and construction material.

Most of the acreage is used for pasture and crops; some is woodland. Suitable crops are grain sorghum, oats, wheat, cotton, and soybeans. Suitable pasture plants are common bermudagrass, johnsongrass, Pensacola bahiagrass, tall fescue, ryegrass, white clover, and southern wild winter pea. Some pasture plants are harvested for hay (fig. 7).

Good tilth is difficult to maintain because of the clayey layer. This soil can be worked only within a narrow range of moisture content. It becomes cloddy when dry, and the use of farm equipment is restricted after heavy rain. A surface drainage system is needed if cultivated crops or pasture plants are grown. Proper management of crop residue improves tilth and reduces erosion. Crops other than legumes generally respond well to nitrogen fertilizer. Other fertilizers and lime generally are not needed. Capability unit IIIw-1; woodland suitability group 2w6.

MoB—Moreland clay, gently undulating. This is a somewhat poorly drained soil on curving, roughly parallel ridges and in swales on the Red River alluvial plain. The ridges are 2 to 4 feet high and are generally less than 200 feet wide. The swales are generally less than 150 feet wide. Areas of this soil cover 20 to 150 acres. This soil has a profile similar to the one described as representative of the series, but its surface layer is thinner. It is clayey throughout.

Included with this soil in mapping are small areas of Latanier, Armistead, and Perry soils and a few small areas of soils on narrow ridges that have slopes of as much as 5 percent.

Fertility is high. Air and water move very slowly through the soil. Surface runoff is medium on the ridges and very slow in the swales. Some of the swales are floooded, mostly by runoff from higher areas, for long periods in winter and spring. This soil has a perched seasonal high water table at a depth of 1 foot to 3 feet from December to April. Wetness causes poor aeration, and it restricts the growth of plant roots. This soil dries out slowly, but plants generally

Figure 7.—**Johnsongrass harvested for hay on Moreland clay, 0 to 1 percent slopes.**

are damaged by a lack of moisture during dry periods in summer and fall. The soil has a very high shrink-swell potential. Cracks ½ inch wide and 20 inches or more deep form in dry periods and seal over when the soil is wet and swells. The soil is hard when dry and sticky when wet, and it is difficult to work. It becomes cloddy and must be worked within a narrow range of moisture content.

Wetness is the main limitation for most uses. Low strength and the very high shrink-swell potential limit the use of this soil for foundations and construction material.

Most of the acreage is used for pasture. Suitable crops are grain sorghum, oats, wheat, cotton, and soybeans. Suitable pasture plants are common bermudagrass, johnsongrass, tall fescue, Pensacola bahiagrass, ryegrass, white clover, and southern wild winter pea.

The high content of clay, wetness in the swales, and the irregular slopes restrict the use of farm equipment. A surface drainage system is needed in the swales if cultivated crops and pasture plants are grown. Crops other than legumes generally respond well to nitrogen fertilizer. Other fertilizers and lime generally are not needed. Proper management of crop residue improves tilth and helps reduce erosion. Capability unit IIIw-4; woodland suitability group 2w6.

Perry Series

The Perry series consists of poorly drained, very slowly permeable soils that are clayey throughout. These soils formed in clayey alluvial sediment. They are at the lowest elevation adjacent to the older natural levees on the Red River alluvial plain.

In a representative profile the surface layer is very dark gray clay about 4 inches thick. The upper part of the subsoil is dark-gray and gray clay 30 inches thick. The lower part of the subsoil and the underlying material are dark reddish-brown clay.

Most of the acreage is woodland and pasture. A small acreage is used for crops.

Representative profile of Perry clay, in woodland 1.3 miles south of Harmon, 600 feet east of farm road, and 300 feet west of Polley Lake, in the NW¼NE¼ sec. 7, T. 12 N., R. 10 W.

A1—0 to 4 inches, very dark gray (10YR 3/1) clay; moderate, fine, subangular blocky structure; firm; medium acid; clear, smooth boundary.

B21g—4 to 16 inches, dark-gray (10YR 4/1) clay; few, fine, distinct, yellowish-red mottles; moderate, medium, subangular blocky structure; firm; medium acid; clear, smooth boundary.

B22g—16 to 34 inches, gray (10YR 5/1) clay; common, medium, distinct, yellowish-red (5YR 4/6) mottles; weak, medium, prismatic structure parting to weak, coarse, subangular blocky; very fine; slightly acid; clear, wavy boundary.

IIB23—34 to 48 inches, dark reddish-brown (5YR 3/4) clay; common, medium, distinct, dark-gray (5YR 4/1) mottles; massive; very firm; distinct slickensides; matrix is noncalcareous; few fine carbonate concretions; moderately alkaline; clear, wavy boundary.

IIC—48 to 60 inches, dark reddish-brown (5YR 3/4) clay; massive; very firm; few medium carbonate concretions; moderately alkaline; strongly effervescent.

The Ap or A1 horizon is 4 to 12 inches thick and is dark gray or very dark gray. Where it is very dark gray, it is less than 10 inches thick. It ranges from medium acid to very strongly acid.

The Bg horizon is 10 to 35 inches thick and is gray or dark-gray clay. It is medium acid to neutral. The IIB2 horizon is dark reddish gray, reddish brown, or dark reddish brown and ranges from slightly acid to moderately alkaline.

The IIC horizon is reddish-brown to dark reddish-brown clay. It is mildly alkaline or moderately alkaline and is calcareous in places.

Perry soils are associated with Armistead, Caspiana, and Moreland soils. They are more poorly drained than Armistead soils, and they do not have the loamy substratum that is characteristic of those soils. They are more poorly drained than Caspiana and Moreland soils and, also, are more clayey than Caspiana soils.

Pr—Perry clay. This is a nearly level to depressional, poorly drained soil on the back slopes of the older natural levees on the Red River alluvial plain. Areas cover 30 to 300 acres.

Included with this soil in mapping are small areas of Buxin, Gallion, and Moreland soils. Also included are some areas of soils that are occasionally flooded.

Fertility is moderately high. Surface runoff is slow or very slow. Air and water move very slowly through the soil. This soil has a perched seasonal high water table within 2 feet of the surface from December to April. Wetness is the cause of poor aeration, and it restricts the growth of plant roots. This soil dries out more slowly than the surrounding soils, but plants are generally damaged by a lack of moisture during dry periods in summer and fall. The soil has a very high shrink-swell potential. Cracks about ½ inch wide and 20 inches or more deep form in dry periods and seal over when the soil is wet and swells. The soil is hard when dry and sticky when wet, and it is difficult to work.

Severe wetness is the main limitation for most uses. Low strength and the very high shrink-swell potential limit the use of this soil for foundations and construction material.

Most of the acreage is woodland and pasture. The rest is mostly used for crops. Suitable crops are cotton, grain sorghum, and soybeans. Suitable pasture plants are common bermudagrass, dallisgrass, tall fescue, ryegrass, Pensacola bahiagrass, johnsongrass, white clover, and southern wild winter pea.

Because of the clayey surface layer, good tilth is difficult to maintain and the use of farm equipment is restricted. This soil can be worked only within a narrow range of moisture content without becoming cloddy. Proper management of crop residue improves tilth and helps reduce erosion. A surface drainage system is needed if cultivated crops or pasture plants are grown. Lime is needed in places, and crops generally respond well to fertilizer. Capability unit IIIw-2; woodland suitability group 2w6.

Ruston Series

The Ruston series consists of well-drained, moderately permeable soils that are loamy throughout. These soils formed in loamy sediment. They are on gently sloping uplands.

In a representative profile the surface layer is yellowish-brown fine sandy loam about 9 inches thick. The upper 18 inches of the subsoil is yellowish-red loam. The lower part is mainly yellowish-red sandy clay loam and fine sandy loam.

Most of the acreage is pasture and woodland. A small acreage is used for homesites.

Representative profile of Ruston fine sandy loam, in an area of Ruston association, sloping, in woodland 5 miles southeast of Hall Summit and 220 feet north of access road, in the SW¼SW¼ sec. 8, T. 13 N., R.8 W.

Ap—0 to 9 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, medium, subangular blocky structure; very friable; a few chert pebbles; slightly acid; clear smooth boundary.

B21t—9 to 14 inches, yellowish-red (5YR 5/6) loam; weak, medium, subangular blocky structure; very friable; a few chert pebbles; thin patchy clay films; medium acid; clear, smooth boundary.

B22t—14 to 27 inches, yellowish-red (5YR 5/6) loam; weak, medium, subangular blocky structure; very friable; few fine pores; distinct patchy clay films; medium acid; clear, smooth boundary.

B23t—27 to 39 inches, yellowish-red (5YR 4/6) sandy clay loam; moderate, medium, subangular blocky structure; friable; common fine roots; few fine pores; few chert pebbles; thin discontinuous clay films; very strongly acid; gradual, smooth boundary.

B&A—39 to 44 inches, yellowish-red (5YR 5/6) fine sandy loam; weak, medium, subangular blocky structure; slightly firm; few fine pores; about 20 percent pockets of light yellowish-brown fine sandy loam; few, thin, patchy clay films; very strongly acid; clear, wavy boundary.

B24t—44 to 65 inches, mottled yellowish-red (5YR 5/6), yellowish-brown (10YR 5/4), and red (2.5YR 4/6) sandy clay loam; moderate, medium, subangular blocky structure; firm; thin patchy clay films; strongly acid.

The A1 or Ap horizon is light brownish-gray, grayish-brown, dark grayish-brown, pale-brown, light yellowish-brown, yellowish-brown, brown, and dark-brown fine sandy loam. The A2 horizon, where present, is pale-brown, light yellowish-brown, yellowish-brown, and brown fine sandy loam, very fine sandy loam, and loamy fine sand. The A horizon ranges from slightly acid to strongly acid.

The Bt horizon is yellowish-red, red, reddish-yellow, and reddish-brown sandy clay loam, fine sandy loam, loam, or clay loam. It is medium acid to very strongly acid. In places the lower part has no mottles. The A horizon part of the B&A horizon is 50 percent streaks and pockets of light yellowish-brown, brown, or pale-brown fine sandy loam or sandy loam.

Ruston soils are associated with Meth and Malbis soils. They are less clayey than Meth soils. They are better drained than Malbis soils.

RUC—Ruston association, sloping. This association consists of well-drained soils on upland areas of 1,000 acres or more that are dissected by numerous small drainageways. It is about 59 percent Ruston fine sandy loam and 41 percent mostly Malbis and Meth soils and wet soils along small drainageways that are subject to flooding.

The composition of this mapping unit is more variable than that of most other mapping units in the parish, but mapping has been controlled well enough for interpretations for the expected uses of the soils.

The Ruston soils in this association are on ridgetops and side slopes. Slopes range from 3 to 8 percent but are mostly 3 to 5 percent. Fertility is low, and air and water move at a moderate rate through the soils. The soils have a seasonal high water table more than 6 feet below the surface. They dry out quickly after rain, and crops and pasture plants generally are damaged by a lack of moisture during dry periods in summer and fall. The soils erode easily unless protected by a vegetative cover. Slope is a limitation for some uses.

The Malbis soils in this association are moderately well drained and loamy. The Meth soils are well drained and have a clayey subsoil. These soils are in small areas and do not significantly affect the overall use and management of the association. They generally have greater limitations for most uses than the Ruston soils. The soils along the small drainageways are more poorly drained than the Ruston soils and are subject to flooding.

Most of the acreage of this association is woodland and pasture. A small acreage is used for homesites. Suitable crops for the Ruston soils are cotton, corn, grain, sorghum, and soybeans. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, Pensacola bahiagrass, ryegrass, and crimson clover. The Ruston soils are friable and fairly easy to keep in good tilth. Tilth can be improved by plowing under crop residue and green-manure crops. Proper management of crop residue and terracing help control erosion in areas of these soils that are used for cultivated crops. Lime is generally needed, and crops and pasture plants respond well to fertilizer. Capability unit IIIe-2; woodland suitability group 2o1.

Severn Series

The Severn series consists of well-drained, moderately rapidly permeable soils that are loamy throughout. These soils formed in loamy alluvial sediment. They are on the more recent natural levees on the Red River alluvial plain.

In a representative profile the surface layer is reddish-brown very fine sandy loam about 9 inches thick. The underlying material is reddish-brown stratified very fine sandy loam, silt loam, loam, and loamy fine sand.

Most of the acreage is in pasture. The rest is in woodland and crops.

Representative profile of Severn very fine sandy loam, occasionally flooded, in a pasture 0.4 mile west of Coushatta on the west side of Red River, 1,680 feet south of Red River Bridge, and 400 feet east of local road along levee, in sec 37, T 12 N., R 10 W. (Sample S65 La-41-4 in laboratory analysis tables.)

A1—0 to 9 inches, reddish-brown (5YR 5/4) very fine sandy loam; weak, medium, granular structure; very friable; moderately alkaline; strongly effervescent; abrupt, smooth boundary.

C1—9 to 18 inches, reddish brown (5YR 5/4) very fine sandy loam that has thin dark-brown bedding planes; single grained; very friable; moderately alkaline; strongly effervescent; clear, smooth boundary.

C2—18 to 26 inches, reddish-brown (5YR 4/4) loam; weak, fine and medium, subangular blocky structure; friable; common fine pores; moderately alkaline; strongly effervescent; abrupt, smooth boundary.

C3—26 to 42 inches, reddish-brown (5YR 4/4) silt loam that has several thin strata of very fine sandy loam; weak, fine and medium, subangular blocky structure;

friable; mildly alkaline; strongly effervescent; abrupt, smooth boundary.

C4—42 to 52 inches, reddish-brown (5YR 5/4) silt loam that has thin dark-brown bedding planes at ½- to 1-inch intervals; weak, medium and fine, subangular blocky structure; very friable; moderately alkaline; strongly effervescent; abrupt, smooth boundary.

C5—52 to 59 inches, reddish-brown (5YR 4/4) loam very fine sand; single grained; very friable; moderately alkaline; strongly effervescent; abrupt, smooth boundary.

C6—59 to 65 inches, brown (7.5YR 5/4) very fine sand; single grained; loose; moderately alkaline.

The Ap or A1 horizon is dark reddish-brown or reddish-brown very fine sandy loam 6 to 10 inches thick. It is mildly alkaline or moderately alkaline.

The C horizon is yellowish-red or reddish-brown very fine sandy loam thinly stratified with loamy very fine sand, silt loam, loam, or very fine sandy loam.

Severn soils are associated with Udifluvents and Coushatta and Latanier soils. They are less clayey in the C horizon than Udifluvents. They are less well developed and have a lower content of clay than Coushatta and Latanier soils. Also, they are better drained than Latanier soils.

Se—Severn very fine sandy loam. This is a well-drained, loamy soil in areas of 10 to 100 acres on the more recent natural levees on the Red River alluvial plain. This soil has a profile similar to the one described as representative of the series, but its surface layer is dark reddish brown and its subsoil is yellowish red. Slopes are less than 1 percent.

Included with this soil in mapping are small areas of Udifluvents, Coushatta soils, and Severn soils that have slopes of 1 to 3 percent.

Fertility is high. Surface runoff is slow. Air and water move moderately rapidly through the soil. A seasonal high water table is typically more than 6 feet below the surface, but in places it is 4 to 6 feet below the surface from December to April. Plants occasionally are damaged by a lack of moisture during dry periods in summer and fall. Low strength limits the use of this soil for foundations and construction material.

Most of the acreage is used for crops and pasture. Suitable crops are corn, oats, wheat, soybeans, grain sorghum, and cotton. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, Pensacola bahiagrass, and white clover.

This soil is friable and easy to keep in good tilth. It can be cultivated throughout a wide range in moisture content. Proper management of crop residue improves tilth and helps reduce erosion. A traffic pan forms easily in cultivated areas, but it can be broken by chiseling or deep plowing. Crops other than legumes respond well to nitrogen. Other fertilizers and lime generally are not needed. Capability unit I-1; woodland suitability group 2o4.

Sn—Severn very fine sandy loam, occasionally flooded. This is a gently undulating, well-drained soil. It is on curving, parallel ridges and in swales on recent natural levees on the Red River alluvial plain between the river and the flood protection levee. The ridges are 2 to 4 feet high and are generally less than 200 feet wide. Areas of this soil cover 15 to 700 acres. This soil has the profile described as representative of the series. Slopes are 1 to 3 percent.

Included with this soil in mapping are small areas of Udifluvents and Latanier and Moreland soils and a few areas of soils on narrow ridges that have slopes of as much as 5 percent.

Fertility is high. Surface runoff is slow. Air and water move moderately rapidly through the soil. A seasonal high water table is typically below a depth of 6 feet, but in places it is at a depth of 4 to 6 feet from December to April. Most of the acreage is occasionally flooded and subject to scouring and deposition by the Red River, but plants occasionally are damaged by a lack of moisture during dry periods in summer and fall. Flooding, scouring, and deposition are the main limitations for most uses.

Most of the acreage is woodland and pasture. A few small areas are used as a source of borrow material for construction purposes, and a few areas are used for crops. Most of the acreage is suitable to short-season cultivated crops, such as soybeans and grain sorghum. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, Pensacola bahiagrass, and white clover. Flooding is the main limitation to use of this soil for crops. Flooding occurs mostly late in winter and spring, and it seldom occurs or lasts after June. In most areas, during flooding cattle can take refuge on the adjacent higher lying natural levees. Crops other than legumes respond well to nitrogen. Other fertilizers and lime generally are not needed. Capability unit IVw-1; woodland suitability group 2o4.

Sr—Severn soils, frequently flooded. These are well-drained loamy soils in areas of 50 to 1,000 acres on the Red River alluvial plain. They occupy low-lying areas between the river channel and the flood protection levee. They are mostly gently undulating and have short, irregular slopes of less than 3 percent. These soils have a profile similar to the one described as representative of the series, but their surface layer is thinner.

Included with these soils in mapping are small areas of soils that have slopes of as much as 5 percent and small areas of medium and coarse sand.

Fertility is high. Surface runoff is slow. Air and water move moderately rapidly through the soils. A seasonal high water table is typically below a depth of 6 feet, but in places it is at a depth of 2 to 6 feet from December to April. These soils are frequently flooded and subject to frequent scouring and deposition by the Red River. Flooding is the main limitation for most uses.

Most of the acreage is woodland and pasture. Most areas of these soils are not suited to cultivated crops because of frequent flooding, but they are suited to grazing when not flooded. Common bermudagrass is a suitable pasture plant. In most areas, during flooding cattle can take refuge in the adjacent higher lying areas. Pasture plants other than legumes generally respond well to nitrogen fertilizer. Capability unit Vw-1; woodland suitability group 1w6.

Shatta Series

The Shatta series consists of moderate well drained, slowly permeable soils that are loamy throughout. These soils formed in loamy sediment of Pleistocene

age that are high in content of silt. They are on very gently sloping uplands.

In a representative profile the surface layer is dark grayish-brown silt loam about 6 inches thick. The subsoil, in the upper 24 inches, is strong-brown or yellowish-brown clay loam and loam. In the lower part it is a fragipan of yellowish-brown loam.

Most of the acreage is used for pasture and crops. The rest is woodland and areas used for homesites.

Representative profile of Shatta silt loam, in an area of Shatta association, gently sloping, in a pasture 3¼ miles southeast of Coushatta and 1,000 feet north of the intersection of U.S. Highway 61 and Mount Olive Parish Road, in the SW¼NE¼ sec. 27, T. 12 N., R. 9 W. (Sample S70 La-41-5 in laboratory analysis tables.)

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

B1—6 to 11 inches, brown (10YR 5/3) silt loam; weak, medium, subangular blocky structure; friable; few fine pores; medium acid; clear, wavy boundary.

B21t—11 to 22 inches, strong-brown (7.5YR 5/6) clay loam; weak, medium, subangular blocky structure; friable; few fine pores; thin patchy clay films; few, fine, brown concretions; medium acid; gradual, wavy boundary.

B22t—22 to 30 inches, yellowish-brown (10YR 5/8) loam; many, coarse and medium, distinct, brown (7.5YR 5/4) mottles; weak, medium, subangular blocky structure; yellowish-brown part of horizon is friable, 30 percent of horizon is firm and brittle; few fine pores; few, fine and medium, brown concretions; distinct discontinuous clay films; strongly acid; gradual, wavy boundary.

Bx1—30 to 42 inches, yellowish-brown (10YR 5/6) loam; many, coarse, distinct, brown (7.5YR 5/4) mottles; moderate, coarse and very coarse, prismatic structure; about 80 percent of horizontal cross section is firm and brittle, 20 percent is friable; few fine roots, mainly between prisms; few pores; vertical cracks between prisms, 1 centimeter to 2 centimeters wide, filled with uncoated sand and silt; thin patchy clay films; few, soft, red masses; strongly acid; gradual, wavy boundary.

Bx2—42 to 70 inches, yellowish-brown (10YR 5/6) loam; common, medium, distinct, reddish-brown (5YR 5/4) mottles; moderate, coarse, prismatic structure parting to moderate, medium and coarse, angular blocky; firm and brittle; few roots, mainly in vertical cracks between peds; polygonal cracks, 1 centimeter to 2 centimeters wide, filled with light-gray loam; many, soft, red masses; very strongly acid.

The AP or A1 horizon is dark gray, dark grayish brown, dark brown, grayish brown, very dark gray, or very dark grayish brown. The A2 horizon, where present, is as much as 7 inches thick and is grayish brown, gray, brown, pale brown, or light yellowish brown. The A horizon ranges from slightly acid to strongly acid.

The B1 horizon, where present, is yellowish-brown, light yellowish-brown, brown, dark yellowish-brown, or strong-brown silt loam or loam that ranges from medium acid to very strongly acid. The B2t horizon has the same color range as the B1 horizon, and in places it has reddish mottles. The B2t horizon is silty clay loam, loam, or clay loam that ranges from medium acid to very strongly acid. The fragipan, at a depth of 20 to 36 inches, is yellowish brown, dark yellowish brown, brown, or strong brown. In places the lower part of the Bx horizon is mottled with shades of brown, yellow, red, or gray. The Bx horizon is silt loam, loam, or silty clay loam that is strongly acid or very strongly acid.

Shatta soils are associated with Guyton, Kolin, Malbis, and Wrightsville soils. They differ from those soils in having a fragipan. Also, they are better drained than Guyton and Wrightsville soils and less clayey than Kolin soils.

STB—Shatta association, gently sloping. This association consists of moderately well drained soils on uplands in areas of 800 to 2,000 acres that are dissected by numerous small drainageways. It is about 75 percent Shatta silt loam and 25 percent Guyton, Kolin, and Malbis soils and wet soils along small drainageways that are subject to flooding.

The composition of this mapping unit is more variable than that of most other mapping units in the parish, but mapping has been controlled well enough for interpretations for the expected uses of the soils.

The Shatta soils in this association are on broad ridgetops and very gently sloping side slopes between drainageways. Slopes range from 1 to 5 percent but are mostly 1 to 3 percent. Fertility is low. Air and water move at a moderate rate through the upper part of the subsoil and at a slow rate through the fragipan, but the soils dry out quickly after rain. The soils have a seasonal high water table more than 6 feet below the surface. Plants generally are damaged by a lack of moisture during dry periods in summer and fall. The soils erode easily unless protected by a vegetative cover. The low strength of the subsoil limits the use of these soils for foundations and construction material.

The Guyton soils in this association are poorly drained and loamy. The Kolin and Malbis soils are moderately well drained and loamy. These soils are in small areas and do not significantly affect overall use and management of the association. The Guyton and Kolin soils generally have greater limitations than the Shatta soils. The soils along the small drainageways are more poorly drained than the Shatta soils and are subject to flooding.

Most of the acreage of this association is used for crops and pasture. The rest is woodland and areas used for homesites. Suitable crops for the Shatta soils are cotton, corn, and soybeans. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, Pensacola bahiagrass, ryegrass, and crimson clover. These soils are friable and fairly easy to keep in good tilth. Wetness sometimes delays planting in spring. Proper management of crop residue generally is needed to help control erosion in areas used for cultivated crops. Lime is generally needed, and crops and pasture plants respond well to fertilizer. Capability unit IIe-2; woodland suitability group 3o1.

Sterlington Series

The Sterlington series consists of well-drained, moderately permeable soils that are loamy throughout. These soils formed in alluvial sediments. They are on the older natural levees on the Red River alluvial plain.

In a representative profile the surface layer is dark-brown silt loam about 9 inches thick. The subsoil is yellowish-red silt loam and very fine sandy loam 33 inches thick. The underlying material is yellowish-red very fine sandy loam.

Most of the acreage is used for pasture and crops.

Representative profile of Sterlington silt loam, 1 to 3 percent slopes, in a pasture 1 mile north of Harmon, 600 feet west of Emmett Church, and 100 feet north of lightpole, in the NW¼SE¼ sec. 36, T. 13 N., R. 11 W.

Ap—0 to 9 inches, dark-brown (7.5YR 4/2) silt loam; weak, medium, granular structure; friable; common fine pores; slightly acid; abrupt, wavy boundary.

B21t—9 to 13 inches, yellowish-red (5YR 4/6) silt loam; moderate, medium, subangular blocky structure; friable; distinct patchy clay films; slightly acid; clear, smooth boundary.

B22t—13 to 25 inches, yellowish-red (5 YR 4/6) silt loam; moderate, medium, subangular blocky structure; friable; common fine pores; thin patchy clay films; slightly acid; clear, smooth boundary.

B3—25 to 42 inches, yellowish-red (5YR 5/6) very fine sandy loam; weak, medium, subangular blocky structure; friable; few fine roots; few fine pores; thin patchy clay films on vertical faces of peds; thin patches of uncoated sand grains on faces of peds; neutral; abrupt, smooth boundary.

C—42 to 65 inches, yellowish-red (5YR 5/6) very fine sandy loam; massive; friable; few thin streaks of pink sand; neutral.

The Ap or A1 horizon is 4 to 10 inches thick and is grayish brown, brown, dark brown, or very dark grayish brown. Where it is very dark grayish brown, it is less than 6 inches thick. It ranges from medium acid to neutral.

The B2t horizon is yellowish-red, reddish-brown, dark-brown, or brown silt loam or very fine sandy loam. It ranges from medium acid to neutral. The B3 horizon has the same color, texture, and reaction as the B2t horizon.

The C horizon is yellowish-red, reddish-brown, dark-brown, or strong-brown very fine sandy loam or silt loam. It is slightly acid to moderately alkaline and is calcareous in places.

Sterlington soils are associated with Caspiana, Gallion, Armistead, and Moreland soils. They are less clayey than those soils. Also, they do not have the thick, dark-colored surface layer that is characteristic of Caspiana soils, and they are better drained and less clayey than Armistead and Moreland soils.

SvB—Sterlington silt loam, 1 to 3 percent slopes. This is a very gently sloping, well-drained soil. It occupies long, narrow bands on older natural levees on the Red River alluvial plain. Areas cover 15 to 100 acres.

Included with this soil in mapping are small areas of Caspiana and Gallion soils and areas of Sterlington soils that have slopes of less than 1 percent.

Fertility is moderately high. Surface runoff is slow. Air and water move at a moderate rate through the soil. The soil has a seasonal high water table at a depth of more than 6 feet. The soil is not wet, and because of its position on the landscape it does not receive surface runoff from the surrounding areas. Plants generally are damaged by a lack of moisture during dry periods in summer and fall. Low strength limits the use of this soil for foundations and construction material.

Most of the acreage is used for crops and pasture. The rest is mainly used for homesites. Suitable crops are grain sorghum, oats, wheat, soybeans, corn, and cotton. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, Pensacola bahiagrass, white clover, southern wild winter pea, and vetch.

The soil is friable and easy to keep in good tilth; however, the surface layer is likely to erode during heavy rain if it is clean tilled. Proper management of crop residue improves tilth and helps reduce erosion. The soil can be cultivated throughout a wide range of moisture content. A traffic pan forms easily in cultivated areas, but it can be broken by chiseling or deep plowing. Crops respond well to fertilizer. Lime is needed in places. Capability unit IIe-1; woodland suitability group 2o4.

Udifluvents

Udifluvents consists of well-drained, moderately permeable and moderately slowly permeable soils that are loamy throughout. These soils formed in loamy sediment. They are on the natural levees on the Red River alluvial plain, near channels or near recently abandoned channels of the Red River.

In a representative profile the surface layer is reddish-brown silt loam about 11 inches thick. The underlying material is reddish-brown stratified silt loam, silty clay, and silty clay loam.

Most of the acreage is used for crops and pasture.

Representative profile of Udifluvents, in a cotton field 1.5 miles north of Grand Bayou and 210 feet south of road, in the SW¼SW¼ sec. 13, T. 13 N., R. 11 W.

Ap1—0 to 5 inches, reddish-brown (5YR 4/4) silt loam; weak, very fine, granular structure; friable; moderately alkaline; slightly effervescent; clear, smooth boundary.

Ap2—5 to 11 inches, reddish-brown (5YR 4/4) silt loam; weak, medium, subangular blocky structure; friable; few fine pores; moderately alkaline; slightly effervescent; gradual, smooth boundary.

C1—11 to 20 inches, reddish-brown (5YR 5/4) silt loam; few, fine, faint, strong-brown mottles; massive; friable; few fine pores; common thin bedding planes; few, soft, fine carbonate accumulations; moderately alkaline; clear, smooth boundary.

C2—20 to 24 inches, dark reddish-brown (5YR 3/4) silt loam; weak, medium, subangular blocky structure; friable; few fine pores; few thin bedding planes; few, soft, fine carbonate concretions; moderately alkaline; strongly effervescent; abrupt, smooth boundary.

IIC3—24 to 32 inches, reddish-brown (2.5YR 4/4) silty clay; dark reddish-brown ped faces; moderate, medium, subangular blocky structure; very firm; common black stains on peds; few fine carbonate concretions; moderately alkaline; strongly effervescent; abrupt, smooth boundary.

IIIC4—32 to 41 inches, reddish-brown (5YR 4/4) silt loam and silty clay loam in ½-inch to 2-inch strata; weak, medium, subangular blocky structure; friable; few fine pores; common black stains on peds; few, soft, fine lime masses; moderately alkaline; strongly effervescent; abrupt, smooth boundary.

IVC5—41 to 52 inches, reddish-brown (5YR 4/4) silty clay; moderate, medium, angular blocky structure; very firm; common black stains on peds; moderately alkaline; strongly effervescent.

Bedding planes are evident throughout the soil.

The Ap or A1 horizon is 12 inches thick and is dark reddish brown or reddish brown. It is mildly alkaline or moderately alkaline.

The upper part of the C horizon is reddish-brown to dark reddish-brown silt loam stratified with silty clay loam, very fine sandy loam, and silty clay. The lower part has the same colors and reaction as the upper part, but it is silty clay or silty clay loam stratified with silt loam or very fine sandy loam.

These soils were classified as Udifluvents at the great

group level of the soil classification system because no series has been established for them.

Udifluvents are associated with Severn, Coushatta, and Moreland soils. They are more clayey than Severn soils. They are less well developed than Coushatta soils. They are better drained and less clayey than Moreland soils.

Ud—Udifluvents. These are nearly level, well-drained soils in areas of 15 to 100 acres on the recent natural levees on the Red River alluvial plain. Slopes are 0 to 1 percent.

Included with these soils in mapping are small areas of Coushatta and Severn soils and soils that have a surface layer of silty clay loam.

Fertility is high. Surface runoff is slow. Plant roots penetrate easily, and water and air move at a moderate rate through the soils. A seasonal high water table is generally below a depth of 6 feet, but in places it is at a depth of 4 to 6 feet from December to April. Plants occasionally are damaged by a lack of moisture during dry periods in summer and fall. Low strength limits the use of these soils for foundations and construction material.

Most of the acreage is used for crops. Suitable crops are cotton, soybeans, corn, and oats. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, Pensacola bahiagrass, johnsongrass, and white clover.

These soils are friable and easy to keep in good tilth. A traffic pan forms easily, but it can be broken by chiseling or deep plowing. Land smoothing and leveling improve surface drainage and permit more efficient use of farm equipment. Crops other than legumes respond well to nitrogen fertilizer. Other fertilizers and lime generally are not needed. Capability unit I-1; woodland suitability group 1o4.

Wrightsville Series

The Wrightsville series consists of poorly drained, very slowly permeable soils that have a thick, loamy surface layer and a clayey subsoil. These soils formed in clayey sediment of Pleistocene age. They are in nearly level and depressional areas on the uplands.

In a representative profile the surface and subsurface layers are light brownish-gray and light-gray silt loam about 14 inches thick. The subsoil is mainly light brownish-gray silty clay 47 inches thick. The underlying material is dark-red clay.

Most of the acreage is woodland and pasture.

Representative profile of Wrightsville silt loam, in an area of Kolin-Wrightsville association, in a pasture 9 miles northwest of Coushatta and 300 feet west of access road, in the NE¼SW¼ sec. 12, T. 12 N., R. 10 W.

Ap—0 to 2 inches, light brownish-gray (10YR 6/2) silt loam; weak, medium, subangular blocky structure; friable; common, fine, strong-brown mottles along root channels; medium acid; abrupt, smooth boundary.

A2g—2 to 14 inches, light-gray (10YR 7/2) silt loam; common, fine, distinct, strong-brown mottles; weak, medium, subangular blocky structure; friable; common fine pores; very strongly acid; abrupt, irregular boundary.

B&A—14 to 26 inches, light brownish-gray (10YR 6/2) silty clay; about 15 percent tongues of light-gray (10YR 7/2) silt loam from A2g horizon; many, fine and medium, distinct, strong-brown (7.5YR 5/6) mottles; weak, coarse, prismatic structure parting to moderate, coarse, subangular blocky; firm; common patchy clay films; few dark-brown concretions; strongly acid; clear, wavy boundary.

B21tg—26 to 43 inches, light brownish-gray (10YR 6/2) silty clay; common, medium, distinct, strong-brown (7.5YR 5/6) mottles; weak, coarse, prismatic structure parting to moderate, coarse, subangular blocky; firm; distinct patchy clay films; about 10 percent tongues of light-gray silt loam from A2 horizon; strongly acid; clear, wavy boundary.

B22tg—43 to 55 inches, light brownish-gray (10YR 6/2) silty clay; many, medium and coarse, yellowish-brown (10YR 5/6) mottles; weak, coarse, prismatic structure parting to weak, coarse, subangular blocky; firm; thin patchy clay films; medium acid; gradual, wavy boundary.

B3—55 to 61 inches, mottled yellowish-brown (10YR 5/4) and red (2.5YR 4/6) clay; weak, coarse, subangular blocky structure; firm; common, fine, dark-brown concretions; moderately alkaline; gradual, wavy boundary.

IIC—61 to 70 inches, dark-red (2.5YR 3/6) clay; massive; firm; many pressure faces; common, fine, black concretions; few medium carbonate concretions; moderately alkaline.

The A1 or Ap horizon is gray, light brownish gray, grayish brown, dark gray, very dark gray, dark grayish brown, or very dark grayish brown. The A2 horizon is gray, light gray, or light brownish gray. The A horizon ranges from medium acid to very strongly acid.

The B2tg horizon has the same color and reaction range as the A2 horizon. It is silty clay or clay. Tongues of silt loam extend into or through the B21tg horizon and range from ½ inch to 6 inches wide. The B3 horizon is clay, silty clay, or silty clay loam. In many places there is a IIC horizon of reddish clay or silty clay that ranges from neutral to moderately alkaline and is calcareous.

In Red River Parish the Wrightsville soils have a slightly higher content of montmorillonite in the clay fraction than is defined in the range for the Wrightsville series. This difference does not affect their use, behavior, and management.

Wrightsville soils are associated with Shatta, Kolin, Gore, and McKamie soils. They are more poorly drained than those soils. Also, they are more clayey than Shatta soils.

Wrightsville soils in Red River Parish are mapped only with Kolin soils.

Use and Management of the Soils

The soils in Red River Parish are used mainly for cultivated crops, pasture, woodland, and wildlife habitat. This section of the survey explains how the soils can be managed for these purposes. It also gives information about engineering uses of the soils.

Crops and Pasture

Fertilizing and liming.—The soils of Red River Parish range from very strongly acid to moderately alkaline. Most soils that are used for crops are low in organic-matter content and in available nitrogen. The Armistead, Buxin, Coushatta, Latanier, Moreland, and Severn soils and Udifluvents are alkaline. Crops other than legumes grown on these soils respond well to nitrogen fertilizer. Most of these soils are moderate to high in phosphorus, potassium, and calcium, and fertilizer should be applied on the basis of soil tests. The Caspiana, Gallion, and Sterlington soils are on the

natural levees and have been subject to more intensive leaching and plant removal than the rest of the alluvial soils in the parish. Some areas of these soils need applications of lime, and all need phosphorous, potassium, and nitrogen fertilizer. The rest of the soils in the parish that are used for crops normally need to be limed and to be fertilized with phosphorus, potassium, and nitrogen if they are used for crops other than legumes. The need of fertilizer and lime should be determined by soil tests.

Maintaining the organic-matter content.—Most of the soils that are used for crops are low in organic-matter content. Organic matter is an important source of nitrogen, and it also helps to increase the rate of water intake, reduce surface crusting and erosion, and improve tilth. The content of organic matter in the soil can be maintained by growing crops that produce an extensive root system and an abundance of foliage, by leaving plant residue on the soil, by growing perennial grasses and legumes in rotation with other crops, and by adding manure.

Tillage.—Soils should be tilled only enough to prepare a seedbed and to control weeds. Excessive tillage destroys the soil structure. A fine-textured soil forms clods if it is plowed at the wrong moisture content. A compact layer, or traffic pan, forms in some loamy soils when they are cultivated. Deep plowing or chiseling helps to break up this pan. The soils can be protected from beating rain by the use of tillage implements that stir the surface and leave crop residue on top of it. This residue helps to reduce surface crusting, slow runoff, increase infiltration, and control erosion.

Drainage and flood control.—Most of the soils on the Red River alluvial plain need surface drainage to make them more suitable for crops. The soils at higher elevations on the natural levees are drained by a gravity drainage system consisting of a series of mains, laterals, and split ditches. In some places, row drains or row arrangement is adequate. The success of gravity drainage systems depends on the availability of outlets, however, and some areas on the Red River alluvial plain do not have adequate outlets. A fairly suitable method of draining soil is land leveling and smoothing. This practice consists of precision leveling of the soil to a uniform grade. Land grading improves surface drainage and eliminates cross ditches. Also, longer rows can be planted, which permits more efficient use of farm equipment. A manmade levee protects most of the area from flooding by the Red River.

Capability grouping

Some readers, particularly those who farm on a large scale, may find it practical to use and manage alike some of the different kinds of soil on their farm. These readers can make good use of the capability classification system, a grouping that shows, in a general way, the suitability of soils for most kinds of farming.

The grouping is based on limitations of soils when used for field crops, the risk of damage when they are farmed, and the way the soils respond to treatment. The grouping does not take into account major and generally expensive land-forming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management.

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

In the capability system, all kinds of soil are grouped at three levels: the class, the subclass, and the unit. The eight classes in the capability system and the subclasses and units in Red River Parish are described in the list that follows. The capability unit for each soil is shown in the Guide to Mapping Units. The use and management of each soil is discussed in the description of the mapping units.

Class I. Soils that have few limitations that restrict their use.
- (No subclasses.)
  - Unit I-1. Well-drained, nearly level, loamy soils that have a surface layer of silt loam and a weakly developed or undeveloped subsoil.
  - Unit I-2. Well-drained, nearly level, loamy soils that have a surface layer of silt loam and a moderately developed subsoil.

Class II. Soils that have moderate limitations that reduce the choice of plants or require moderate conservation practices.
- Subclass IIe. Soils that are subject to moderate erosion unless protected.
  - Unit IIe-1. Well-drained, very gently sloping, loamy soils.
  - Unit IIe-2. Moderately well drained, very gently sloping to gently sloping, loamy soils.
- Subclass IIw. Soils that are moderately limited because of excess water.
  - Unit IIw-1. Somewhat poorly drained, nearly level, loamy soils that have a clayey surface layer and a loamy moderately developed subsoil.
  - Unit IIw-2. Well-drained and somewhat poorly drained, nearly level, loamy soils that have a surface layer of silty clay loam and a weakly developed or undeveloped subsoil.
  - Unit IIw-3. Well-drained, nearly level, loam and a weakly developed or undeveloped silty clay loam and a moderately developed subsoil.

Class III. Soils that have severe limitations that reduce the choice of plants, require special conservation practices, or both.
- Subclass IIIe. Soils that are subject to severe erosion if they are cultivated and not protected.

Unit IIIe-1. Very gently sloping to gently sloping, somewhat poorly drained, loamy soils.
Unit IIIe-2. Gently sloping to moderately sloping, well-drained, loamy soils.
Unit IIIe-3. Gently sloping to moderately sloping, moderately well drained and well drained soils that have a loamy surface layer and a loamy or clayey subsoil.
Unit IIIe-4. Gently sloping to moderately sloping, moderately well drained and well drained soils that have a loamy surface layer and a clayey subsoil.

Subclass IIIw. Soils that are severely limited for cultivation because of excess water.
Unit IIIw-1. Somewhat poorly drained, nearly level, clayey soils.
Unit IIIw-2. Poorly drained, nearly level, clayey soils.
Unit IIIw-3. Somewhat poorly drained, nearly level, soils that have a loamy surface layer and a clayey subsoil.
Unit IIIw-4. Somewhat poorly drained, gently undulating, clayey soils.
Unit IIIw-5. Poorly drained, nearly level soils that have a loamy surface layer and a strongly developed subsoil.

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

Subclass IVe. Soils that are subject to very severe erosion if they are cultivated and not protected.
Unit IVe-1. Very gently sloping to moderately sloping, moderately well drained and well drained, clayey solis.

Subclass IVw. Soils that are severely limited for cultivation because of occasional flooding.
Unit IVw-1. Well-drained, gently undulating, loamy soils that are occasionally flooded.

Subclass IVs. Soils that are severely limited for cultivation because of occasional flooding.
Unit IVs-1. Poorly drained, nearly level, loamy soils that have a high sodium saturation.

Class V. Soils that are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, woodland, or wildlife habitat.

Subclass Vw. Soils that flood too frequently for cultivation; protection generally is not feasible.
Unit Vw-1. Well-drained, gently undulating, loamy soils that are frequently flooded.

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

Subclass VIe. Soils that are severely limited, chiefly by risk of erosion, unless a protective cover is maintained.
Unit VIe-1. Moderately steep to steep, well-drained soils that have a loamy surface layer and a clayey subsoil.

Class VII. Soils that have very severe limitations that make them unsuitable for cultivation and restrict their use largely to range, woodland, or wildlife habitat. (None in Red River Parish.)

Class VIII. Soils and landforms that have limitations that preclude their use for commercial crop production and restrict their use to recreation, wildlife habitat, water supply, or esthetic purposes. (None in Red River Parish.)

Predicted yields

Table 2 lists predicted yields of the principal crops grown in the parish. The predictions are based on estimates made by farmers, soil scientists, and others who have knowledge of yields in the parish and on information taken from research data. The predicted yields are average yields per acre that can be expected by farmers at the level of management that tends to produce the highest economic returns.

Crops other than those shown in table 2 are grown in the parish, but their predicted yields are not included because their acreage is small or reliable data on yields are not available.

The predicted yields shown in table 2 can be expected if the following management practices are used:

1. Rainfall is effectively used and conserved.
2. Surface drainage systems are installed.
3. Crop residue is managed to maintain good tilth.
4. Minimum but timely tillage is used.
5. Insect, disease, and weed control measures are consistently used.
6. Fertilizer is applied according to soil tests and crop needs.
7. Adapted crop varieties are used at recommended seeding rates.

Woodland

Originally, Red River Parish was mainly wooded. Now trees cover only about 51 percent of the parish.

Good stands of commercial trees are produced in the woodlands of the parish. Loblolly and shortleaf pine occur in natural and planted stands in the uplands. Heavy equipment is commonly used in preparing a site for the planting of pine trees (fig. 8). Southern hardwoods grow on the Red River alluvial plain and on the alluvial plains of streams that drain the uplands.

The commercial value of wood products produced in the parish is substantial. Other woodland values include wildlife habitat, recreation, grazing (woodland), natural beauty, and the conservation of soil and water.

This section explains how soils affect the growth and management of trees. Table 3 gives information about the suitability of the soils of Red River Parish for woodland. In the table the woodland suitability group for each soil is listed. Each group is made up of soils that are suited to the same kind of trees, that need about the same kind of management to produce these trees, and that have about the same potential productivity.

TABLE 2. — *Predicted average acre yields of principal crops and pasture plants*

[Absence of a yield indicates that the crop is not suited to the soil or is not commonly grown on the soil]

Soil	Crops			Pasture plants			
	Cotton (lint)	Corn	Soybeans	Common bermudagrass	Coastal bermudagrass	Pensacola bahiagrass	Tall fescue
	Lb	*Bu*	*Bu*	*AUM*[1]	*AUM*[1]	*AUM*[1]	*AUM*[1]
Armistead clay	675		35	6.5	12.0	8.5	8.0
Bonn complex			15	4.0		4.5	
Boswell-Falkner association, sloping	450	45		5.5	10.0	6.5	
Buxin clay	575		32	6.0		8.0	8.0
Caspiana silt loam	875	90	40	7.5	15.0	9.5	
Caspiana silty clay loam	800	85	40	7.5	13.0	9.5	
Coushatta silt loam	875	90	40	7.5	15.0	9.5	
Coushatta silty clay loam	800	85	40	7.5	13.0	9.5	7.0
Falkner-Boswell association, gently sloping	550	50	25	5.5	10.0	6.5	
Gallion silt loam	875	85	35	7.0	15.0	9.0	
Gallion silty clay loam	800	80	35	7.0	13.0	9.0	
Gore-McKamie association, sloping:							
Gore part			22	4.5		5.0	
McKamie part			23	5.0		6.0	
Guyton association, frequently flooded				4.5		5.5	
Guyton-Messer association:							
Guyton part			22	5.5		6.0	
Messer part			25	5.5		6.5	
Kolin-Wrightsville association:							
Kolin part	500	60	28	5.5	11.0	6.5	
Wrightsville part			25	4.5		6.0	
Latanier clay	750		40	6.5	13.0	8.5	8.0
Malbis-Beauregard association, gently sloping:							
Malbis part	600	60	28	5.5	12.0	6.5	
Beauregard part	500	60	25	6.0		7.0	
Meth-Malbis association, sloping:							
Meth part	500	55	25	5.5	12.0	6.0	
Malbis part	550	55	25	5.5	12.0	6.5	
Meth-Ruston association, steep:							
Meth part				4.5	11.0	5.5	
Ruston part	450	55	25	5.5	12.0	7.5	
Moreland silt loam, overwash, 0 to 1 percent slopes	650		40	6.0	13.0	8.5	8.0
Moreland clay, 0 to 1 percent slopes	625		40	6.0	13.0	8.5	8.0
Moreland clay, gently undulating	575		35	6.0	12.0	8.5	8.0
Perry clay	475		33	5.5		8.0	7.5
Ruston association, sloping	450	60	25	5.5	12.0	7.5	
Severn very fine sandy loam	650	75	40	7.5	15.0	9.5	
Severn very fine sandy loam, occasionally flooded			35	7.5	15.0	9.5	
Severn soils, frequently flooded				4.5			
Shatta association, gently sloping	600	70	28	5.5		6.0	
Sterlington silt loam, 1 to 3 percent slopes	825	85	35	7.0	13.5	8.5	
Udifluvents	875	90	40	7.5	15.0	9.5	

[1] AUM is animal-unit-months, a term used to express the carrying capacity of pasture. It is the number of months during the year that 1 acre will provide grazing for 1 animal unit (1,000 pounds live weight) without damage to the pasture.

Each woodland suitability group is identified by a three-part symbol. The first part of the symbol, an Arabic numeral, indicates the relative productivity of the soils: 1 means very high, 2 means high, 3 means moderately high, 4 means moderate, and 5 means low.

The second part of the symbol, a letter, indicates the important soil property that imposes a moderate or severe hazard or limitation in managing the soils for wood production. The letter *w* shows that excess water in or on the soil is the chief limitation; *t* shows that toxic substances in the soil is the chief limitation; *c* shows that clay in the upper part of the soil is a limitation; and *o* shows that the soil has no significant restrictions or limitations for woodland use or management.

The third part of the symbol, another number, indicates the degree of management limitations and the general suitability of the soils for certain kinds of trees. The three concerns in management considered here are erosion hazard, equipment limitations, and seedling mortality. The numeral 1 indicates soils that have no or slight limitations and that are best suited to needleleaf trees. The numeral 2 indicates soils that have one or more moderate limitations and that are

Figure 8.—**Preparing a site for planting of pine trees on Boswell soils in the Boswell-Falkner association, sloping.**

best suited to needleleaf trees. The numeral 3 indicates soils that have one or more severe limitations and that are best suited to needleleaf trees. (None in Red River Parish.) The numeral 4 indicates soils that have no to slight limitations and that are best suited to broadleaf trees. The numeral 5 indicates soils that have one or more moderate limitations and that are best suited to broadleaf trees. The numeral 6 indicates soils that have one or more severe limitations and that are best suited to broadleaf trees. The numeral 7 indicates soils that have no to slight limitations and that are suitable for either needleleaf or broadleaf trees. (None in Red River Parish.) The numeral 8 indicates soils that have one or more moderate limitations and that are suitable for either needleleaf or broadleaf trees. The numeral 9 indicates soils that have one or more severe limitations and that are suitable for either needleleaf or broadleaf trees. The numeral 0 indicates soils that are not suitable for the production of major commercial wood products.

In table 3 some of the commercially important trees that are adapted to the soil are listed. These are the trees that woodland managers generally favor in intermediate or improvement cuttings. Also shown is the potential productivity of the dominant trees in terms of site index. The site index is the average height of dominant trees, in feet, at age 30 for cottonwood, at age 35 for sycamore, and at age 50 for all other species or types.

The potential productivity of grazable understory grasses, legumes, forbs, or low shrubs for a medium tree canopy class (36 to 55 percent canopy) is given. These plants can be used by cattle, with proper management, to supplement a woodland pasture without damage to the woodland crop. Productivity is expressed in pounds of air-dry forage per acre. Where yield data are not available and estimates cannot be made, the species are listed in order of their productivity. Grazing is not recommended for hardwood woodland; therefore, yield data are not provided for soil series suited only to hardwoods. The principal forage species listed are those that are climax. The production shown is the production that can be expected in normal years when woodland forage is in good condition.

The concerns of management evaluated in table 3 are erosion hazard, equipment limitations, and seedling mortality. Erosion hazard measures the risk of soil losses in well-managed woodland. Erosion hazard is

TABLE 3. — *Suitability of the soils for woodland*

Soil series and map symbols	Woodland suitability group	Potential productivity				Concerns of management			Trees suitable for planting
		Important trees	Site index	Understory vegetation used as forage		Erosion hazard	Equipment limitations	Seedling mortality	
				Principal plants	Estimated yields under medium canopy				
					Pounds per acre				
Armistead: Ar	2w5	Green ash	80	Grazing not recommended.		Slight	Moderate	Moderate	Eastern cottonwood, American sycamore.
		Cherrybark oak	90						
		Water oak	90						
		Pecan	90						
		Sweetgum	90						
		American sycamore							
		Eastern cottonwood	110						
Beauregard Mapped only in an association with Malbis soils.	2w8	Loblolly pine	90	Pinehill bluestem	800	Slight	Moderate	Slight	Loblolly pine.
		Sweetgum	90	Sedges and rushes	300				
		Red oak	80	Switchgrass	200				
				Low panicums	200				
				Other plants	300				
Bonn: Bc Not suitable for commercial woodland.	5t0								
Boswell: BFC For the Falkner part, see the Falkner series.	3c2	Loblolly pine	80	Pinehill and little bluestem.	300	Slight	Moderate	Moderate	Loblolly pine.
		Shortleaf pine	70	Longleaf uniola	300				
				Beaked panicum	150				
Buxin: Bx	2w6	Green ash	70	Grazing not recommended.		Slight	Severe	Moderate	Eastern cottonwood, American sycamore.
		Water oak							
		Eastern cottonwood	90						
		Sweetgum	88						
		American sycamore							
Caspiana: Ca, Cn	2o4	Green ash	75	Grazing not recommended.		Slight	Slight	Slight	Eastern cottonwood, American sycamore.
		Eastern cottonwood	105						
		Cherrybark oak	100						
		Water oak	90						
		Pecan	90						
		Sweetgum	100						
		American sycamore							
Coushatta: Cs, Ct	1o4	Eastern cottonwood	100	Grazing not recommended.		Slight	Slight	Slight	Eastern cottonwood, American sycamore.
		Cherrybark oak							
		Water oak							
		Pecan							
		Sweetgum	100						
		American sycamore							
Falkner: FBB For the Boswell part, see the Boswell series.	2w8	Loblolly pine	90	Pinehill bluestem	500	Slight	Moderate	Slight	Loblolly pine.
		Shortleaf pine	80	Switchcane	400				
		Sweetgum	90	Longleaf uniola	300				
		Red oak							
		White oak							

TABLE 3.—*Suitability of the soils for woodland*—Continued

Soil series and map symbols	Woodland suitability group	Potential productivity				Concerns of management			Trees suitable for planting
		Important trees	Site index	Understory vegetation used as forage		Erosion hazard	Equipment limitations	Seedling mortality	
				Principal plants	Estimated yields under medium canopy				
Gallion: Ga, Gn	2o4	Green ash	80	Grazing not recommended.		Slight	Slight	Slight	Eastern cottonwood, American sycamore.
		Cherrybark oak	95						
		Sweetgum	83						
		Water oak							
		Pecan							
		American sycamore							
Gore: GSC For the McKamie part, see the McKamie series.	3c2	Loblolly pine	76	Pinehill and little bluestem.	1,000	Slight	Moderate	Moderate	Loblolly pine.
		Shortleaf pine		Low panicums	250				
				Longleaf uniola	150				
				Pineland three-awn	150				
				Other plants	250				
Guyton: GU, GY[1] For the Messer part of GY, see the Messer series.	2w9	Loblolly pine	90	Pinehill and little bluestem.	800	Slight	Severe	Moderate	Loblolly pine, eastern cottonwood, American sycamore.
		Slash pine	90						
		Sweetgum	90	Rushes and sedges	200				
		Green ash		Chalky bluestem	100				
		Eastern cottonwood		Silver plumgrass	100				
		Red oak		Other plants	600				
		White oak							
		Water oak							
		American sycamore							
Kolin: KW For the Wrightsville part, see the Wrightsville series.	3w8	Loblolly pine	80	Pinehill bluestem	800	Slight	Moderate	Slight	Loblolly pine.
		Shortleaf pine	70	Sedges and rushes	300				
				Switchgrass	200				
				Low panicums	200				
				Other plants	300				
Latanier: La	2w5	Green ash	80	Grazing not recommended.		Slight	Moderate	Moderate	Eastern cottonwood, American sycamore.
		Cherrybark oak	90						
		Water oak	90						
		Pecan							
		Sweetgum	90						
		American sycamore							
		Eastern cottonwood	110						
Malbis: MAB For the Beauregard part, see the Beauregard series.	2o1	Loblolly pine	90	Pinehill and little bluestem.	200	Slight	Slight	Slight	Loblolly pine.
		Shortleaf pine	80	Longleaf uniola	400				
				Low panicums	300				
				Other plants	200				
McKamie Mapped only in an association with Gore soils.	3c2	Loblolly pine	80	Pinehill bluestem	1,000	Slight	Moderate	Moderate	Loblolly pine.
		Shortleaf pine	70	Low panicums	250				
				Longleaf uniola	150				
				Pineland three-awn	150				
				Other plants	250				

Messer Mapped only in an association with Guyton soils.	2w8	Loblolly pine Sweetgum Red oak White oak	90 	Pinehill bluestem Sedges and rushes Switchgrass Low panicums	800 300 200 200	Slight	Moderate	Slight	Loblolly pine.
Meth: MLC, MME For the Malbis part of MLC and the Ruston part of MME, see their respective series.	3o1	Loblolly pine Shortleaf pine	80 70	Uniolas Pinehill and little bluestem. Beaked panicum Low panicums Purpletop Other plants	400 300 250 200 100 150	Slight	Slight	Slight	Loblolly pine.
Moreland: MnA, MoA, MoB.	2w6	Green ash Eastern cottonwood Sweetgum American sycamore Cherrybark oak	75 100 90 	Grazing not recommended.		Slight	Severe	Moderate	Eastern cottonwood, American sycamore.
Perry: Pr	2w6	Sweetgum Green ash Eastern cottonwood Water oak Cherrybark oak	92 72 90 80 80	Grazing not recommended.		Slight	Severe	Moderate	Eastern cottonwood, American sycamore.
Ruston: RUC	2o1	Loblolly pine Shortleaf pine	80 75	Longleaf uniola Pinehill bluestem Beaked panicum Low panicums Other plants	350 200 150 150 350	Slight	Slight	Slight	Loblolly pine.
Severn: Se, Sn	2o4	Eastern cottonwood Sweetgum Red oak American sycamore	100 90 90 90	Grazing not recommended.		Slight	Slight	Slight	Eastern cottonwood, American sycamore.
Sr[1]	1w6	Eastern cottonwood American sycamore	100 90	Grazing not recommended.		Slight	Moderate to severe.	Moderate to severe.	Eastern cottonwood, American sycamore.
Shatta: STB	3o1	Loblolly pine Shortleaf pine Sweetgum	83 71 	Longleaf uniola Pinehill and little bluestem. Beaked panicum Low panicums Purpletop Other plants	400 300 250 200 100 150	Slight	Slight	Slight	Loblolly pine.
Sterlington: SvB	2o4	Green ash Eastern cottonwood Cherrybark oak Water oak Sweetgum Pecan	75 100 95 90 90 	Grazing not recommended.		Slight	Slight	Slight	Eastern cottonwood, American sycamore.
Udifluvents: Ud	1o4	Green ash Eastern cottonwood Pecan Sweetgum American sycamore	90 110 100 	Grazing not recommended.					Eastern cottonwood, American sycamore.
Wrightsville Mapped only in an association with Kolin soils.	3w9	Loblolly pine Sweetgum Water oak	80 80 80	Pinehill and little bluestem. Rushes and sedges Chalky bluestem Silver plumgrass Other plants	800 200 100 100 600	Slight	Severe	Moderate to severe.	Loblolly pine.

[1] Equipment limitations and seedling mortality vary depending on the frequency, depth, and duration of floods and the amount of scouring and deposition.

slight if the expected soil loss is small, *moderate* if some measures to control erosion are needed in logging and construction, and *severe* if intensive treatment or special equipment and methods are needed to prevent excessive soil losses.

Equipment limitation ratings reflect the soil conditions that restrict the use of equipment normally used in woodland management or harvesting. A rating of *slight* indicates equipment use is not limited to a specific kind of equipment or time of year. A rating of *moderate* indicates a seasonal limitation or need for modification in type of equipment used. *Severe* indicates that special equipment is needed or that use of equipment is severely limited by one or more unfavorable soil characteristics.

Seedling mortality ratings indicate the degree of expected mortality of planted seedlings where plant competition is not a limiting factor. Normal rainfall, good planting stock, and proper planting are assumed. A rating of *slight* indicates expected mortality is less than 25 percent. *Moderate* indicates a 25 to 50 percent loss. *Severe* indicates more than 50 percent loss of seedlings.

In the last column of the table the trees suitable to plant for commercial wood production are listed.

Wildlife Habitat

The soils of Red River Parish furnish suitable habitat for many forms of wildlife. The continued presence of this wildlife depends on the amount and type of plants that the soils can produce and on man's treatment of the land and vegetation. Because of the land use, some soils of this parish will never provide habitat for a significant number of wildlife, but others will continue to be inhabited by large numbers of animals and birds.

The most important animals and birds in the parish are deer, squirrels, rabbits, raccoons, quail, ducks, and doves. The important species of fish are black or largemouth bass, crappie, bluegills, and white bass.

The deer population of this parish is fairly large and is mostly concentrated in the upland areas adjacent to the Red River alluvial plain. Squirrels are fairly abundant over most of the parish. Rabbits are almost as abundant as the squirrels, and raccoons are also rather plentiful.

Quail are quite abundant throughout the parish. The duck population is somewhat limited. Mallards and wood ducks are the main species. The greatest concentration of ducks is in the Black Lake area and along the Red River. These areas also provide nesting areas for wood ducks during spring and early in summer. The dove population, too, is limited, and doves are found in only moderate numbers. The cultivated fields on the Red River alluvial plain attract most of the birds that pass through the parish.

There are two lakes within the parish and one larger one bordering it. Stephens and Wilson Lakes are oxbow lakes formed by the meandering of the Red River. Black Lake is in the southeast corner of the parish. The fisheries in these lakes are of a moderate level, and the most common fish are largemouth bass, crappie, bluegills, and white bass. Commercial fish, such as the catfish, buffalo, gar, and gaspergou, are also in these lakes.

Soils directly influence kinds and amounts of vegetation and amounts of water available, and in this way they indirectly influence the kinds of wildlife that can live in an area. Soil properties that affect the growth of wildlife habitat are thickness of soil useful to crops, surface texture, available water capacity, wetness, flood hazard, slope, and permeability of the soil to air and water.

In table 4 the soils of the parish are rated for producing seven elements of wildlife habitat and for suitability as habitat for three groups or kinds of wildlife. The ratings indicate levels of suitability for various elements. They are defined as follows.

Good means that habitat is easily improved, maintained, or created. The soil has few or no limitations for habitat management, and satisfactory results can be expected. *Fair* means that habitat can be improved, maintained, or created on these soils, but moderate soil limitations affect habitat management or development. A moderate intensity of management and fairly frequent attention may be required to ensure satisfactory results. *Poor* means that habitat can be improved, maintained, or created on these soils, but the limitations are severe. Habitat management may be difficult and expensive and require intensive efforts. Results are questionable. *Very poor* means that, under the prevailing soil conditions, it is impractical to attempt to improve, maintain, or create habitat. Unsatisfactory results are probable.

Each soil is rated in table 4 according to its suitability for producing various kinds of plants and other elements that make up wildlife habitat. The ratings take into account mainly the characteristics of the soils and closely related natural factors of the environment. They do not take into account climate, present use of soils or present distribution of wildlife and people. For this reason, selection of a site for development as habitat for wildlife requires inspection at the site. The elements of wildlife habitat in table 4 are defined in the following paragraphs.

Grain and seed crops are annual grain-producing plants, such as corn, sorghums, millet, and soybeans.

Domestic grasses and legumes are domestic grasses and legumes that are established by planting. They provide food and cover for wildlife. Grasses are bahiagrass, ryegrass, panicgrass, and others; legumes are annual lespedeza, shrub lespedeza, clover, and others.

Wild herbaceous plants are native or introduced perennial grasses, forbs, and weeds that provide food and cover for wildlife. Examples are beggarweed, perennial lespedeza, wild bean, pokeweed, and panicgrass.

Hardwood trees are nonconiferous trees and shrubs that produce wildlife food in the form of fruit, nuts, buds, catkins, or browse. Such plants commonly grow naturally, but they may be planted and developed through wildlife management programs. Typical species in this category are oak, hickory, beech, cherry, dogwood, maple, virburnum, grape, honeysuckle, greenbrier, and blackgum.

TABLE 4. — *Suitability of the soils for elements of wildlife habitat and kinds of wildlife*

[Lack of an entry means the soil generally is not suitable for that element of wildlife habitat]

Soil series and map symbols	Elements of wildlife habitat							Kinds of wildlife		
	Grain and seed crops	Domestic grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland	Woodland	Wetland
Armistead: Ar	Fair	Fair	Fair	Good		Good	Fair	Fair	Good	Fair.
Beauregard Mapped only in an association with Malbis soils.	Good	Good	Good		Good	Poor	Poor	Good	Good	Poor.
Bonn: Bc	Poor	Poor	Poor	Poor		Poor	Good	Poor	Poor	Fair.
Boswell: BFC. For the Falkner part, see the Falkner series.										
1 to 3 percent slopes	Good	Good	Good		Good	Poor	Poor	Good	Good	Poor.
3 to 5 percent slopes	Good	Good	Good		Good	Poor	Very poor	Good	Good	Very poor.
Buxin: Bx	Fair	Fair	Fair	Good		Good	Good	Fair	Good	Good.
Caspiana: Ca, Cn	Good	Good	Good	Good		Poor	Very poor	Good	Good	Poor.
Coushatta: Cs, Ct	Good	Good	Good	Good		Poor	Very poor	Good	Good	Poor.
Falkner: FBB. For the Boswell part, see the Boswell series.										
1 to 3 percent slopes	Good	Good	Good		Good	Poor	Poor	Good	Good	Poor.
3 to 5 percent slopes	Good	Good	Good		Good	Poor	Very poor	Good	Good	Very poor.
Gallion: Ga, Gn	Good	Good	Good	Good		Poor	Very poor	Good	Good	Very poor.
Gore: GSC For the McKamie part, see the McKamie series.	Fair	Good	Good		Fair	Poor	Poor	Fair	Fair	Poor.
Guyton:										
GU	Poor	Fair	Fair	Fair		Good	Good	Poor	Fair	Good.
GY	Fair	Fair	Fair	Fair		Good	Good	Fair	Fair	Good.
For the Messer part of GY, see the Messer series.										
Kolin: KW For the Wrightsville part, see the Wrightsville series.	Good	Good	Good		Good	Poor	Poor	Good	Good	Poor.
Latanier: La	Fair	Fair	Fair	Good		Good	Good	Fair	Good	Good.
Malbis: MAB For the Beauregard part, see the Beauregard series.	Good	Good	Good		Good	Poor	Very poor	Good	Good	Very poor.
McKamie Mapped only in an association with the Gore soils.	Fair	Good	Good		Fair	Poor	Poor	Fair	Fair	Poor.
Messer Mapped only in an association with the Guyton soils.	Good	Good	Good		Good	Poor	Very poor	Good	Good	Very poor.

TABLE 4.—*Suitability of the soils for elements of wildlife and habitat and kinds of wildlife*—Continued

Soil series and map symbols	Elements of wildlife habitat							Kinds of wildlife		
	Grain and seed crops	Domestic grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland	Woodland	Wetland
Meth:										
MLC	Good	Good	Good		Good	Poor	Very poor	Good	Good	Very poor.
For the Malbis part, see the Malbis series.										
MME	Poor	Good	Good		Good	Poor	Very poor	Fair	Good	Very poor.
For the Ruston part, see the Ruston series.										
Moreland:										
MnA, MoA	Fair	Fair	Fair	Good		Good	Good	Fair	Good	Good.
MoB	Fair	Fair	Fair	Good		Good	Fair	Fair	Good	Fair.
Perry: Pr	Fair	Fair	Fair	Good		Good	Good	Fair	Good	Good.
Ruston: RUC	Good	Good	Good		Good	Poor	Very poor	Good	Good	Very poor.
Severn:										
Se, Sn	Good	Good	Good	Good		Poor	Very poor	Good	Good	Very poor.
Sr	Poor	Fair	Good	Good		Poor	Very poor	Fair	Good	Very poor.
Shatta: STB	Good	Good	Good		Good	Poor	Poor	Good	Good	Poor.
Sterlington: SvB	Good	Good	Good	Good		Poor	Very poor	Good	Good	Very poor.
Udifluvents: Ud	Good	Good	Good	Good		Poor	Very poor	Good	Good	Poor.
Wrightsville	Poor	Fair	Fair	Good		Good	Good	Fair	Good	Good.
Mapped only in an association with Kolin soils.										

Coniferous plants are cone-bearing trees and shrubs that provide cover and frequently furnish food in the form of browse, seeds, or fruitlike cones. They commonly grow naturally, but they may be planted and managed. Typical plants in this category are pines, cedars, and ornamental trees and shrubs.

Wetland plants are annual and perennial herbaceous plants that grow wild on moist and wet sites. They furnish food and cover mostly for wetland wildlife. Examples are smartweed, wild millet, spike-rush, rushes, sedges, and grasses. Submerged and floating aquatics are not included in this category.

Shallow water areas are impoundments or excavations for controlling water, generally no more than 3 feet deep, to create habitats that are suitable for waterfowl or crayfish. Some are designed to be drained, planted, and then flooded; others are permanent impoundments that grow submerged aquatics.

Table 4 rates the soils according to their suitability as habitat for the three kinds of wildlife in the parish—openland, woodland, and wetland. These are related to ratings made for the elements of habitat. For example, soils rated as very poor for shallow water developments are rated very poor for wetland wildlife.

Openland wildlife are birds and mammals that normally live in meadows, pastures, and open areas where grasses, herbs, and shrubby plants grow. Quail, doves, meadowlark, field sparrows, cottontail rabbits, and foxes are examples of openland wildlife.

Woodland wildlife are birds and mammals that normally live in wooded areas of hardwood trees, coniferous trees, and shrubs. Woodcock, thrushes, wild turkeys, vireos, deer, swamp rabbit, squirrels, and raccoons are typical examples of woodland wildlife.

Wetland wildlife are birds and mammals that normally live in wet areas, marshes, and swamps. Ducks, geese, rails, shore birds, herons, minks, nutria, and muskrats are examples of wetland wildlife.

Engineering[2]

This section is useful to those who need information about soils used as structural material or as foundation upon which structures are built. Among those who can benefit from this section are planning commissions, town and city managers, land developers, engineers, contractors, and farmers.

Among the properties of soils highly important in engineering are permeability, strength, compaction characteristics, soil drainage condition, shrink-swell potential, grain size, plasticity, and soil reaction. Also important are depth to the water table and soil slope. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse.

Information in this section of the soil survey can be helpful to those who—

1. Select potential residential, industrial, commercial, and recreational areas.
2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Seek sources of gravel, sand, or clay.
4. Plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for controlling water and conserving soil.
5. Correlate the performance of structures already built with the properties of the soil on which they are built, for the purpose of predicting performance of structures on the same or similar kinds of soil in other locations.
6. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment.
7. Develop preliminary estimates pertinent to construction in a particular area.

Most of the information in this section is presented in table 5, which shows several estimated soil properties significant in engineering, and in table 6, which gives interpretations for various engineering uses.

This information, along with the soil map and other parts of this publication, can be used to make interpretations in addition to those in table 6, and it also can be used to make other useful maps.

This information, however, does not eliminate the need for further investigations at sites selected for engineering works, especially works that involve heavy loads or that require excavations to depths greater than those shown in the tables, generally depths of more than 6 feet. Also, inspection of sites, especially the small ones, is needed because many mapped areas of a given mapping unit may contain small areas of other kinds of soil that have strongly contrasting properties and different suitabilities or limitations for soil engineering.

Some of the terms used in this soil survey have special meaning in soil science. The Glossary defines many of these terms.

Engineering soil classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system (*2*), used by the Soil Conservation Service, Department of Defense, and other agencies, and the AASHTO system (*1*), adopted by the American Association of State Highway and Transportation Officials.

In the Unified system soils are classified according to particle-size distribution, plasticity, liquid limit, and organic matter. Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, CL-ML, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt.

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

[2] JOHN B. TUBB, engineer, Soil Conservation Service, helped prepare this section.

TABLE 5. — *Estimated soil properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. indicated in the first column of this

Soil series and map symbols	Depth from surface	USDA texture	Classification		Percentage smaller than 3 inches passing sieve—	
			Unified	AASHTO	No. 4 (4.7 mm)	No. 10 (2.0 mm)
	Inches					
Armistead: Ar	0–13	Clay	CH	A–7–6		
	13–62	Silt loam, silty clay loam	ML, CL, CL–ML	A–4, A–6		
Beauregard	0–5	Silt loam	ML	A–4		100
Mapped only with Malbis soils.	5–35	Silt loam, silty clay loam	CL, CL–ML	A–6, A–4		100
	35–63	Silty clay loam, silt loam	CL	A–6		100
Bonn: Bc	0–17	Silt loam	ML, CL–ML	A–4		100
	17–43	Silt loam, silty clay loam	CL	A–6	95–100	90–100
	43–60	Silt loam, silty clay loam	CL	A–6	100	95–100
*Boswell: BFC	0–10	Fine sandy loam	ML, SM	A–4		100
For the Falkner part, see the Falkner series.	10–64	Silty clay, clay	CH	A–7–6		100
Buxin: Bx	0–47	Clay, silty clay	CH	A–7–6		
	47–65	Clay, silty clay loam, silty clay	CH, CL	A–7–6		
Caspiana:						
Ca	0–11	Silty clay loam	CL	A–6, A–7–6		
	11–52	Silty clay loam, loam, silt loam	CL	A–6, A–7–6		
	52–60	Very fine sandy loam, silt loam, loam, silty clay loam.	CL, CL–ML	A–4, A–6		
Cn	0–11	Silt loam	CL, CL–ML	A–4		
	11–52	Silty clay loam, loam, silt loam	CL	A–6, A–7–6		
	52–60	Very fine sandy loam, silt loam, loam, silty clay loam.	CL, CL–ML	A–4, A–6		
Coushatta:						
Cs	0–8	Silty clay loam	CL	A–6, A–7–6		
	8–27	Silt loam, silty clay loam	CL	A–6		
	27–61	Stratified silt loam, silty clay loam.	ML, CL, CL–ML	A–4, A–6		
Ct	0–8	Silt loam	ML, CL, CL–ML	A–4		
	8–27	Silt loam, silty clay loam	CL	A–6		
	27–61	Stratified silt loam, silty clay loam.	ML, CL, CL–ML	A–4, A–6		
*Falkner: FBB	0–6	Silt loam	ML, CL–ML	A–4		100
For the Boswell part, see the Boswell series.	6–27	Silt loam, silty clay loam	CL	A–6		100
	27–64	Clay, silty clay, sandy clay	CH, SC	A–7–6		100
Gallion:						
Ga	0–10	Silty clay loam	CL	A–6		
	10–33	Silt loam, silty clay loam	CL	A–6		
	33–60	Very fine sandy loam, loam, silt loam, silty clay loam.	CL, CL–ML	A–4, A–6		
Gn	0–10	Silt loam	ML, CL–ML	A–4		
	10–33	Silt loam, silty clay loam	CL	A–6		
	33–60	Very fine sandy loam, loam, silt loam, silty clay loam.	CL, CL–ML	A–4, A–6		
*Gore: GSC	0–5	Silt loam	ML, CL–ML	A–4		100
For the McKamie part, see the McKamie series.	5–40	Clay, silty clay	CH	A–7–6		100
	40–70	Clay, silty clay	CH	A–7–6		100
*Guyton: GU, GY	0–17	Silt loam	ML, CL–ML	A–4		100
For the Messer part of GY, see the Messer series.	17–60	Silt loam, silty clay loam, loam	CL	A–6, A–4		100
*Kolin: KW	0–8	Silt loam	ML, CL–ML	A–4		100
For the Wrightsville part, see the Wrightsville series.	8–30	Silty clay loam, silt loam	CL	A–6		100
	30–63	Clay, silty clay	CH	A–7–6		100

significant in engineering

The soils in such mapping units can have different properties, and for this reason it is necessary to refer to other series as table. The symbol < means less than]

Percentage smaller than 3 in. passing sieve—Cont.		Liquid limit	Plasticity index	Reaction	Permeability	Available water capacity	Shrink-swell potential	Corrosivity to uncoated steel	Wetness[1]
No. 40 (0.42 mm)	No. 200 (0.074 mm)								
		Percent		*pH*	*Inches per hour*	*Inches per inch of soil*			
100	95–100	51–70	25–40	6.1–8.4	0.06–0.2	0.18–0.20	High	High	Moderate.
100	80–100	<40	[2]NP–20	6.1–8.4	0.2–0.6	0.18–0.22	Low to moderate.	High.	
90–100	70–95	<23	NP–3	5.1–6.0	0.6–2.0	0.20–0.22	Low	Moderate	Slight.
95–100	75–95	25–35	7–15	4.5–5.5	0.2–0.6	0.20–0.22	Low	High.	
85–100	75–95	30–40	12–19	4.5–5.5	0.06–0.2	0.20–0.22	Low	High.	
95–100	75–100	20–25	2–7	4.5–7.3	0.2–0.6	0.15–0.23	Low	High	Severe.
85–100	65–100	30–40	12–22	5.6–9.0	<0.06	0.08–0.14	Low	High.	
90–100	75–100	28–38	8–18	5.6–9.0	<0.2	0.08–0.14	Low	High.	
70–85	40–55		NP	5.0–6.0	0.6–2.0	0.15–0.18	Low	High	Slight.
90–100	70–95	51–70	25–40	4.5–5.5	<0.06	0.14–0.18	High	High.	
100	95–100	51–75	30–45	6.1–7.8	<0.06	0.17–0.20	Very high	High	Severe.
100	95–100	45–75	20–45	6.1–8.4	<0.2	0.17–0.22	High to very high.	High.	
100	85–100	32–43	11–20	5.6–8.4	0.6–2.0	0.20–0.22	Moderate	Moderate	Not wet.
100	85–100	32–43	11–20	5.6–8.4	0.6–2.0	0.20–0.22	Moderate	Moderate.	
100	85–100	23–37	4–15	6.6–8.4	0.6–2.0	0.15–0.23	Low	Moderate.	
100	85–100	20–30	4–10	5.6–8.4	0.6–2.0	0.21–0.23	Low	Low	Not wet.
100	85–100	32–43	11–20	5.6–8.4	0.6–2.0	0.20–0.22	Moderate	Moderate.	
100	85–100	23–37	4–15	6.6–8.4	0.6–2.0	0.15–0.23	Low	Moderate.	
100	90–100	32–50	12–28	6.1–7.3	0.2–0.6	0.18–0.21	Moderate	Moderate	Not wet.
100	90–100	28–40	11–20	6.1–8.4	0.6–2.0	0.18–0.22	Moderate	Moderate.	
100	70–100	<40	NP–20	6.6–8.4	0.6–2.0	0.15–0.23	Low to moderate.	Moderate.	
100	85–100	<30	NP–10	6.1–7.3	0.6–2.0	0.18–0.23	Low	Moderate	Not wet.
100	90–100	28–40	11–20	6.1–8.4	0.6–2.0	0.18–0.22	Moderate	Moderate.	
100	70–100	<40	NP–20	6.6–8.4	0.6–2.0	0.15–0.23	Low to moderate.	Moderate.	
95–100	90–100	<27	NP–7	4.5–6.0	0.2–0.6	0.20–0.22	Low	High	Moderate.
95–100	85–95	32–40	11–18	4.5–5.5	0.2–0.6	0.19–0.22	Moderate	High.	
95–100	45–95	51–75	25–45	4.5–5.5	0.06–0.2	0.16–0.18	High	High.	
100	90–100	32–40	11–17	5.6–7.3	0.6–2.0	0.20–0.22	Moderate	Moderate	Not wet.
100	90–100	32–40	11–17	5.6–7.8	0.6–2.0	0.20–0.22	Moderate	Moderate.	
100	90–100	23–35	4–15	6.1–8.4	0.6–2.0	0.20–0.23	Low	Low.	
100	90–100	<27	NP–7	5.6–7.3	0.6–2.0	0.21–0.23	Low	Low	Not wet.
100	90–100	32–40	11–17	5.6–7.8	0.6–2.0	0.20–0.22	Moderate	Moderate.	
100	90–100	23–35	4–15	6.1–8.4	0.6–2.0	0.20–0.23	Low	Low.	
95–100	60–90	<27	NP–7	4.5–6.0	0.6–2.0	0.20–0.22	Low	Moderate	Slight.
95–100	85–100	53–65	28–40	4.5–5.5	<0.06	0.14–0.18	Very high	High.	
95–100	85–100	50–75	25–45	4.5–7.3	<0.06	0.14–0.18	Very high	High.	
95–100	65–90	<27	NP–7	4.5–6.0	0.6–2.0	0.20–0.23	Low	High	Severe.
95–100	75–95	26–40	8–21	4.5–6.0	0.06–0.2	0.18–0.22	Low	High.	
85–100	60–85	<27	NP–7	5.1–6.5	0.6–2.0	0.18–0.22	Low	Moderate	Slight.
95–100	85–95	30–40	11–18	4.5–6.0	0.2–0.6	0.18–0.22	Moderate	High.	
90–100	75–95	51–63	25–35	4.5–7.8	<0.06	0.15–0.18	High	High.	

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth from surface	USDA texture	Classification		Percentage smaller than 3 inches passing sieve—	
			Unified	AASHTO	No. 4 (4.7 mm)	No. 10 (2.0 mm)
	Inches					
Latanier: La	0–5	Clay	CH	A–7–6		
	5–23	Clay, silty clay	CH	A–7–6		
	23–60	Stratified silt loam, silty clay loam, very fine sandy loam, silty clay.	ML, CL, CL–ML	A–4, A–6		
*Malbis: MAB	0–10	Fine sandy loam	ML, SM	A–4		100
For the Beauregard part, see the Beauregard series.	10–38	Sandy clay loam	CL	A–4, A–6		100
	38–67	Sandy clay loam	CL	A–6		100
McKamie	0–5	Silt loam	ML, CL–ML	A–4		100
Mapped only with Gore soils.	5–41	Clay	CH, CL	A–7–6		100
	41–65	Silty clay loam, silt loam, very fine sandy loam.	CL–ML, ML	A–6, A–7–6, A–4		100
Messer	0–40	Silt loam	ML, CL–ML	A–4		100
Mapped only with Guyton soils.	40–60	Silty clay loam, clay loam	CL	A–6		100
*Meth: MLC, MME	0–18	Fine sandy loam	SM, ML, CL–ML, SM–SC	A–4		100
For the Malbis part of MLC and the Ruston part of MME, see their respective series.	18–34	Sandy clay, clay loam, clay	CL, ML, MH	A–6, A–7–6, A–7–5		100
	34–70	Sandy loam, sandy clay loam, fine sandy loam.	SM, ML, CL, SC, CL–ML, SM–SC	A–4, A–6		100
Moreland:						
MnA	0–10	Silt loam	ML, CL, CL–ML	A–4, A–6		100
	10–40	Clay, silty clay	CH	A–7–6	100	95–100
	40–64	Clay, silty clay loam, silty clay, silt loam.	CH, CL	A–7–6, A–6	100	95–100
MoA, MoB	0–6	Clay, silty clay	CH	A–7–6		
	6–50	Clay, silty clay	CH	A–7–6	100	95–100
	50–70	Clay, silty clay loam, silty clay, silt loam.	CH, CL	A–7–6, A–6	100	95–100
Perry: Pr	0–34	Clay	CH	A–7–6		
	34–60	Clay	CH	A–7–6	90–100	85–100
Ruston: RUC	0–14	Fine sandy loam, loam	SM, ML	A–4, A–2–4		100
	14–39	Sandy clay loam, loam, clay loam	SC, CL	A–6		100
	39–44	Fine sandy loam, sandy loam	SM, ML, SM–SC, CL–ML	A–4, A–2–4		100
	44–65	Sandy clay loam, loam, clay loam	SC, CL, CL–ML, SM–SC	A–6, A–4		100
Severn: Se, Sn, Sr	0–9	Very fine sandy loam	ML, CL–ML	A–4		100
	9–65	Stratified very fine sandy loam, loamy very fine sand, silt loam, loam, very fine sand.	ML, CL–ML	A–4		100
Shatta: STB	0–6	Silt loam	ML, CL–ML	A–4		100
	6–30	Silty clay loam, loam, silt loam, clay loam.	CL	A–6		100
	30–70	Loam, silt loam, silty clay loam	CL	A–6, A–4		100
Sterlington: SvB	0–9	Silt loam	ML	A–4		100
	9–42	Silt loam, very fine sandy loam	CL–ML, ML	A–4		100
	42–65	Very fine sandy loam, silt loam	ML, CL–ML	A–4		100
Udifluvents: Ud	0–52	Stratified silt loam, silty clay loam, very fine sandy loam, silty clay.	CL, CL–ML	A–6, A–4		
Wrightsville	0–14	Silt loam	ML, CL–ML, CL	A–4		100
Mapped only with Kolin soils.	14–55	Silty clay, clay	CH, CL	A–7–6		100
	55–61	Silty clay, silty clay loam, clay	CL, CH	A–7–6, A–6		100

[1] Ratings are for the entire soil, not for specific horizons.
[2] NP means nonplastic.

significant in engineering—Continued

Percentage smaller than 3 in. passing sieve—Cont.		Liquid limit	Plasticity index	Reaction	Permeability	Available water capacity	Shrink-swell potential	Corrosivity to uncoated steel	Wetness[1]
No. 40 (0.42 mm)	No. 200 (0.074 mm)								
		Percent		*pH*	*Inches per hour*	*Inches per inch of soil*			
100	95–100	51–75	26–45	6.6–8.4	<0.06	0.18–0.20	Very high	High	Moderate.
100	95–100	51–75	26–45	6.6–8.4	<0.06	0.18–0.20	Very high	High.	
100	80–100	<40	NP–17	6.6–8.4	0.06–2.0	0.18–0.22	Low to moderate.	High.	
90–100	40–80	<23	NP–3	5.1–6.0	0.6–2.0	0.10–0.15	Low	Moderate	Slight.
90–100	60–80	25–40	8–18	4.5–5.5	0.2–0.6	0.12–0.17	Low	Moderate.	
90–100	60–80	32–40	11–18	4.5–5.5	0.2–0.6	0.12–0.17	Low	Moderate.	
90–100	51–60	<25	NP–5	5.1–6.5	0.6–2.0	0.14–0.22	Low	Low	Not wet.
95–100	85–95	45–70	22–40	4.5–6.0	<0.06	0.18–0.20	High	High.	
95–100	85–95	25–45	5–22	5.6–8.4	0.2–2.0	0.18–0.22	Moderate to low.	Moderate.	
95–100	80–95	<25	NP–5	4.5–6.0	0.6–2.0	0.16–0.20	Low	High	Slight.
95–100	85–95	32–40	11–18	4.5–6.0	0.06–0.2	0.16–0.20	Low	High.	
80–100	36–75	<25	NP–5	4.5–6.0	0.6–2.0	0.12–0.18	Low	Low	Not wet.
80–100	50–85	41–55	14–22	4.5–6.0	0.2–0.6	0.15–0.18	Low	Moderate.	
80–100	36–75	25–40	5–17	4.5–6.0	0.6–2.0	0.12–0.18	Low	Low.	
95–100	85–100	22–35	3–15	6.6–7.8	0.6–2.0	0.21–0.23	Low	Low	Moderate.
90–100	90–100	51–75	25–45	6.1–8.4	<0.06	0.18–0.20	Very high	High.	
90–100	90–100	35–75	15–45	7.4–8.4	<0.2	0.18–0.21	Moderate to very high.	High.	
100	90–100	51–75	25–45	6.6–7.8	<0.06	0.18–0.20	Very high	High	Moderate.
90–100	90–100	51–75	25–45	6.1–8.4	<0.06	0.18–0.20	Very high	High.	
95–100	90–100	35–75	15–45	7.4–8.4	<0.2	0.18–0.21	Moderate to very high.	High.	
100	95–100	60–80	33–50	4.5–7.4	<0.06	0.18–0.20	Very high	High	Severe.
75–100	70–100	51–80	22–50	6.1–8.4	<0.06	0.18–0.20	Very high	High.	
80–100	30–60		NP	5.1–6.5	0.6–2.0	0.09–0.16	Low	Low	Not wet.
85–100	40–75	30–40	11–18	4.5–6.0	0.6–2.0	0.12–0.17	Low	Moderate.	
85–100	30–75	<27	NP–7	4.5–6.0	0.6–2.0	0.12–0.15	Low	Low.	
85–100	40–75	25–40	5–18	4.5–6.0	0.6–2.0	0.12–0.17	Low	Moderate.	
90–100	50–65	<27	NP–7	7.4–8.4	2.0–6.0	0.15–0.20	Low	Low	Not wet.
85–100	50–90	<27	NP–7	8.4	2.0–6.0	0.15–0.20	Low	Low.	
90–100	55–90	23–27	3–7	5.1–6.5	0.6–2.0	0.18–0.22	Low	Moderate	Slight.
90–100	70–90	30–40	11–18	4.5–6.0	0.2–0.6	0.18–0.22	Low	Moderate.	
90–100	60–90	28–38	8–16	4.5–5.5	0.06–0.2	0.08–0.12	Low	Moderate.	
90–100	60–85	<23	NP–3	5.6–7.3	0.6–2.0	0.18–0.22	Low	Low	Not wet.
90–100	80–90	<28	NP–7	5.6–7.3	0.6–2.0	0.18–0.22	Low	Low.	
90–100	80–90	<28	NP–7	6.1–8.4	0.6–2.0	0.18–0.22	Low	Low.	
100	80–100	25–40	5–18	7.9–8.4	0.2–2.0	0.18–0.22	Low to moderate.	Moderate	Not wet.
95–100	85–100	<31	NP–10	4.5–6.0	0.2–0.6	0.20–0.23	Low	High	Severe.
95–100	90–100	41–65	22–40	4.5–6.0	<0.06	0.17–0.20	High	High.	
95–100	90–100	35–65	16–40	5.1–8.4	<0.2	0.17–0.22	Moderate to high.	High.	

TABLE 6. — *Engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. series as indicated in the first column of this table. "Low strength" and some of the other terms that describe restrictive soil

Soil series and map symbols	Degree and kind of limitations for—			
	Septic tank absorption fields	Sewage lagoons	Sanitary landfills (trench type)	Picnic areas
Armistead: Ar	Severe: wetness; percs slowly.	Severe: wetness	Severe: wetness	Severe: too clayey
Beauregard Mapped only with Malbis soils.	Severe: wetness; percs slowly	Severe: wetness	Severe: wetness	Moderate: wetness
Bonn: Bc	Severe: wetness; percs slowly.	Slight	Severe: wetness	Severe: wetness
*Boswell: BFC For the Falkner part, see the Falkner series.	Severe: percs slowly	Moderate: slope	Severe: too clayey	Slight
Buxin: Bx	Severe: percs slowly; wetness.	Slight	Severe: wetness; too clayey.	Severe: wetness; too clayey.
Caspiana: Ca	Moderate: percs slowly.	Moderate: seepage	Moderate: too clayey	Slight
Cn	Moderate: percs slowly.	Moderate: seepage	Moderate: too clayey	Moderate: too clayey
Coushatta: Cs	Moderate: percs slowly.	Moderate: seepage	Moderate: too clayey	Slight
Ct	Moderate: percs slowly.	Moderate: seepage	Moderate: too clayey	Moderate: too clayey
*Falkner: FBB For the Boswell part, see the Boswell series.	Severe: percs slowly; wetness.	Slight	Severe: wetness; too clayey.	Moderate: wetness
Gallion: Ga	Moderate: percs slowly.	Moderate: seepage	Moderate: too clayey	Slight
Gn	Moderate: percs slowly.	Moderate: seepage	Moderate: too clayey	Moderate: too clayey
*Gore: GSC For the McKamie part, see the McKamie series.	Severe: percs slowly	Moderate: slope	Severe: too clayey	Slight
*Guyton: GU	Severe: floods; wetness; percs slowly.	Severe: floods; wetness	Severe: floods; wetness	Severe: floods; wetness
GY For the Messer part, see the Messer series.	Severe: wetness; percs slowly.	Severe: wetness	Severe: wetness	Severe: wetness
*Kolin: KW For the Wrightsville part, see the Wrightsville series.	Severe: percs slowly; wetness.	Moderate: slope	Severe: wetness; too clayey in lower part of subsoil.	Moderate: wetness
Latanier: La	Severe: percs slowly; wetness.	Slight. Severe if excavated below a depth of 23 inches: seepage.	Severe: wetness	Severe: too clayey
*Malbis: MAB For the Beauregard part, see the Beauregard series.	Moderate: percs slowly.	Moderate: slope; seepage.	Slight	Slight

interpretations, part I

The soils in such mapping units can have different properties and limitations, and for this reason it is necessary to refer to other features are defined in the Glossary. See text for definitions of "slight," "moderate," and other terms used to rate the soils]

Degree and kind of limitations for—Continued				
Playgrounds	Camp areas	Roads and streets	Dwellings without basement	Small commercial buildings
Severe: too clayey	Severe: too clayey	Moderate: low strength; wetness.	Moderate: wetness; low strength.	Moderate: wetness; low strength.
Moderate: wetness	Moderate: wetness	Moderate: low strength	Moderate: wetness; low strength.	Moderate: wetness; low strength.
Severe: wetness; percs slowly.	Severe: wetness; percs slowly.	Severe: wetness	Severe: wetness	Severe: wetness.
Moderate: percs slowly; slope.	Moderate: percs slowly	Severe: shrink-swell; low strength.	Severe: low strength; shrink-swell.	Severe: low strength; shrink-swell.
Severe: wetness; percs slowly; too clayey.	Severe: wetness; percs slowly; too clayey.	Severe: wetness; shrink-swell; low strength.	Severe: wetness; shrink-swell; low strength.	Severe: wetness; shrink-swell; low strength.
Slight	Slight	Moderate: low strength; shrink-swell.	Moderate: shrink-swell; low strength.	Moderate: shrink-swell; low strength.
Moderate: too clayey	Moderate: too clayey	Moderate: low strength; shrink-swell.	Moderate: shrink-swell; low strength.	Moderate: shrink-swell; low strength.
Slight	Slight	Moderate: low strength; shrink-swell.	Moderate: low strength; shrink-swell.	Moderate: low strength; shrink-swell.
Moderate: too clayey	Moderate: too clayey	Moderate: low strength; shrink-swell.	Moderate: low strength; shrink-swell.	Moderate: low strength; shrink-swell.
Moderate: wetness; percs slowly.	Moderate: wetness; percs slowly.	Severe: low strength; shrink-swell; wetness.	Severe: low strength; shrink-swell; wetness.	Severe: low strength; shrink-swell; wetness.
Slight	Slight	Moderate: shrink-swell; low strength.	Moderate: shrink-swell; low strength.	Moderate: shrink-swell; low strength.
Moderate: too clayey	Moderate: too clayey	Moderate: shrink-swell; low strength.	Moderate: shrink-swell; low strength.	Moderate: shrink-swell; low strength.
Moderate: percs slowly; slope.	Moderate: percs slowly	Severe: shrink-swell; low strength.	Severe: shrink-swell; low strength.	Severe: shrink-swell; low strength.
Severe: floods; wetness	Severe: floods; wetness	Severe: floods; wetness	Very severe: floods	Severe: floods; wetness.
Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness.
Moderate: wetness; percs slowly; slope.	Moderate: wetness; percs slowly.	Severe: shrink-swell; low strength in lower part of subsoil.	Moderate: shrink-swell; low strength.	Severe: shrink-swell; low strength in lower part of subsoil.
Severe: too clayey; percs slowly.	Severe: too clayey; percs slowly,	Severe: shrink-swell; low strength.	Severe: shrink-swell; low strength; wetness.	Severe: shrink-swell; wetness; low strength.
Moderate: slope	Slight	Moderate: low strength	Slight	Slight.

TABLE 6. — *Engineering*

Soil series and map symbols	Degree and kind of limitations for—			
	Septic tank absorption fields	Sewage lagoons	Sanitary landfills (trench type)	Picnic areas
McKamie Mapped only with Gore soils.	Severe: perc slowly	Moderate: slope	Severe: too clayey	Slight
Messer Mapped only with Guyton soils.	Severe: perc slowly	Moderate: slope	Moderate: too clayey	Slight
*Meth: MLC, MME For the Malbis part of MLC and the Ruston part of MME, see their respective series.	Severe: perc slowly; slope, where it is more than 15 percent.	Moderate where slopes are 2 to 7 percent. Severe where slopes are more than 7 percent.	Moderate: too clayey	Slight where slopes are 2 to 8 percent. Moderate where slopes are 8 to 15 percent. Severe where slopes are more than 15 percent.
Moreland:				
MnA	Severe: wetness; perc slowly.	Slight	Severe: wetness; too clayey.	Severe: wetness
MoA, MoB	Severe: wetness; perc slowly.	Slight	Severe: wetness; too clayey.	Severe: too clayey; wetness.
Perry: Pr	Severe: perc slowly; wetness.	Slight	Severe: wetness; too clayey.	Severe: wetness; too clayey.
Ruston: RUC	Slight	Moderate: seepage; slope.	Slight	Slight
Severn:				
Se	Slight	Severe: seepage	Severe: seepage	Slight
Sn, Sr	Severe: floods	Severe: floods; seepage	Severe: floods; seepage	Moderate: floods
Shatta: STB	Severe: perc slowly	Moderate: slope	Slight	Slight
Sterlington: SvB	Slight	Moderate: seepage	Slight	Slight
Udifluvents: Ud	Moderate: perc slowly	Moderate: seepage	Moderate: too clayey	Slight
Wrightsville Mapped only with Kolin soils.	Severe: wetness; perc slowly.	Slight	Severe: wetness; too clayey.	Severe: wetness

follows: A-1-a, A-1-b; A-2-4, A-2-5, A-2-6, A-2-7; and A-7-5 and A-7-6. As additional refinement, the engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest. The AASHTO classification for the estimated classification, without group index numbers, is shown in table 5 for all soils mapped in the parish.

Soil properties significant in engineering

Several estimated soil properties significant in engineering are shown in table 5. These estimates are made for typical soil profiles, by layers sufficiently different to have different significance for soil engineering. The estimates are based on field observations made in the course of mapping, on test data for these and similar soils, and on experience with the same kinds of soil in other counties.

Depth to bedrock is the distance from the surface of the soil to the upper surface of the rock layer. The depth to bedrock is more than 60 inches in all soils of the parish.

Depth to a seasonal high water table is the distance from the surface of the soil to the highest level that ground water reaches in the soil in most years. The depth to a seasonal high water table for each soil of the parish is given in the mapping unit descriptions in the section "Descriptions of the Soils."

Following are explanations of some of the columns in table 5.

Soil texture is described in table 5 in the standard terms used by the Department of Agriculture. These

interpretations, part I — Continued

Degree and kind of limitations for—Continued				
Playgrounds	Camp areas	Roads and streets	Dwellings without basement	Small commercial buildings
Moderate: percs slowly; slope.	Moderate: percs slowly	Severe: shrink-swell; low strength.	Severe: shrink-swell; low strength.	Severe: shrink-swell; low strength.
Slight	Slight	Moderate: low strength	Slight	Slight.
Moserate where slopes are 2 to 6 percent. Severe where slopes are more than 6 percent.	Slight where slopes are 2 to 8 percent. Moderate where slopes are 8 to 15 percent. Severe where slopes are more than 15 percent.	Severe: low strength; slope.	Moderate where slopes are 2 to 15 percent: low strength; shrink-swell. Severe where slopes are more than 15 percent.	Moderate where slopes are 2 to 8 percent: low strength; shrink-swell. Severe where slopes are more than 8 percent.
Severe: percs slowly; wetness.	Severe: percs slowly; wetness.	Severe: low strength; shrink-swell.	Severe: wetness; shrink-swell; low strength.	Severe: wetness; shrink-swell; low strength.
Severe: percs slowly; too clayey; wetness.	Severe: wetness; percs slowly; too clayey.	Severe: low strength; shrink-swell; wetness.	Severe: wetness; shrink-swell; low strength.	Severe: wetness; shrink-swell; low strength.
Severe: wetness; too clayey; percs slowly.	Severe: wetness; too clayey; percs slowly.	Severe: wetness; shrink-swell; low strength.	Severe: wetness; shrink-swell; low strength.	Severe: wetness; shrink-swell; low strength.
Moderate: slope	Slight	Moderate: low strength	Slight	Slight where slopes are 0 to 4 percent. Moderate where slopes are 4 to 8 percent.
Slight	Slight	Moderate: low strength	Slight	Slight.
Severe: floods	Moderate: floods	Severe: floods	Very severe: floods	Severe: floods.
Moderate: slope	Slight	Moderate: low strength	Slight	Slight where slopes are 1 to 4 percent. Moderate where slopes are 4 to 8 percent.
Slight	Slight	Moderate: low strength	Slight	Slight.
Slight	Slight	Moderate: low strength	Moderate: low strength	Moderate: low strength.
Severe: wetness; percs slowly.	Severe: wetness; percs slowly.	Severe: wetness; shrink-swell; low strength.	Severe: wetness; shrink-swell; low strength.	Severe: wetness; shrink-swell; low strength.

terms take into account the relative percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the soil contains gravel or other particles coarser than sand, an appropriate modifier is added, as for example, "gravelly loamy sand."

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semisolid to a plastic. If the moisture content is further increased, the material changes from a plastic to a liquid. The plastic limit is the moisture content at which the soil material changes from semisolid to plastic; and the liquid limit, from a plastic to a liquid. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic. Liquid limit and plasticity index are estimated in table 5.

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

Permeability is that quality of a soil that enables it to transmit water or air. It is estimated on the basis of soil characteristics observed in the field, particularly structure and texture. The estimates in table 5 do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

TABLE 6. — *Engineering interpretations, part II*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soil in such mapping units can have different properties and limitations, and for this reason it is necessary to refer to other series as indicated in the first column of this table. "Low strength" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms used to rate the soils]

Soil series and map symbols	Degree and kind of limitations for—			Suitability as a source of—		
	Pond reservoir areas	Embankments, dikes, and levees	Shallow excavations	Topsoil	Highway subgrade (road fill)	Highway subbase
Armistead: Ar	Moderate: seepage in lower part of the subsoil.	Moderate: low strength; compressible.	Severe: wetness	Poor: too clayey	Fair: wetness; low strength.	Poor to unsuited.
Beauregard Mapped only with Malbis soils.	Slight	Slight	Severe: wetness	Poor: thin layer	Fair: low strength	Poor to unsuited.
Bonn: Bc	Slight	Moderate: piping; erodes easily; low strength.	Severe: wetness; cutbanks cave.	Poor: wetness; excess alkali.	Poor: wetness; low strength.	Poor to unsuited.
*Boswell: BFC For the Falkner part, see the Falkner series.	Slight	Moderate: compressible; low strength; shrink-swell.	Severe: too clayey	Fair: thin layer	Poor: low strength; shrink-swell.	Poor to unsuited.
Buxin: Bx	Slight	Moderate: compressible; low strength; shrink-swell.	Severe: wetness; too clayey.	Poor: too clayey; wetness.	Poor: wetness; low strength; shrink-swell.	Unsuited.
Caspiana:						
Ca	Moderate: seepage	Slight	Slight	Good	Fair: low strength; shrink-swell.	Poor to unsuited.
Cn	Moderate: seepage	Slight	Slight	Fair: too clayey	Fair: low strength; shrink-swell.	Poor to unsuited.
Coushatta:						
Cs	Moderate: seepage	Slight	Slight	Good	Fair: low strength; shrink-swell.	Poor to unsuited.
Ct	Moderate: seepage	Slight	Slight	Fair: too clayey	Fair: low strength; shrink-swell.	Poor to unsuited.
*Falkner: FBB For the Boswell part, see the Boswell series.	Slight	Moderate: compressible; shrink-swell; low strength.	Severe: wetness; too clayey.	Poor: thin layer	Poor: low strength; shrink-swell.	Poor to unsuited.
*Gallion:						
Ga	Moderate: seepage	Slight	Slight	Fair: thin layer	Fair: low strength; shrink-swell.	Poor to unsuited.
Gn	Moderate: seepage	Slight	Slight	Fair: too clayey	Fair: low strength; shrink-swell.	Poor to unsuited.
*Gore: GSC For the McKamie part, see the McKamie series.	Slight	Moderate: compressible; low strength; shrink-swell.	Severe: too clayey	Poor: thin layer	Poor: low strength; shrink-swell.	Poor to unsuited.
*Guyton:						
GU	Slight	Moderate: compressible; erodes easily; low strength; piping.	Severe: floods; wetness; cutbanks cave.	Poor: wetness	Poor: wetness	Poor to unsuited.
GY For the Messer part, see the Messer series.	Slight	Moderate: compressible; erodes easily; low strength; piping.	Severe: wetness; cutbanks cave.	Poor: wetness	Poor: wetness	Poor to unsuited.

*Kolin: KW For the Wrightsville part, see the Wrightsville series.	Slight	Moderate: low strength; shrink-swell; compressible.	Severe: wetness; too clayey in lower part of the subsoil.	Poor: thin layer	Poor: low strength; shrink-swell.	Poor to unsuited.
Latanier: La	Slight	Moderate: compressible; low strength; shrink-swell.	Severe: wetness; too clayey.	Poor: too clayey	Poor: low strength; shrink-swell.	Poor to unsuited.
*Malbis: MAB For the Beauregard part see the Beauregard series.	Moderate: seepage	Slight	Moderate: wetness	Fair: thin layer	Fair: low strength	Poor.
McKamie Mapped only with Gore soils.	Slight	Moderate: compressible; shrink-swell; low strength.	Severe: too clayey	Poor: thin layer	Poor: low strength; shrink-swell.	Poor to unsuited.
Messer Mapped only with Guyton soils.	Slight	Slight	Moderate: wetness	Good	Fair: low strength	Poor.
*Meth: MLC, MME For the Malbis part of MLC and the Ruston part of MME, see their respective series.	Moderate: seepage	Moderate: compressible; low strength.	Moderate where slopes are 2 to 15 percent: too clayey. Severe where slopes are more than 15 percent.	Fair where slopes are 2 to 15 percent: thin layer. Poor where slopes are more than 15 percent.	Poor: low strength	Poor to unsuited.
Moreland:						
MnA	Slight	Moderate: compressible; low strength; shrink-swell.	Severe: wetness; too clayey.	Fair: thin layer	Poor: low strength; shrink-swell.	Unsuited.
MoA, MoB	Slight	Moderate: compressible; low strength; shrink-swell.	Severe: wetness; too clayey.	Poor: too clayey	Poor: low strength; shrink-swell.	Poor to unsuited.
Perry: Pr	Slight	Moderate: compressible; low strength; shrink-swell.	Severe: wetness; too clayey.	Poor: too clayey; wetness.	Poor: low strength; shrink-swell; wetness.	Unsuited.
Ruston: RUC	Moderate: seepage	Slight	Slight	Fair: thin layer	Fair: low strength	Fair to unsuited.
Severn:						
Se	Severe: seepage	Moderate: piping; erodes easily; compressible.	Slight	Good	Fair: low strength	Poor.
Sn, Sr	Severe: seepage	Moderate: piping; erodes easily; compressible.	Severe: floods	Good	Fair: low strength	Poor.
Shatta: STB	Slight	Slight	Slight	Poor: thin layer	Fair: low strength	Poor to unsuited.
Sterlington: SvB	Moderate: seepage	Moderate: compressible; erodes easily; piping.	Slight	Good	Fair: low strength	Poor.
Udifluvents: Ud	Moderate: seepage	Moderate: low strength; piping.	Slight	Good	Fair: low strength	Poor to unsuited.
Wrightsville Mapped only with Kolin soils.	Slight	Moderate: low strength; compressible; shrink-swell.	Severe: wetness; too clayey.	Poor: wetness	Poor: low strength; shrink-swell; wetness.	Poor to unsuited.

Available water capacity is the ability of soils to hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of most crop plants.

Shrink-swell potential is the relative change in volume to be expected of soil material with changes in moisture content, that is, the extent to which the soil shrinks as it dries out or swells when it gets wet. Extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils causes much damage to building foundations, roads, and other structures. A high shrink-swell potential indicates a hazard to maintenance of structures built in, on, or with material that has this rating.

Corrosivity, as used in table 5, pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel. The rate of corrosion of uncoated steel is related to such soil properties as drainage, texture, total acidity, and electrical conductivity. Installations of uncoated steel that intersect soil boundaries or soil horizons are more susceptible to corrosion than installations made entirely in one kind of soil or in one soil horizon. A corrosivity rating of *low* means that there is a low probability of soil-induced corrosion damage. A rating of *high* means that there is a high probability of damage, so that protective measures for steel should be used to avoid or minimize damage (*8*).

Wetness hazard ratings are based on estimates of the length of time that free water stays in a soil after the saturation point has been reached. The five classes of soil wetness hazard used in this parish are: not wet, slight, moderate, severe, and very severe. *Not wet* means that free water stays in the soil generally less than 3 days after a saturating rain. *Slight* means that free water stays in the soil more than 3 days but less than 30 days after a saturating rain. *Moderate* means that free water stays in the soil more than 1 month but less than 3 months of the year after a saturating rain. *Severe* means that free water stays in the soil more than 3 months of the year but is at or near the surface less than 4 months. *Very severe* means that free water is at or near the surface more than 4 months of the year.

Engineering interpretations

The estimated interpretations in table 6 are based on the engineering properties of soils shown in table 5, on test data for soils in this survey area and others nearby or adjoining, and on the experience of engineers and soil scientists with the soils of Red River Parish. In table 6, ratings are used to summarize limitation or suitability of the soils for all listed purposes.

Soil limitations are indicated by the ratings slight, moderate, severe, and very severe. *Slight* means that soil properties are generally favorable for the rated use, or in other words, limitations are minor and easily overcome. *Moderate* means that some soil properties are unfavorable but can be overcome or modified by special planning and design. *Severe* means that soil properties are so unfavorable and so difficult to correct or overcome that they require major soil reclamation, special design, or intensive maintenance. For some uses, the rating of severe is divided to obtain ratings of severe and very severe. *Very severe* means that one or more soil properties are so unfavorable for a particular use that overcoming the limitations is most difficult and costly and commonly is not practical for the rated use.

Soil suitability is rated by the terms *good, fair, poor,* and *unsuited,* which have, respectively, meanings approximately parallel to the terms slight, moderate, severe, and very severe.

The soils of Red River Parish are not a probable source of sand or gravel. There are several deposits of commercial gravel and sand along the eastern boundary of the parish, but these deposits are below the soil profile depth evaluated in table 6.

Table 6 is divided into part I and II. Following are explanations of some of the columns in part I.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into natural soil. The soil material from a depth of 18 inches to 6 feet is evaluated. The soil properties considered are those that affect both absorption and effluent and construction and operation of the system. Properties that affect absorption are permeability, depth to the water table or rock, and susceptibility to flooding. Slope is a soil property that affects difficulty of layout and construction and, also, the risk of soil erosion, lateral seepage, and downslope flow of effluent. State and local health ordinances must be considered in the location and installation of septic tanks.

Sewage lagoons are shallow ponds constructed to hold sewage within a depth of 2 to 5 feet long enough for bacteria to decompose the solids. A lagoon has a nearly level floor and sides, or embankments, of compacted soil material. The assumption is made that the embankment is compacted to medium density and the pond is protected from flooding. Properties are considered that affect the pond floor and the embankment. Those that affect the pond floor are permeability, content of organic matter, and slope. Soil properties that affect the ease of excavation and compaction of the embankment material are the engineering properties of the embankment material, as interpreted from the Unified soil classification. State and local health ordinances covering location, installation, and operating procedures must also be considered before constructing sewage lagoons.

Sanitary landfills (trench type) are a method of disposing of refuse in dug trenches. In this method the waste is spread in thin layers, compacted, and covered with soil throughout the disposal period. Landfill areas are subject to heavy vehicular traffic. Some properties that affect suitability of the soil for landfill are ease of excavation, hazard of polluting ground water, and trafficability. The best soils have moderately slow permeability, withstand traffic, and are friable and easy to excavate. Unless otherwise stated, the ratings in table 6 apply only to a depth of about 6 feet; therefore, limitation ratings of *slight* or *moderate* may not be valid if trenches are to be much deeper than that. For

some soils, reliable predictions can be made to a depth of 10 or 15 feet, but regardless of that, every site should be investigated before it is selected. State and local health ordinances must be considered in the location of sanitary landfills, as well as ordinances covering installation and operating procedures.

Picnic areas are attractive natural or landscaped tracts used mainly for preparing meals and eating outdoors. These areas are subject to heavy foot traffic. Most of the vehicular traffic, however, is confined to access roads. The best soils are firm when wet but not dusty when dry, are free of flooding during the season of use, and do not have slopes that greatly increase cost of leveling sites or of building access roads.

Playgrounds are areas used intensively for baseball, football, badminton, and similar organized games. Soils suitable for this use need to withstand intensive foot traffic. The best soils have a nearly level surface, good drainage, freedom from flooding during periods of heavy use, and a surface that is firm after rain but not dusty when dry.

Camp areas are used intensively for tents and small camp trailers and the accompanying activities of outdoor living. Little preparation of the site is required, other than shaping and leveling for tent and parking areas. Camp areas are subject to heavy foot traffic and limited vehicular traffic. The best soils have mild slopes, good drainage, freedom from flooding during periods of heavy use, and a surface that is firm after rain but not dusty when dry.

Roads and streets, as rated in table 6, have an all-weather surface expected to carry automobile traffic all year. They have a subgrade of underlying soil material; a base consisting of gravel, crushed rock, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. These roads are graded to shed water and have ordinary provisions for drainage. They are built mainly from soil at hand, and most cuts and fills are less than 6 feet deep.

Soil properties that most affect design and construction of roads and streets are load-supporting capacity and stability of the subgrade and, also, the workability and quality of cut and fill material available. The AASHTO and Unified classifications of the soil material and the shrink-swell potential indicate the traffic-supporting capacity. Wetness and flooding affect stability of the material. Slope and wetness affect ease of excavation and the amount of cut and fill needed to reach an even grade.

Dwellings without basements and small commercial buildings, as rated in table 6, are no more than three stories high and are supported by foundation footings placed in undisturbed soil. The features that affect the rating of a soil for dwellings are those that relate to its capacity to support load and resist settlement under load and those that relate to ease of excavation. Soil properties that affect capacity to support load are wetness, susceptibility to flooding, density, plasticity, texture, and shrink-swell potential. Those that affect excavation are wetness and slope.

Following are explanations of some of the columns in table 6, part II.

Pond reservoir areas hold water behind a dam or embankment. Soils suitable for pond reservoir areas have low seepage, which is related to their permeability.

Embankments, dikes, and levees require soil material that is resistant to seepage and piping and is of favorable stability, shrink-swell potential, shear strength, and compactibility.

Shallow excavations are those that require digging or trenching to a depth of less than 6 feet; for example, excavations for pipelines, sewerlines, phone and power transmission lines, basements, open ditches, and cemeteries. Desirable soil properties are good workability, moderate resistance to sloughing, gentle slopes, and freedom from flooding or a high water table.

Topsoil is used for topdressing an area where vegetation is to be established and maintained. Suitability is affected mainly by ease of working and spreading the soil material, as for preparing a seedbed; natural fertility of the material, or the response of plants when fertilizer is applied; and absence of substances toxic to plants. Texture of soil material is a characteristic that affects suitability. Also considered in the ratings is damage that will result at the area from which topsoil is taken.

Highway subgrade (road fill) is soil material used in embankments for roads. The suitability ratings reflect the predicted performance of soil after it has been placed in an embankment that has been properly compacted and provided with adequate drainage and the relative ease of excavating the material at borrow areas.

Highway subbase is soil material used under rigid or flexible pavement roads. It makes up the lower part of the base coarse material and is placed directly on the subgrade. The best soils are those that have no or a very low plasticity index. Soils that have a plasticity index of more than 15 are unsuitable.

Formation and Classification of the Soils

This section describes the factors and processes of soil formation and tells how they have affected the soils of Red River Parish. It also explains the current system of soil classification and classifies the soils of the parish according to the system.

Factors of Soil Formation

Soil forms as a result of the interaction of five major factors: parent material; climate; living organisms in and on the soil; relief, or lay of the land; and time. The interrelations of these factors are so complex that few generalizations can be made about one factor unless conditions are specified for the other four. The degree to which each of these factors influences soil formation varies from place to place.

Climate and vegetation are the active forces in soil formation. They act on the parent material and slowly change it into a natural body that has genetically related horizons. Relief modifies the effects of climate

and living organisms mainly by its influence on runoff, erosion, and temperature. Parent material also affects the kind of profile that can be formed. Finally, time is essential for the changing of parent material into a soil profile.

Parent material

Parent material is the mass from which soils form. The nature of the parent material influences the chemical and mineralogical composition of the soils. It also influences the degree of leaching, the reaction, texture, permeability, drainage, and color of the surface layer and subsoil. Textural differences in parent material are accompanied by differences in chemical and mineralogical composition. In general, soils that form in silty and sandy parent material have a lower capacity to hold nutrients than those that form in clay.

The soils in Red River Parish formed mainly in water-deposited material—alluvial and marine sediments. Age of deposits range from Tertiary to Pleistocene to Recent.

The Recent deposits on the natural levees on the Red River alluvial plain have a wide range in texture because of the variable velocity of the flood waters. When the river overflows its banks and spreads out, the coarser sand particles are deposited nearest the river. As the floodwaters continue to spread and move more slowly, the finer particles are deposited. Most of the clay and fine silt particles settle out of the very slowly moving or standing water in the low depressions and backswamp where floodwaters have a uniform velocity and load. Moreland soils formed in these thick, clayey sediments in low depressions and near the toe of the natural levee. In contrast, Severn soils, which are loamy, formed in sediment deposited nearest the river. Although Severn soils formed in deposits of very fine sand and silt, they are generally more productive than the clayey soils, such as Moreland soils, because their air and water relationships are more favorable for plant growth.

The Pleistocene and Tertiary deposits range from loamy to clayey. Although this material was deposited many thousands of years ago, the soils that formed in it were also loamy and clayey. They are largely leached of carbonates and soluble salts. Loamy Ruston, Shatta, and Malbis soils formed in loamy parent material. Similarly, clayey Meth soils formed in clayey deposits.

Climate

Red River Parish has the humid, subtropical climate that is characteristic of areas near the Gulf of Mexico. The climate is uniform within the survey area. The rainfall is relatively high, the humidity is high except in fall, and the temperatures are fairly high to moderate. More detailed information about the climate is in the section "General Nature of the Parish." As a result of the warm, moist climate, some of the soils have developed rapidly and are strongly weathered and acid. Ruston soils, for example, are acid, highly leached soils compared to Severn soils, which are calcareous. The clay materials in Ruston soils have moved downward from the surface layer and have accumulated in a well-developed Bt horizon. Factors other than climate also influence the degree of leaching and cause local differences in soils. Severn soils and other soils of the recent flood plain are weakly developed because they have been exposed to the influence of the climate for only a comparatively short time.

Differences between the soils of Red River Parish and the soils of arid or tropical regions are often the result of climate. Because the climate is fairly uniform throughout the parish, climate has had little effect on soil differences within the parish. Soil differences within the parish are attributed mainly to the other soil-forming factors.

Living organisms

Living organisms, including plants, bacteria, fungi, and animals, are important in the formation of soils. Among the chemical and mechanical changes they cause are gains in the content of organic matter and nitrogen, gains or losses in content of plant nutrients, and changes in structure and porosity. As the organisms grow, they break up and rearrange the soil particles. Plants transfer nutrients from the subsoil to the surface layer and, when they die, supply humus to the soils. Bacteria decomposes organic matter and helps improve the physical condition of the soil. Animals, such as crawfish and earthworms, also influence soil formation by mixing the soil. When animals die, they also form humus, which is a source of nutrients.

The dominant native vegetation on the alluvial plain in Red River Parish was mixed hardwoods. Soils that formed under this kind of vegetation, such as Severn and Coushatta soils, are relatively low in organic-matter content. The Caspiana soils on the Red River alluvial plain formed under a luxuriant growth of grasses and, consequently, have a moderately thick, dark colored surface layer that is fairly high in organic matter content.

The native vegetation on the uplands consisted mostly of pine trees. The amount of organic matter that accumulated in the soils of this area generally is low to moderately low.

Relief

Relief and the drainage patterns caused by the relief have had an important influence on the formation of the soils.

The level Moreland soils are on low positions and receive runoff from the higher Coushatta and Severn soils; consequently, they are more poorly drained and have a higher water table than the higher lying soils.

Shatta soils are mainly nearly level to very gently sloping and have slow runoff. The movement of water through these soils is restricted by a fragipan. Frequent wetting and drying has produced gray mottles in the Bt horizon.

Guyton and Wrightsville soils are level to nearly level and occur on broad flats and in drainageways. Runoff is slow to very slow, and the water table is near the surface for long periods. Because excessive wetness has caused reduction of the iron compounds, these soils are gray.

Ruston soils are gently sloping to sloping and have medium runoff. Water moves through these soils at a moderate rate, and they are not wet for extended periods. The free movement of air and water in the soil has caused oxidation of the iron compounds and turned the soils red.

Time

The length of time required for soil formation depends on the combined influence of the five soil-forming factors. The differences in the length of time that parent materials have been exposed to the active forces of soil formation are commonly reflected in the characteristics of the soil profile.

The youngest soils in the parish are on the alluvial plain. The oldest soils formed on uplands.

The soils that formed in recent deposits on the Red River alluvial plain have only faint profile development. They retain many of the characteristics of their alkaline parent material. The faint development is shown in a darkening of the A horizon by organic matter and in a weakly developed B horizon. Severn soils have even less profile development.

In contrast, the Ruston and Shatta soils on uplands formed in older parent material and have a distinct profile development. They have been leached of most carbonates and other soluble salts, and they are acid. Fine clays have moved downward from the A horizon and accumulated in a well-developed Bt horizon.

Classification of the Soils

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

The narrow categories of classification, such as those used in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965.[3] Because this system is under continual study, readers interested in developments of the current system should search the latest literature available.

The current system of classification has six categories. Beginning with the broadest, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that soils of similar genesis, or mode of origin, are grouped. In table 7, the soil series of Red River Parish are placed in four categories of the current system. Classes of the current system are briefly defined in the following paragraphs.

ORDER.—Ten soil orders are recognized. The properties used to differentiate among soil orders are those that tend to give broad climatic groupings of soils. The two exceptions to this are the Entisols and Histosols, which occur in many different climates. Each order is named with a word of three or four syllables ending in *sol* (Ent-i-sol).

SUBORDER.—Each order is divided into suborders, based mainly on those soil characteristics that seem to produce classes that have the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of waterlogging, or soil differences that result from the climate or vegetation. The names of suborders have two syllables. The last syllable indicates the order. An example is *Aquent (Aqu,* meaning water or wet, and *ent,* from Entisol).

GREAT GROUP.—Soil suborders are separated into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus has accumulated; those that have pans that interfere with growth of roots, movement of water, or both; and thick, dark-colored surface horizons. The features used are the self-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), dark-red and dark-brown colors associated with basic rocks, and the like. The names of great groups have three or four syllables and are made by adding a prefix to the name of the suborder. An example is *Haplaquents (Hapl,* meaning simple horizons; *aqu,* for wetness or water; and *ent,* from Entisols). One soil in Red River Parish, Udifluvents, is classified only at the great group level.

SUBGROUP.—Great groups are divided into subgroups, one that represents the central (typic) segment of the group, and others, called intergrades, that have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside the range of any great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives in front of the name of the great group. An example is *Typic Haplaquents* (a typical Haplaquent).

FAMILY.—Soil families are established within a subgroup mainly on the basis of properties important to the growth of plants or on the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. A family name consists of a series of adjectives preceding the subgroup name. The adjectives are the class names

[3] Unpublished working document used in the Soil Conservation service: "Soil Taxonomy of the National Cooperative Soil Survey." (Chapters 3, 8, 10, 12, 13, 16, and 18, illus. 1970.)
Copy available in the SCS State office.

TABLE 7. — *Classification of soil series*

Series	Family	Subgroup	Order
Armistead	Fine-silty, mixed, thermic	Aquic Argiudolls	Mollisols.
Beauregard	Fine-silty, siliceous, thermic	Plinthaquic Paleudults	Ultisols.
Bonn	Fine-silty, mixed, thermic	Glossic Natraqualfs	Alfisols.
Boswell	Fine, mixed, thermic	Vertic Paleudalfs	Alfisols.
Buxin[1]	Fine, mixed, thermic	Vertic Hapludolls	Mollisols.
Caspiana	Fine-silty, mixed, thermic	Typic Argiudolls	Mollisols.
Coushatta	Fine-silty, mixed, thermic	Fluventic Eutrochrepts	Inceptisols.
Falkner[2]	Fine-silty, siliceous, thermic	Aquic Paleudalfs	Alfisols.
Gallion	Fine-silty, mixed, thermic	Typic Hapludalfs	Alfisols.
Gore	Fine, mixed, thermic	Vertic Paleudalfs	Alfisols.
Guyton[3]	Fine-silty, siliceous, thermic	Typic Glossaqualfs	Alfisols.
Kolin	Fine-silty, siliceous, thermic	Glossaquic Paleudalfs	Alfisols.
Latanier	Clayey over loamy, mixed, thermic	Vertic Hapludolls	Mollisols.
Malbis	Fine-loamy, siliceous, thermic	Plinthic Paledults	Ultisols.
McKamie	Fine, mixed, thermic	Vertic Hapludalfs	Alfisols.
Messer	Coarse-silty, siliceous, thermic	Haplic Glossudalfs	Alfisols.
Meth[4]	Fine, kaolinitic, thermic	Typic Paleudalfs	Alfisols.
Moreland	Fine, mixed, thermic	Vertic Hapludolls	Mollisols.
Perry	Very fine, montmorillonitic, nonacid, thermic	Vertic Haplaquepts	Inceptisols.
Ruston	Fine-loamy, siliceous, thermic	Typic Paleudults	Ultisols.
Severn	Coarse-silty, mixed, (calcareous), thermic	Typic Udifluvents	Entisols.
Shatta	Fine-silty, siliceous, thermic	Typic Fragiudults	Ultisols.
Sterlington	Coarse-silty, mixed, thermic	Typic Hapludalfs	Alfisols.
Udifluvents[5]		Udifluvents	Entisols.
Wrightsville[6]	Fine, mixed, thermic	Typic Glossaqualfs	Alfisols.

[1] The Buxin soils in Red River Parish are taxadjuncts to the Buxin series because they have a few calcium carbonate concretions which is outside the range defined for the series.

[2] The Falkner soils in Red River Parish are taxadjuncts to the Falkner series because they have slightly less silt and slightly more very fine sand than is defined in the range for the series.

[3] The Guyton soils in the Guyton-Messer association are taxadjuncts to the Guyton series because they have slightly less clay than is defined in the range for the series.

[4] The Meth soils in the Meth-Ruston association, steep, are taxadjuncts to the Meth series because their base saturation is lower than is defined in the range for the series.

[5] Classified only to the great group.

[6] The Wrightsville soils in Red River Parish are taxadjuncts to the Wrightsville series because they have a slightly higher content of montmorillonite in the clay fraction than is defined in the range for the series.

for texture, mineralogy, and so on, that are used as family differentiae (see table 7). An example is the coarse-loamy, siliceous, acid, thermic family of Typic Haplaquents.

SERIES.—The series has the narrowest range of characteristics of the categories in the classification system. It is explained in the section "How This Survey Was Made."

Laboratory Data

The physical and chemical properties of representative soils of five series are shown in table 8. Samples of Caspiana, Coushatta, Gallion, Shatta, and Severn soils were analyzed by the Louisiana Agricultural Experiment Station of Louisiana State University. Table 9 shows data obtained by clay and silt mineral analysis. These estimates were made by A. G. Caldwell, professor of agronomy, Louisiana State University. Detailed descriptions of all soils analyzed are in the section "Descriptions of the Soils."

Methods of Sampling and Analysis

Samples were taken from pits at carefully selected locations. For sampling methods used, see Soil Survey Investigations Report No. 1 (*7*). The results are reported in tables 8 and 9.

The Louisiana Agricultural Experiment Station determined the textural data on the oven-dry soil basis; sand by dry sieving; silt and clay by the hydrometer method. The percent of water retained was determined on sieved samples using a pressure plate apparatus. The 1/3-bar and 15-bar values are percentages of the oven-dry soil. Bulk densities and coefficient of linear extensibility (COLE) were based on undisturbed clod samples. Mineralogical data on the silt, coarse clay, and fine clay were estimated based on X-ray diffraction (*3*).

Cation exchange capacity is expressed in milliequivalents per 100 grams of soil, as determined with ammonium acetate, pH 7.0. Base saturation, as a percent, is based on the above-mentioned cation exchange capacities. Organic carbon was determined by the Walkley-Black method of wet digestion with sulfuric acid and dichromate. Nitrogen content was determined by the macro-Kjeldahl method. Available phosphorus (P2 method), shown in pounds per acre, was extracted with the strong acid, Bray extractant. The pH was determined in a 1:1 ratio with distilled water and in a 1:2 ratio with a 0.01 molar $CaCl_2$ solution.

Interpretation of Laboratory Data[4]

Four soils reported in table 8 are representative of

[4] By A. G. CALDWELL, professor of agronomy, Louisiana Agricultural Experiment Station, Baton Rouge.

important soil series on the alluvial plain of the Red River, and one, the Shatta soil, is on uplands.

Caspiana silt loam is more than 1 percent organic carbon in the upper 11 inches and readily qualifies as a Mollisol. Base saturation is 75 percent in the Ap horizon and increases with increasing depth. There is an increase in clay content from the A horizon to the Bt horizon. This soil is medium in content of available phosphorus, low in extractable potassium, high in extractable magnesium, and moderate in extractable calcium. It has a very high capacity to store available water. Montmorillonite is abundant in the fine-clay fraction; mica-illite and kaolinite are moderately abundant in the coarse clay and silt fractions. The clay fraction also contains vermiculite and mixed-layer minerals, and the silt fraction contains the expected quartz and feldspars. The family mineralogy class is mixed. The sample showed little change in volume when dried, indicating that it has the dimensional stability expected from this mineralogy and texture.

Coushatta silt loam is similar to Caspiana silt loam in many respects. The Coushatta soil has high available phosphorus and magnesium but low potassium and calcium. The water storage capacity and dimensional stability are very good. Mixed mineralogy is confirmed for the family classification.

Gallion silt loam is somewhat siltier than Caspiana silt loam and Coushatta silt loam. The B21t horizon has enough clay to qualify as an argillic horizon. Base saturation is moderately high and increases with increasing depth. Low levels of available phosphorus and extractable potassium and calcium indicate good plant response to lime and fertilizer. The data suggest good dimensional stability and water storage capacity. The mineralogy is very similar to that of Caspiana silt loam and Coushatta silt loam and is typical of loamy Red River alluvial soils.

Shatta silt loam is on a terrace of Pleistocene age. Clay distribution in this soil indicates that a very pronounced argillic horizon has developed. The soil is very strongly acid throughout. The low base saturation confirms its classification as Ultisol. This is reflected in very low levels of available phosphorus and extractable potassium, calcium, and magnesium. Plants grown on this soil should respond to lime and a complete fertilizer. The moderate moisture-holding capacity of this soil is complicated by the presence of a fragipan at a depth of about 30 inches. Although quite a mixture of minerals is present, there is a very high proportion of quartz in the silt and coarse clay fractions. In sum, the data confirm the placement of this soil in the siliceous family.

Severn very fine sandy loam has the variability in texture with depth that is expected in an Entisol. This young soil is calcareous throughout and high in available phosphorus and extractable potassium, calcium, and magnesium, especially in the A horizon. Little response to fertilizers, other than nitrogen, is likely. The mineralogy of the size fractions is mixed and quite similar to that of Caspiana silt loam, Coushatta silt loam, and Gallion silt loam.

General Nature of the Parish

Red River Parish was formed from the parishes of Bienville, DeSoto, and Natchitoches on March 2, 1871, by a legislative act. It was named for the Red River, which flows across the length of the parish. At that time the two largest trading posts were Lake End and East Point on the Red River. The original settlers were the Coushatta Indians. Coushatta was selected as the parish seat when the parish was formed.

Red River Parish has always been a farming area. Large farms and plantations are on the Red River alluvial plain, and small farms are on the uplands. Cotton is the most important crop, and it is concentrated on the Red River alluvial plain. The small upland farms in recent years have been converted from row crops to woodland and pasture. Farm products, in decreasing order of economic importance, are cotton, beef cattle, poultry, hay, timber, and soybeans.

Red River Parish is served by two main railroads, two Federal highways, and numerous paved State highways and parish roads.

The population of the parish was slightly less than 16,000 in 1940 and decreased to less than 10,000 by 1970. It is largely rural. Coushatta is the only incorporated town and has a population of less than 1,500. Hall Summit and Martin are incorporated villages.

Physiography and Surface Geology

The three main physiographic surfaces in Red River Parish are the alluvial plain of the Red River, the terrace uplands, and the Tertiary uplands.

The alluvial plain of the Red River occupies the western quarter of the parish (*5*). It averages between 7 and 8 miles wide. Its greatest width is near the Caddo-Red River Parish line, where it is approximately 10 miles wide.

The alluvial plain is divisible into two main parts, the natural levees and broad, level areas. The natural levees are low, ridgelike deposits immediately adjacent to the stream channels. They are formed by deposition from floodwaters—when floodwaters leave the channels they lose velocity and the coarser and heavier materials are deposited.

The most recent and highest natural levees of the Red River alluvial plain are those that flank the present channel. The levees reach a maximum height of no more than 15 feet above the broad, level areas; their average height is 10 feet. The slope from the crest of these natural levees to the broad, level areas is between 3 and 4 feet per mile.

Although no longer active because of the presence of manmade levees and the removal of the logjams known as the "Great Raft," the channels of at least seven former active crevasses or breaks in the natural levee, are known. They had a strong influence on the pattern of drainage and deposition in the parish because the water diverted from the Red River reached the broad, level areas through Jones Bayou, Bayou LaChute, Grand Bayou, Boggy Bayou, Bayou Winsey,

TABLE 8. — *Physical and*

[Analyzed by the soils laboratory of the Louisiana Agricultural

Soil and sample number	Horizon	Depth from surface	Particle-size distribution			Water content		Bulk density		COLE
			Sand (2–0.05 mm)	Silt (0.05–0.002 mm)	Clay (smaller than 0.002 mm)	1/3-bar	15-bar	Oven-dried	At 1/3-bar pressure	
		Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Grams per cubic centimeter*	*Grams per cubic centimeter*	*Ratio*
Caspiana silt loam (S65La–41–6).	Ap	0–6	31	51	18	17.0	7.1	1.62	1.60	0.004
	A12	6–11	24	53	23	21.2	8.9	1.60	1.56	.013
	B1	11–15	19	59	22	25.0	9.5	1.66	1.65	.002
	B21t	15–21	20	53	27	27.1	11.1	1.64	1.63	.002
	B22t	21–27	36	42	22	20.7	8.5	1.78	1.70	.015
	B31	27–38	34	50	16	17.9	6.8	1.55	1.55	.000
	B32	38–52	27	58	15	17.9	6.1	1.50	1.50	.000
	C1	52–60	21	63	16	21.8	7.8	1.51	1.50	.003
Coushatta silt loam (S65La–41–5).	Ap	0–8	43	43	14	13.8	5.1	1.64	1.63	.002
	B21	8–15	44	36	20	17.5	7.3	1.63	1.60	.006
	B22	15–27	8	61	31	28.5	12.2	1.68	1.56	.025
	IIC1	27–38	9	70	21	26.2	8.5	1.53	1.48	.011
	IIIC2	38–44	15	73	12	16.2	5.6	1.46	1.46	.000
	IVC3	44–61	5	71	24	32.6	10.4	1.50	1.47	.007
Gallion silt loam (S65La–41–2).	Ap	0–10	11	73	16	21.0	6.4	1.51	1.49	.004
	B21t	10–22	7	69	24	27.3	9.7	1.65	1.64	.002
	B22	22–33	11	70	19	26.2	8.6	1.60	1.58	.004
	B3	33–44	29	56	15	17.1	6.6	1.58	1.56	.004
	C1	44–49	42	46	12	12.6	5.3	1.49	1.48	.002
	C2	49–60	21	62	17	19.1	7.7	1.56	1.54	.004
Severn very fine sandy loam (S65La–41–4).	A1	0–9	55	37	8	8.0	3.9	1.48	1.50	.000
	C1	9–18	64	30	6	6.0	3.1	1.48	1.48	.000
	C2	18–26	49	41	10	9.3	3.9	1.54	1.54	.000
	C3	26–42	25	61	14	16.0	5.7	1.46	1.44	.005
	C4	42–52	33	56	11	13.4	4.9	1.44	1.42	.....
	C5	52–59	78	18	4	4.4	3.3	.....	.....	.....
	C6	59–65	98	0	2	1.9	1.7	.....	.....	.....
Shatta silt loam (S70La–41–5).	Ap	0–6	45	50	5	11.0	1.7	1.54	1.52	.004
	B1	6–11	38	52	10	15.4	3.2	1.56	1.52	.009
	B21t	11–22	30	42	28	21.1	10.0	1.63	1.54	.019
	B22t	22–30	33	45	22	19.7	8.1	1.71	1.64	.014
	Bx1	30–42	37	44	19	17.4	6.9	1.74	1.68	.012
	Bx2	42–70	37	41	22	17.5	7.7	1.74	1.65	.018

Wright Bayou, and Bayou Lumbro. Each, at its inception, was a crevasse formed at or near the head of the raft. The channels created during the active lives of the crevasses remained more or less open and today assist in draining the Red River alluvial plain. Crevasse deposits are easily recognized by their irregular surface and by the extension of the natural levee into the broad, level areas.

Farther from the river, lesser alluviation resulted in the broad, level areas of clayey deposits. Drainage is away from the Red River manmade levees in a southwesterly direction and is returned to the Red River through Bayou Pierre and its tributaries.

There has been no deposition by flooding since the completion of the manmade levees along the Red River, except in a few small areas where the levees were broken during high river stages.

The terrace uplands are alluvial surfaces and are parts of the regional Prairie, Montgomery, and Bentley Terraces, which were deposited as a Red River and Black Lake Bayou fluvatile plain during the interglacial stages of the Pleistocene Epoch. Subsequently, the terraces were tilted gently gulfward and incised by erosion during the fall in sea level associated with the last preceding glacial stages. The Bentley, being the oldest, is the most dissected of the terraces. Little of its original surface remains, although the dissected surface extends continuously throughout the parish and is terminated by the Black Lake Bayou and Grand Bayou drainageways. The Montgomery surface is well dissected and retains some of its original flatness only in its widest part, between Coushatta and the Natchitoches Parish boundary. The Prairie Terrace is the least dissected and retains most of its original flatness.

chemical test data

Experiment Station. Dashes indicate that analyses were not made]

Extractable bases				Extractable acidity	Cation exchange capacity (NH_4OAC)	Base saturation (NH_4OAC)	Organic carbon	Nitrogen	Available phosphorus	Reaction	
Calcium	Magnesium	Sodium	Potassium							Soil-water ratio of 1:1	Soil-solution ratio of 1:2 (0.01 molar $CaCl_2$ solution)
Meq per 100 grams	*Meq per 100 grams*	*Meq per 100 grams*	*Meq per 100 grams*	*Meq per 100 grams*	*Meq per 100 grams*	*Percent*	*Percent*	*Percent*	*Pounds per acre*	*pH*	*pH*
5.8	3.2	0.2	0.3	3.2	12.6	75	1.00	0.087	107	6.2	6.0
7.5	3.6	.2	.3	2.9	15.1	77	1.04	.082	82	6.4	6.2
6.0	3.8	.3	.2	3.0	14.3	72	0.67	.055	37	6.5	6.2
6.2	5.0	.3	.3	2.9	15.9	74	.30	.044	51	6.5	6.3
5.2	4.5	.2	.2	2.3	12.5	81	.33	.035	68	6.6	6.2
4.0	4.3	.2	.2	1.9	10.5	83	.29	.026	96	6.6	6.3
.....	3.7	.2	.2	.....	9.6	.....	.26	.023	144	7.8	7.3
.....	3.6	.2	.2	.....	11.1	.....	.22	.025	130	7.9	7.5
4.6	2.6	.1	.4	2.2	8.2	94	.82	.066	196	6.2	6.0
5.4	3.6	.2	.2	1.8	11.8	80	.64	.051	130	6.6	6.3
10.8	7.1	.2	.4	1.9	19.1	97	.56	.048	182	7.5	7.1
.....	4.7	.2	.2	.....	13.2	.....	.34	.035	154	7.9	7.4
.....	3.1	.2	.2	.....	8.8	.....	.26	.027	130	8.0	7.5
.....	4.5	.2	.3	.....	15.0	.....	.34	.038	135	7.9	7.5
4.4	2.9	.2	.2	4.4	11.0	70	1.15	.089	58	5.5	5.3
6.2	5.4	.2	.3	2.7	13.6	89	0.43	.038	93	6.5	6.3
5.9	5.4	.3	.2	1.8	12.3	96	.38	.030	182	7.2	6.9
5.4	4.8	.3	.2	.9	9.8	.....	.34	.024	233	7.6	7.4
.....	3.6	.2	.1	.....	7.9	.....	.17	.021	191	7.9	7.6
.....	4.4	.3	.2	.....	10.8	.....	.18	.023	105	8.1	7.8
.....	1.0	.1	.4	1.3	6.0	.....	.50	.042	140	7.5	7.0
.....	.5	.1	.1	.....	4.7	.....	.20	.016	107	8.3	7.3
.....	.8	.1	.2	.....	6.6	.....	.12	.011	128	8.0	7.3
.....	1.2	.1	.3	.....	9.2	.....	.72	.046	130	7.7	7.3
.....	1.1	.1	.2	.....	8.6	.....	.69	.039	114	8.0	7.4
.....	.4	.1	.1	.....	4.4	.....	.23	.020	89	8.2	7.3
.....	.4	.1	.1	.....	1.9	.....	.44	.042	47	8.4	7.0
.7	.2	.2	.2	4.8	2.7	48	1.10	.....	3	4.8	4.4
.8	.3	.2	.2	2.7	2.8	54	0.31	.....	8	5.0	4.5
.5	1.1	.1	.2	8.3	8.2	23	.34	.....	18	4.9	4.6
.2	1.1	.1	.2	6.9	6.6	24	.15	.....	8	4.9	4.6
.2	.9	.1	.1	6.2	5.5	24	.09	.....	8	4.9	4.6
.1	.6	.1	.1	7.4	6.4	14	.07	.....	10	4.8	4.6

It is associated with the last glacial stage. The Red River and Black Lake Bayou and other valleys were entrenched at that time, forming escarpments that bounded the upland.

The Tertiary uplands consist mostly of outcrop belts in Red River Parish that were later covered by Pleistocene deposits. Truncations and subsequent uplift by orographic movement and entrenching of valleys associated with glacial stages of the Pleistocene Epoch result in surface exposures of the Hall Summit Formation and its subdivisions and of the Marthaville Formation.

The soil map that accompanies this survey demonstrates the close correlation of the present soils with the physiographic and geologic features in Red River Parish.

Farming

According to the U.S. Census of Agriculture, the number of farms in Red River Parish decreased from 552 in 1964 to 428 in 1969. Land in farms decreased from 148,315 acres in 1964 to 131,513 acres in 1969. The average size of farms increased from about 268 acres in 1964 to about 307 acres in 1969. In 1964 the farm industry in Red River Parish employed about 93 percent of the working population.

In 1969, about 22,800 acres were planted to cultivated crops. Cotton was grown in about 29 percent of the cropland, or 6,337 acres. Practically all of the cotton in the parish is grown on the natural levees of the Red River alluvial plain, and most of the acreage is west of the river. The only other cultivated crop of

TABLE 9. — *Mineralogy data*[1]

Soil and sample number	Horizon	Depth from surface	Silt fraction (2–50 microns)	Clay fraction	
				0.2–2.0 microns	Less than 0.2 microns
		Inches			
Caspiana silt loam (S65La–41–6).	Ap	0–6	Q1,F2,K2,I2,V3	I2,K2,V2	M1,I3,K3,V+I3,M+I3,M+C3
	B21t	15–21	Q1,F2,I3,K3,V3	I2,K2,V3,M3	M1,I3,K3,M+I3,M+C3
	C1	52–60	Q2,F2,K3,I3,V3	I2,K2,V3,M3	M1,I3,K3,V+I3,M+I3,M+C3
Coushatta silt loam (S65La–41–5).	Ap	0–8	Q1,F2,K3,I3	K2,I2,V3	M1,I3,K3,V+I3,M+I3,M+C3
	B22	15–27	Q1,F2,K3,I3,V3	I2,K2,V3,M3	M1,I3,K3,V+I3,M+I3,M+C3
	IVC3	44–61	Q1,F2,K3,I3,V3	K2,I2,M3,F3	M1,I3,K3,V+I3,M+I3,M+C3
Gallion silt loam (S65La–41–2).	Ap1	0–6	Q2,F2,I3,K3,V3	I2,K3,V3,M3	M1,I3,V+I3
	B21t	10–22	Q2,F2,I3,K3,V3	V2,I2,K2	M1,I3,K3,V+I3,M+I3
	C1	44–49	Q2,F2,I3,K3,V3	V2,I2,K2	M1,I3,M+C3,M+I3,I+C3
Severn very fine sandy loam (S65La–41–4).	A11	0–6	Q1,F3,K3,I3	K2,I2,V3,M3,V+I3	M1,I3,K3,V+I3,M+I3,M+C3
	C2	18–26	Q1,F2,K3,I3	K2,I3,V3,M3,V+I3	M1,I3,K3,V+I3,M+I3,M+C3
	C4	42–52	Q1,F3,K3,I3	I2,K2,V3,M3,V+I3	M1,I3,K3,V+I3,M+I3,M+C3
Shatta silt loam (S70La–41–5).	Ap	0–6	Q1,F3,Cr3,K3	Q1,K3,V3,I3	V1,K2,M3,I3,M+C3
	B22t	22–30	Q1,F3,I3,K3,Cr3,V3	Q1,K2,I3,V3,M3, V+I3,M+I3,M+C3	K1,V2,M3,I3,M+C3
	Bx2	42–70	Q1,Cr3,F3,K3,I3	Q1,K2,I3,V3,M3, V+I3,M+C3	K1,V2,M2,I3,M+C3

[1] Kind and quantity of minerals:

A. Kind of mineral:
- C — chlorite
- Cr — cristobalite
- F — feldspars
- I — illite
- K — kaolinite
- M — montmorillonite
- Q — quartz
- V — vermiculite
- I+C — interstratified (regular) illite and chlorite (*s*)
- M+C — interstratified (regular) montmorillonite and chlorite
- M+I — interstratified (regular) montmorillonite and illite
- V+I — interstratified (regular) vermiculite and illite

B. Quantity of mineral:
1. Abundant, more than 40 percent.
2. Moderate, 10 to 40 percent.
3. Minor, less than 10 percent.

Minerals are listed in order of abundance, decreasing from left to right.

significant acreage is soybeans. In 1969, about 2,630 acres of soybeans was planted on 28 farms, and in that year there were about 27,220 cattle in the parish. Pasture covered 37,421 acres. Most of the acreage used for pasture is on the clayey soils and the occasionally flooded, loamy soils (fig. 9) of the Red River alluvial plain and on the loamy terrace upland soils in the eastern part of the parish. About half of the parish, or about 128,000 acres, is woodland.

Climate[5]

Red River Parish is in the Northwest Division of Louisiana, a subtropical, transitional climatic region affected alternately by cold air moving southward and warm, moist air moving northward. Transitions from one flow to another bring changes in weather that are frequently significant and sometimes abrupt. Data on temperature and precipitation recorded at Westdale are shown in table 10, data on probabilities of freezing temperatures are shown in table 11, and data on rainfall frequency are shown in table 12.

Summers are consistently warm. In most years the temperature exceeds 100° F on one or more days. At Westdale a reading of 107° was recorded on August 13, 1962. Maximum temperatures of 90° or warmer can be expected each year from May to October. Individual years may have less than 80 to more than 120 days of 90° weather.

Winters are comparatively mild. In most years the temperature drops to 16° or lower on 1 day or more. At Westdale a reading of 0° was recorded on January 12, 1962. Temperatures of 32° or lower can be expected from October to April, with individual years having less than 50 to more than 70 such days. Cold spells are usually of short duration, and in only a few years are there 1 to 3 days when the temperature does not rise above 32°. The ground freezes briefly to a shallow depth but thaws rapidly.

Precipitation falls on about 2 days out of 7 during the year. Rainfall is mainly in the form of showers. Periods of prolonged rain sometimes occur during winter and spring but are not frequent. During the cooler months, the usual weather pattern is rain followed by

[5] By GEORGE W. CRY, climatologist for Louisiana, National Weather Service, U.S. Department of Commerce.

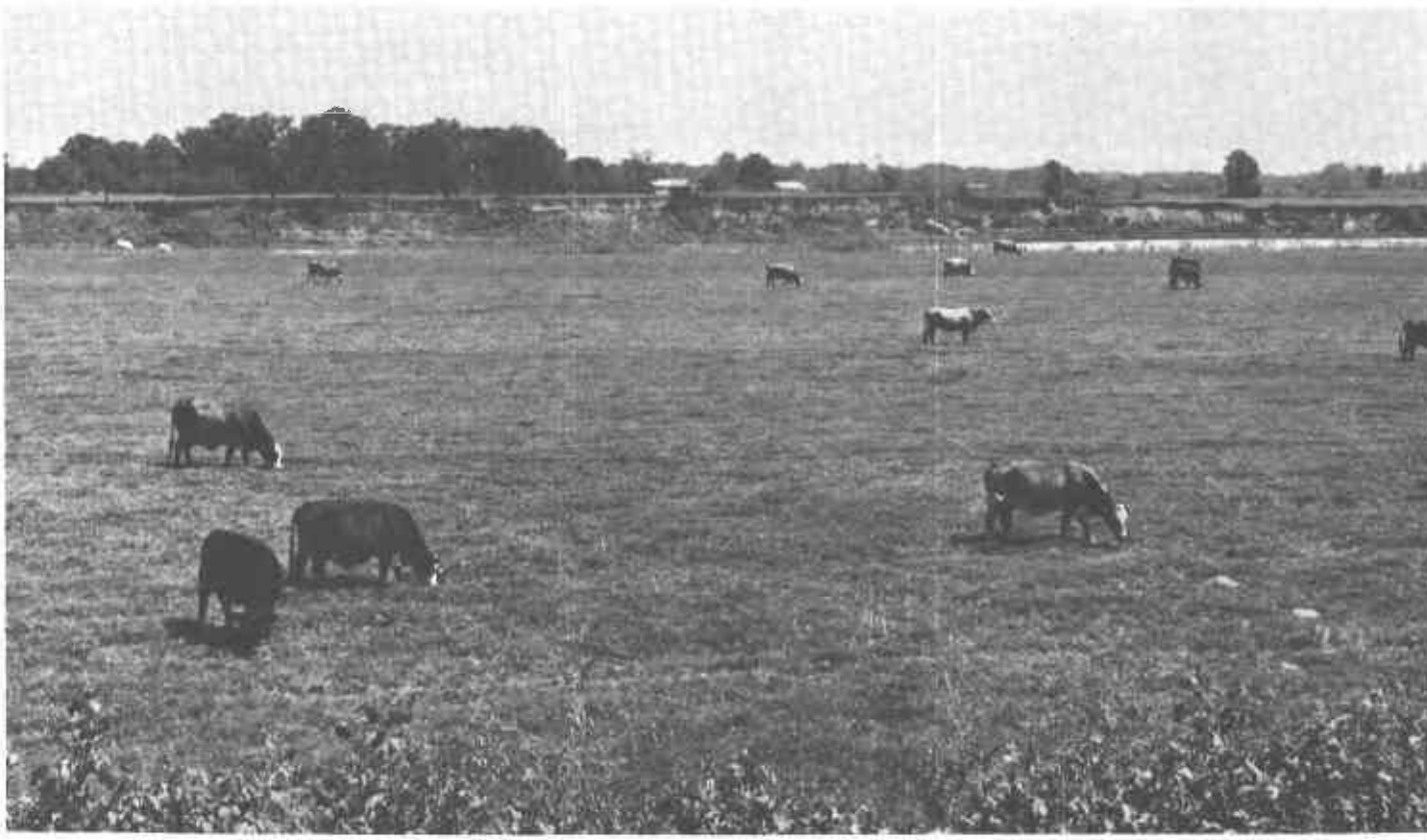

Figure 9.—**Common bermudagrass pasture on Severn very fine sandy loam, occasionally flooded.**

TABLE 10. — *Temperature and precipitation data*
[All data from Westdale]

Month	Temperature				Precipitation		
	Average daily maximum	Average daily minimum	Average monthly highest temperature	Average monthly lowest temperature	Average monthly total	One year in 10 will have—	
						Less than—	More than—
	°F	°F	°F	°F	*Inches*	*Inches*	*Inches*
January	56	33	76	15	3.6	1.6	6.2
February	61	36	78	22	3.8	1.8	6.1
March	67	41	82	25	4.0	1.7	6.8
April	77	53	87	35	5.5	2.0	9.8
May	84	60	92	46	5.9	2.9	9.4
June	90	67	97	56	3.2	0.9	6.0
July	94	70	99	63	3.6	1.0	7.0
August	93	69	100	58	2.8	1.2	4.7
September	88	62	96	48	4.2	0.8	8.9
October	80	50	91	33	2.3	0.3	5.3
November	69	41	84	23	3.9	1.3	7.1
December	60	36	78	19	4.3	1.6	7.7
Year	77	51	[1]101	[2]14	47.1	31.7	71.7

[1] Average annual highest temperature.

[2] Average annual lowest temperature.

TABLE 11. — *Probabilities of last freezing temperatures in spring and first in fall*

[All data from Westdale]

Probability	Dates for given probability at temperature of—		
	24° F or lower	28° F or lower	32° F or lower
Spring:			
1 year in 10 later than	March 30	April 4	April 11
2 years in 10 later than	March 19	March 29	April 6
5 years in 10 later than	February 27	March 18	March 27
Fall:			
1 year in 10 earlier than	November 3	October 28	October 24
2 years in 10 earlier than	November 11	November 3	October 30
5 years in 10 earlier than	November 27	November 15	November 10

TABLE 12. — *Rainfall frequency*

[Data recorded at Westdale]

Duration	Return period for a central location			
	2 years	10 years	50 years	100 years
	Inches	*Inches*	*Inches*	*Inches*
30 minutes	1.6	2.3	2.9	3.3
1 hour	2.0	3.0	3.7	4.0
2 hours	2.6	3.7	4.7	5.3
3 hours	2.8	4.2	5.3	5.8
6 hours	3.4	5.2	6.6	7.3
12 hours	4.1	6.2	8.2	9.0
24 hours	4.7	7.3	9.4	10.6
2 days	5.4	8.3	11.2	12.5
4 days	6.4	9.8	13.0	14.5
7 days	7.4	11.4	15.2	17.0

cool then moderating temperatures; a few balmy days; and then another rain. Snowfall averages less than 1 inch per year, and many years may pass with no snow. Several inches of snow have been measured after storms during December, January, and February. Glaze or ice storms have caused significant damage but occur at long intervals.

Thunderstorms can occur in any season. Most months have 1 day or more with thunder, and the annual average is 50 to 60 days. In summer nearly all rainy days have afternoon and evening lightning or thunder. Thunderstorms are less frequent late in fall and in winter and occur least often in January. Cool-season thunderstorms are associated with passing weather systems (fronts and squall lines). They can occur at any hour and generally have higher winds than in summer. Torrential rains sometimes occur in this area (see rainfall frequency table).

Occasionally, during the warm months, northerly and westerly winds bring extended periods of dry, hot weather. If these periods are prolonged, drought is a hazard on farms and the danger of forest fires increases. Some places in Red River Parish have recorded periods of 1 month or more of no rainfall. In many years, however, dry weather in the fall is helpful during harvesting.

Measuring the evaporation from Class A Weather Service pans provides some information on water losses of soil and crops. The average annual pan evaporation is about 65 inches, of which 68 percent, or some 44 inches, occurs from May to October. Pan evaporation is a maximum, or potential, value: the average annual open-lake evaporation is about 48 inches. The actual loss of soil moisture is less, because the amount of available moisture is often limited.

The annual mean relative humidity is about 71 percent. Humidity of less than 30 percent is rare, occurring only during about 2 percent of the hours of the year and less frequently in summer. Humidity of more than 80 percent occurs during about 37 percent of the hours and is frequent early in the morning and during periods of rain. At times heavy fog occurs during the night and early in the morning, but it rarely lasts throughout the day.

The parish averages some 2,800 hours of sunshine per year, or two-thirds of the possible annual amount.

Windspeeds are generally less than 12 miles per hour. During storms, however, speeds may exceed 40 miles per hour, and they are substantially higher in brief gusts. The average wind direction is southerly except during September and October when it is most frequently easterly. Based on instrument readings at a standard 30-foot elevation, it is estimated that a sustained windspeed of 70 miles per hour occurs once in 50 years in Red River Parish.

Water Supply

Red River Parish has an abundance of water in lakes, streams, and ponds. The largest source of surface water in the parish is the Red River, which drains approximately 63,400 square miles upstream from the parish. The Red River has an average flow of about 13,100 cubic feet per second, or about 8,500 million gallons per day. Many of the streams that drain the uplands are not dependable sources of supply because their flows are not well sustained during dry seasons.

According to a recent survey (*4*), the parish ground water supplies can be divided into three general types, which can be correlated with the three types of aquifers in the parish. These general types are the Red River Valley, Pleistocene terrace deposits, and Tertiary sands.

In the Red River Valley, moderate to large quantities of very hard, iron-bearing water, suitable for irrigation, are available to wells in the alluvial sand and gravel of Quaternary age. The aquifer ranges from 20 feet to slightly more than 100 feet in thickness. The Quaternary alluvium contains more than 330 billion gallons of ground water in storage, and the maximum discharge of ground water to the streams is slightly less than 30 million gallons per day.

Moderate supplies of soft, iron-bearing water may be obtained from dissected Pleistocene terrace deposits that flank the flood plains of the Red River and Black Lake Bayou. However, the quantity of water that can be pumped from these deposits varies widely from place to place because of differences in the extent and thickness of the deposits.

Beds of fine-grained lignitic sands of Tertiary age contain water of generally good quality to a depth of 150 to 450 feet. The thickness and low permeability of the sands restrict their development to low-yield wells. Water from Tertiary sands that lie beneath the alluvial valley in the western part of the parish is more mineralized than that from the younger Tertiary sands exposed in the east-central part.

Only small amounts of surface water are used for domestic or industrial purposes in Red River Parish. Some is used for irrigation.

Natural Resources

Oil, gas, timber, and sand and gravel are the main natural resources of Red River Parish. Oil was discovered in the Red River Bull Bayou field in 1912. Since the early 1930's, three additional fields have been discovered and developed. They are the Gahagan, Coushatta, and Lake End fields. Because there are no refineries in the parish, oil and gas are moved to other locations by pipeline for processing.

There are several deposits of commercial gravel and sand in the parish. These deposits are along the eastern boundary of the parish.

There is about 128,000 acres of woodland in the parish, consisting mainly of loblolly pine, shortleaf pine, planted slash pine, and mixed upland and lowland hardwoods. Timber is used for lumber, plywood, poles, piling, pulpwood, fenceposts, and various miscellaneous uses. There is one sawmill in the parish. Most of the timber is transported to various processing plants outside the parish.

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Glossary

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

Association, soil. A group of soils geographically associated in a characteristic repeating pattern.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Backswamp (geological). The low-lying part of an alluvial plain that joins a natural levee.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

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

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

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

Complex, soil. A mapping unit consisting of different kinds of soils that occur in such small individual areas or in such an intricate pattern that they cannot be shown separately on a publishable soil map.

Compressible. The soil is relatively soft and decreases excessively in volume when a load is applied.

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

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

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

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

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

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

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

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

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

Cemented.—Hard and brittle; little affected by moistening.

Cutbanks cave. Walls of cuts are not stable. The soil sloughs easily.

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

Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low available water 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 mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

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.

Excess alkali. Exchangeable sodium imparts poor physical properties that restrict the growth of plants.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

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

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

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

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

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

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

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

Low strength. The soil has inadequate strength to support loads.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Natural levee (geological). A very low ridge built up by a stream as it floods and deposits alluvium on the flood plain on either side of the stream channel.

Pan. A layer in a soil that is compacted or very rich in clay. Frequently the word "pan" is combined with other words that more explicitly indicate the nature of the layer; for example, *hardpan, fragipan, claypan,* and *traffic pan.*

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

Percs slowly. Water moves through the soil slowly, affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Phase, soil. A subdivision of a soil series or other unit in the soil classification system made because of differences in the soil that affect its management but do not affect its classification in the natural landscape. A soil series, for example, may be divided into phases because of differences in slope, stoniness, thickness, or some other characteristic that affects its management but not its behavior in the natural landscape.

pH value. A numerical means for designating acidity and alkalinity in soils. A pH value of 7.0 indicates precise neutrality; a higher value, alkalinity; and a lower value, acidity.

Piping. This soil is susceptible to the formation of tunnels or pipelike cavities by moving water.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents that commonly shows as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on exposure to repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade, whereas, ironstone cannot be cut, but can be broken or shattered with a spade. Plinthite is one form of the material that has been called laterite.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

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

Sand. Individual rock or mineral fragments in a soil that range in diameter 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.

Seepage. Water moves through the soil so quickly that it affects the specified use.

Series, soil. A group of soils developed from a particular type of parent material and having genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile.

Shrink-swell. The soil expands on wetting and shrinks on drying, which may cause damage to roads, dams, building foundations, or other structures.

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.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on relatively steep slopes and in swelling clays, where there is marked change in moisture content.

Slick spots. Small areas in a field that are slick when wet because they contain excess exchangeable sodium, or alkali.

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

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles) adhering together without any regular cleavage, as in many claypans and hardpans).

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

Substratum. Technically, the part of the soil below the solum.

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

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

Thin layer. Suitable soil material is not thick enough for use as borrow material or topsoil.

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

Upland (geological). Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace. Land above the lowlands along rivers.

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.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. The system of capability grouping is discussed in the section beginning on page 33.

Map symbol	Mapping unit	Described on page	Capability unit Symbol
Ar	Armistead clay	8	IIw-1
Bc	Bonn complex	9	IVs-1
BFC	Boswell-Falkner association, sloping	10	------
	Boswell soils	--	IIIe-4
	Falkner soils	--	IIIe-1
Bx	Buxin clay	11	IIIw-1
Ca	Caspiana silt loam	12	I-1
Cn	Caspiana silty clay loam	13	IIw-2
Cs	Coushatta silt loam	13	I-1
Ct	Coushatta silty clay loam	14	IIw-2
FBB	Falkner-Boswell association, gently sloping	15	------
	Falkner soils	--	IIIe-1
	Boswell soils	--	IIIe-4
Ga	Gallion silt loam	16	I-2
Gn	Gallion silty clay loam	16	IIw-3
GSC	Gore-McKamie association, sloping	17	IVe-1
GU	Guyton association, frequently flooded	18	Vw-2
GY	Guyton-Messer association	18	------
	Guyton soils	--	IIIw-5
	Messer soils	--	IIIe-3
KW	Kolin-Wrightsville association	20	------
	Kolin soils	--	IIe-2
	Wrightsville soils	--	IIIw-5
La	Latanier clay	21	IIIw-1
MAB	Malbis-Beauregard association, gently sloping	22	IIe-2
MLC	Meth-Malbis association, sloping	24	IIIe-3
MME	Meth-Ruston association, steep	24	------
	Meth soils	--	VIe-1
	Ruston soils	--	IIIe-2
MnA	Moreland silt loam, overwash, 0 to 1 percent slopes	25	IIIw-3
MoA	Moreland clay, 0 to 1 percent slopes	25	IIIw-1
MoB	Moreland clay, gently undulating	26	IIIw-4
Pr	Perry clay	27	IIIw-2
RUC	Ruston association, sloping	28	IIIe-2
Se	Severn very fine sandy loam	29	I-1
Sn	Severn very fine sandy loam, occasionally flooded	29	IVw-1
Sr	Severn soils, frequently flooded	29	Vw-1
STB	Shatta association, gently sloping	30	IIe-2
SvB	Sterlington silt loam, 1 to 3 percent slopes	31	IIe-1
Ud	Udifluvents	32	I-1

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