SOIL SURVEY OF

Madison 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.

Major fieldwork for this soil survey was completed in the period 1968–72. 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 Madison Soil and Water Conservation District. This survey includes about 7,400 acres of Warren County, Mississippi, that was not included in the 1964 soil survey of that county.

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

HOW TO USE THIS SOIL SURVEY

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

Locating Soils

All the soils of Madison 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

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

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

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

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

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

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

Newcomers in Madison 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 about the parish given in "General nature of the parish."

Cover: Cotton on Bruin silt loam.

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SOIL SURVEY OF MADISON PARISH, LOUISIANA

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

MADISON PARISH is in the northeastern part of Louisiana (fig. 1). Tallulah is the parish seat. The parish has a total area of 423,680 acres, of which 12,160 acres is lakes, bayous, and rivers. Elevation ranges from about 60 to 90 feet above sea level.

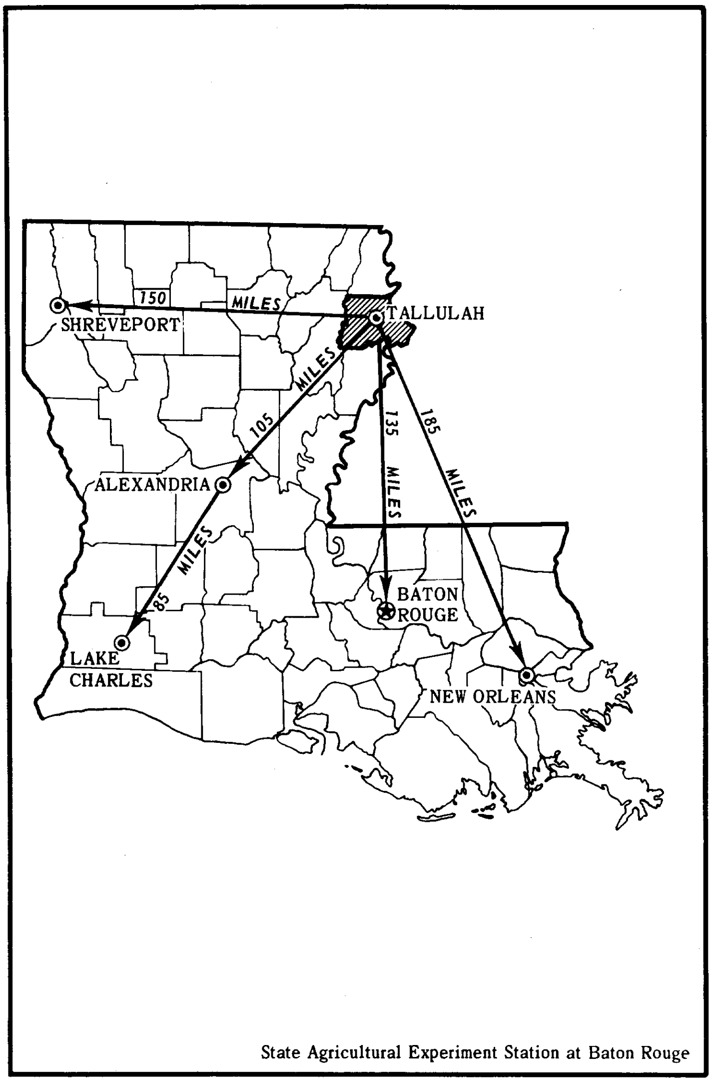

Figure 1.—**Location of Madison Parish in Louisiana.**

The climate of the parish is warm and temperate. Summers are hot and humid. Winters are mild.

All of the soils in the parish are on the alluvial plain of the Mississippi River. They formed in alluvium deposited by the river and range from fine sand to clay in texture. About 65 percent of the acreage is clayey soils. The soils range from level to gently undulating and are in a ridge and swale pattern. Most of the parish is nearly level. A manmade levee system along the Mississippi River protects most of the area from flooding, but most of the soils between the levee and the river are frequently flooded (fig. 2).

The parish is drained by Bayou Macon, Joes Bayou, the Tensas River, and many smaller streams. Drainage is dominantly from north to south. Most of the clayey soils are poorly drained. The loamy soils are somewhat poorly drained and moderately well drained. The sandy soils are excessively drained. Most of these soils are high in natural fertility and are well suited to crops, pasture, and hardwood trees.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in Madison 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. 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

***Figure 2.*—Cattle grazing on manmade levee and berm of the Mississippi River.**

characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Bruin and Sharkey, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Sharkey clay, frequently flooded, is one of several phases within the Sharkey 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 kind that have been seen within an area that is dominantly of a recognized soil phase.

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

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Dundee-Sharkey complex, gently undulating, 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. If there are two or more dominant series represented in the group, the name of the group ordinarily consists of the names of the dominant soils, joined by "and." Bruin and Commerce 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 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 to the slow permeability of the soil or its 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 the survey area.[1] A soil association is a landscape that has a distinctive pattern of soils in defined proportions. It typically consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in an association can occur in other associations, but in different patterns.

A map showing soil associations is useful to people who want to have a general idea of the soils in a survey area, who want to compare different parts of that area, 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 for broad planning on a watershed, a wooded tract, or a wildlife area or for broad planning of recreational facilities, community developments and such engineering works as transportation corridors. It is not a suitable map for detailed planning for management of a farm or field or for selecting the exact location of a road or building or other structure, because the soils within an association ordinarily vary in slope, drainage, and other characteristics that affect their management.[2]

The soil associations in this survey area (fig. 3) have been grouped into general kinds of landscapes for broad interpretative purposes. Each of the broad groups and the soil associations in it are described on the following pages.

[1] About 7,400 acres of Warren County, Mississippi, is included on this map.

[2] Madison Parish joins Tensas Parish on the south. Slight differences occur in the components of associations joined on the general soil maps of these two parishes. These differences are mainly a result of the design of the surveys and recent changes in soil taxonomy.

Loamy and clayey soils on natural levees

Two soil associations consist of nearly level loamy and clayey soils on the natural levees of the Mississippi River and its distributaries. These soils formed in alluvium deposited by the Mississippi River. Slopes range from 0 to 3 percent but are dominantly less than 1 percent. The nearly level loamy soils are at the highest elevations along the Mississippi River levee and along Joes Bayou. The natural levees slope away from the stream channels. The nearly level clayey soils are on the lower elevations of the natural levees of Joes Bayou and are at the greatest distance from the stream channel. These associations make up 20 percent of the parish.

1. Commerce-Bruin association

Nearly level, somewhat poorly drained and moderately well drained, loamy soils

This association consists of loamy soils on the natural levees of the Mississippi River, Walnut Bayou, Roundaway Bayou, Bayou Bidal, and Eagle Lake. Slopes are 0 to 3 percent. Elevation ranges from 80 to 95 feet above sea level.

This association makes up about 11 percent of the parish. It is about 76 percent Commerce soils and 14 percent Bruin soils. Sharkey and Tunica soils make up most of the remaining 10 percent of this association.

Commerce soils are on the higher parts of the natural levees. They have a surface layer of dark grayish-brown silt loam. The subsoil is dark grayish-brown silty clay loam in the upper 9 inches and grayish-brown and dark grayish-brown silt loam below. Runoff is medium to slow, and permeability is moderately slow. These soils are somewhat poorly drained.

Bruin soils are on the highest part of the natural levees. They have a surface layer of dark grayish-brown and dark-brown silt loam. The subsoil is brown and dark-brown silt loam that is mottled with shades of brown. Runoff is medium, and permeability is moderate. These soils are moderately well drained.

Minor in this association are small areas of Sharkey and Tunica soils. These clayey, poorly drained soils are on the lower parts of the natural levees.

Most areas of this association are used for crops and pasture. A small acreage is used as sites for homes and light industry. The soils of this association are well suited to crops and pasture because of their loamy texture, high natural fertility, and nearly level slopes. They are limited for some uses by wetness and low strength. Most of the farms in this association are 100 to 1,000 acres in size and are operated by the owner.

2. Dundee-Sharkey association

Nearly level, somewhat poorly drained, loamy soils and poorly drained, clayey soils

This association consists of loamy and clayey soils on the natural levees of the Joes Bayou, Bayou Macon, and Spring Bayou. Slopes are 0 to 1 percent. Elevation dominantly ranges from 70 to 80 feet above sea level.

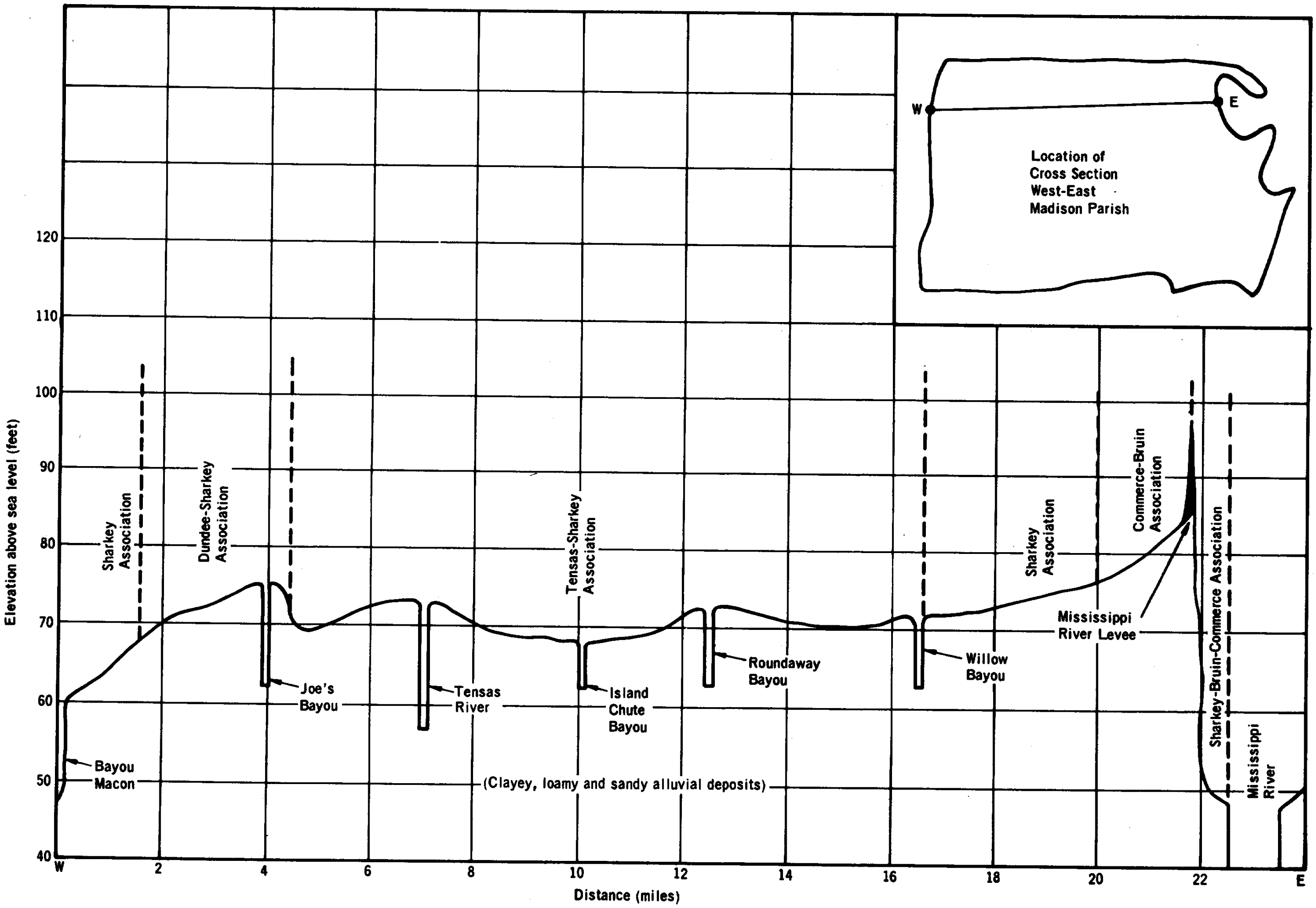

Figure 3.—**Relationship of soil associations to elevation.**

This association makes up about 9 percent of the parish. It is 76 percent Dundee soils and 14 percent Sharkey soils. Tensas soils, Tunica soils, and Udifluvents make up most of the remaining 10 percent of this association.

Dundee soils are on the higher elevations of the natural levees. They have a surface layer of dark-brown silt loam. The subsoil is grayish-brown silty clay loam in the upper 5 inches and grayish-brown loam below. It is mottled in shades of brown. Runoff is slow, and permeability is moderately slow. These soils have moderate natural fertility.

Sharkey soils are on the lower elevations of the natural levees, in nearly level areas, and in slight depressions. They have a surface layer of dark grayish-brown clay and a subsoil of dark-gray clay mottled in shades of brown. Runoff is slow or very slow, and permeability is very slow. These soils have high natural fertility.

Minor in this association are Udifluvents and Tensas and Tunica soils. The Tensas and Tunica soils are on the lower parts of natural levees. The Udifluvents are on spoil banks from dredged channels.

Most areas of this association are used for crops and pasture. A small acreage is used as woodland. The soils of this association are well suited to the crops commonly grown in this area. They are also well suited to use as woodland. The Sharkey soils are limited for most other uses by wetness, low strength, and very high shrink-swell potential.

Clayey soils on broad flats, on ridges, and in swales

Two soil associations consist of level, nearly level, and gently undulating clayey soils on broad flats, on ridges, and in swales. The level and nearly level soils are at low elevations. A few small areas of these soils are subject to flooding. The ridges and swales are mainly adjacent to the Tensas River and are at higher elevations than the level areas. These soils formed in alluvium deposited by the Mississippi River. Slopes range from 0 to 3 percent. These associations make up 73 percent of the parish.

3. Sharkey association

Level, nearly level and gently undulating, poorly drained, clayey soils

This association consists of clayey soils on broad flats, on ridges, and in swales and narrow depressions. Slopes are 0 to 3 percent. Elevation ranges from 75 to 80 feet above sea level.

This association makes up about 55 percent of the parish. It is 91 percent Sharkey soils. Tunica, Commerce, Dundee, and Tensas soils make up the remaining 9 percent of this association.

Sharkey soils are on broad flats, on ridges, and in swales and depressions. They have a surface layer of dark grayish-brown clay. The subsoil is dark-gray clay mottled in shades of brown. These soils are poorly drained and very slowly permeable. They crack when dry, and they swell and seal over when wet.

Commerce, Dundee, and Tensas soils are minor in this association. Tensas soils are on low ridges and in swales. Commerce, Dundee, and Tensas soils are on natural levees.

Most areas of this association are used for woodland. A small acreage is used for crops and pasture. Farms are mostly 200 to 1,500 acres in size and are operated by the owner. The soils in this association are suited to most crops grown in the area. They are high in natural fertility.

This association is limited for most uses by wetness, a very high shrink-swell potential, and low strength.

4. Tensas-Sharkey association

Gently undulating and level, somewhat poorly drained, and poorly drained clayey soils

This association consists of clayey soils on lower parts of natural levees, on broad flats, on ridges, and in swales. Most of the association is on ridges and in swales. Slopes are 0 to 3 percent. Elevation ranges from 60 to 80 feet above sea level.

This association makes up about 18 percent of the parish. It is 60 percent Tensas soils and 37 percent Sharkey soils. Dundee and Tunica soils make up the remaining 3 percent of the association.

Tensas soils are on ridges and lower parts of natural levees. They have a surface layer of dark grayish-brown silty clay. The subsoil is grayish-brown silty clay to a depth of about 22 inches, and it is grayish-brown silty clay loam below. Runoff is medium on the ridges and is slow on the natural levees.

Sharkey soils are in the swales and on broad flats. They have a surface layer of dark grayish-brown clay. The subsoil is dark-gray clay mottled in shades of brown. Runoff is slow, and permeability is very slow.

Dundee and Tunica soils are minor in this associaation. Dundee soils are on the higher parts of the natural levees.

About 60 percent of this association is used for crops. The remaining 40 percent is used for woodland. Farms are large and are operated by the owners.

The soils of this association are suited to most cultivated crops commonly grown in the area. They are well suited to woodland.

This association is limited for most uses by wetness, low strength, high shrink-swell potential, and uneven surfaces.

Clayey, loamy, and sandy, frequently flooded and occasionally flooded soils mainly between the Mississippi River and its levee

Two associations consist of level to gently undulating soils on recent natural levees of the Mississippi River and in low areas away from the river. The clayey soils are at the greatest distance from the river and are in the low areas. The loamy soils are on the higher part of the natural levees. The sandy soils occur on sand bars and on the highest parts of natural levees adjacent to the Mississippi River. Slopes range from 0 to 3 percent but are dominantly less than 1 percent. These associations make up 7 percent of the parish.

5. Sharkey-Bruin-Commerce association

Level, nearly level and gently undulating, poorly drained, clayey soils and moderately well drained and somewhat poorly drained, loamy soils that are frequently flooded

The soils of this association are between the Mississippi River and its manmade levee and on the island east of the Mississippi River. They are subject to deposition or loss of soil material by scouring during floods. Slopes are 0 to 5 percent. Elevation ranges from 65 to 95 feet above sea level.

This association makes up about 6 percent of the parish. In addition, about 7,400 acres located in Warren County, Mississippi, is in this association. This association is 40 percent Sharkey soils, 29 percent Bruin soils, and 19 percent Commerce soils. Tunica soils make up most of the remaining 12 percent of the association.

Sharkey soils are in low areas at the lowest elevations in the association. They have a surface layer of dark grayish-brown clay. The subsoil is dark-gray clay mottled in shades of brown. Runoff is very slow or ponded. Permeability is very slow. These soils are wet and are poorly drained.

Bruin soils are on the higher parts of the natural levees. They have a surface layer of dark-brown silt loam. The subsoil is dark-brown silt loam mottled in shades of brown. Runoff is medium. Permeability is moderate. These soils are moderately well drained.

Commerce soils are on higher parts of natural levees. They have a surface layer of dark grayish-brown silt loam. The subsoil is dark grayish-brown silty clay loam in the upper part and grayish-brown silt loam mottled in shades of brown in the lower part. Runoff is medium to slow. These soils are somewhat poorly drained.

The poorly drained Tunica soils are minor in this association. They are closely associated with the Sharkey soils. These soils are clayey in the upper 25 inches and loamy below.

Most areas of this association are used for woodland. Cleared areas are used mainly for pasture and hay. Some areas of the Bruin and Commerce soils that have low-quality woodland are being cleared and planted to more profitable trees.

The soils of this association are well suited to woodland. Bruin, Commerce, Sharkey, and Tunica soils are suited to crops commonly grown in the parish, but frequent flooding makes production uncertain.

The Sharkey and Commerce soils are limited for most uses by wetness and the hazard of flooding. Sharkey soils are also limited by low strength and very high shrink-swell potential.

6. Crevasse-Udipsamments association

Nearly level and gently sloping, excessively drained, frequently flooded and occasionally flooded, sandy soils

This association consists of sandy soils between the Mississippi River and its manmade levee. Slopes range from 0 to 5 percent. Elevation ranges from 80 to 100 feet above sea level.

This association makes up less than 1 percent of the parish. It is 50 percent Crevasse soils and 46 percent Udipsamments. Commerce, Bruin, and Sharkey soils make up most of the remaining 4 percent of the association.

Crevasse soils are on recent natural levees and sand bars that border the Mississippi River or its former channels. They have a surface layer of brown fine sand. The subsoil is grayish-brown, dark-brown, and brown fine sand. Runoff is very slow. Permeability is rapid. These soils are excessively drained and are frequently flooded.

Udipsamments occupy the highest elevations. They have a surface layer of dark yellowish-brown loamy sand. The subsoil is brown fine sand and sand mottled in shades of brown. Runoff is very slow. Permeability is rapid. Most areas of these soils are occasionally flooded, but some small areas are rarely flooded.

Commerce, Bruin, and Sharkey soils are minor in this association. Commerce and Bruin soils are at intermediate elevations on the natural levees. Sharkey soils are in low areas.

Crevasse soils are mainly in pasture and woodland. Udipsamments are in areas that are suitable for grass in spring, but these areas are commonly barren during the rest of the year. Crevasse soils and Udipsamments are not commonly suited to cultivated crops, because of their droughtiness and the hazard of flooding. The sandy surfaces of these soils do not provide good traction for farm equipment during dry periods.

Most areas of this association are managed to provide suitable wildlife habitat.

Descriptions of the soils

In this section the soils of Madison Parish are described in detail and their use and management are discussed. Each soil series is described in detail, and then, briefly, the mapping units in that series. Unless it is specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to 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 soil series is representative for mapping units in that series. If a given mapping unit has a profile in some ways different from the one described in the series, these differences are stated in the description of the mapping unit, or they are apparent in the name of the mapping unit. The description of each mapping unit contains suggestions on how the soil can be managed.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. 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 is the capability unit and woodland group in which the mapping unit has been placed.

The acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the Glossary, and more detailed information about the terminology

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

Mapping unit	Area	Extent
	Acres	*Percent*
Bruin silt loam	6,435	1.5
Bruin and Commerce soils, frequently flooded	11,175	2.6
Commerce silt loam	21,313	5.0
Commerce silty clay loam	11,498	2.7
Commerce silty clay loam, gently undulating	2,439	.6
Crevasse soils, frequently flooded	1,386	.3
Dundee silt loam	7,432	1.8
Dundee silty clay loam	15,664	3.7
Dundee-Sharkey complex, gently undulating	11,448	2.7
Sharkey silt loam	1,165	.3
Sharkey silty clay loam	5,388	1.3
Sharkey clay	179,340	42.2
Sharkey clay, undulating	1,652	.4
Sharkey clay, frequently flooded	5,254	1.2
Sharkey soils, frequently flooded	2,117	.5
Sharkey-Tunica complex, gently undulating	27,064	6.4
Sharkey and Tunica soils, frequently flooded	9,382	2.2
Tensas silty clay	12,327	3.0
Tensas-Sharkey complex, gently undulating	62,147	14.7
Tunica clay	12,447	3.0
Udifluvents	610	.1
Udipsamments	1,293	.3
Water	14,704	3.5
Total area	423,680	100.0

and methods of soil mapping can be obtained from the Soil Survey Manual (*10*).[3]

Bruin series

The Bruin series consists of moderately well drained, moderately permeable soils. These soils are on the highest part of the natural levees along the Mississippi River, Walnut Bayou, and Roundaway Bayou. They are loamy throughout the profile and formed in alluvium deposited by the Mississippi River.

In a representative profile the surface layer is dark grayish-brown and dark-brown silt loam about 11 inches thick. The subsoil extends to a depth of 46 inches. It is brown and dark-brown silt loam mottled with shades of brown.

Most areas of these soils are used for crops. A small acreage is used for pasture, as woodland, and as sites for homes.

Representative profile of Bruin silt loam, in a field, 8 miles southeast of Tallulah, 51 feet south of center of blacktop highway, 8 feet west of property line, SE¼NW¼, sec. 22, T. 15 N., R. 14 E.:

Ap1—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; common, medium, faint, dark-brown (10YR 4/3) mottles; weak, medium, subangular blocky structure; friable; neutral; abrupt, smooth boundary.

Ap2—6 to 11 inches, dark-brown (10YR 4/3) silt loam; few, fine, faint, dark grayish-brown mottles; massive; friable; few worm casts; weak traffic pan or plowpan; neutral; abrupt, smooth boundary.

B21—11 to 16 inches, dark-brown (10YR 4/3) silt loam; common, fine, faint, dark yellowish-brown mottles and few, fine, faint, grayish-brown mottles; weak, medium, subangular blocky structure; friable; few very fine pores; few, fine, brown concretions; mildly alkaline; clear, smooth boundary.

B22—16 to 31 inches, dark-brown (10YR 4/3) silt loam; common, fine, faint, grayish-brown mottles; weak, medium, subangular blocky structure; friable; few fine pores; few, fine, brown concretions; moderately alkaline; clear, smooth boundary.

B3—31 to 46 inches, brown (10YR 5/3) silt loam; common, medium, faint, grayish-brown (10YR 5/2) mottles and few, fine, faint, dark-brown mottles; weak, medium, subangular blocky structure; friable; few fine pores; moderately alkaline; clear, smooth boundary.

C1—46 to 63 inches, dark-brown (10YR 4/3) silt loam; few, medium, faint, dark grayish-brown (10YR 4/2) mottles; massive; very friable; few fine pores; moderately alkaline; clear, smooth boundary.

C2—63 to 71 inches, grayish-brown (10YR 5/2) and brown (10YR 5/3) silt loam; few, fine, faint, dark yellowish-brown mottles; weak, medium, subangular blocky structure; friable; moderately alkaline.

The A horizon ranges from 5 to 12 inches in thickness. It is dark grayish brown or dark brown and is mottled in shades of brown. It is slightly acid to mildly alkaline in reaction. The B horizon is dark brown or brown and is mottled in shades of brown. It is neutral to moderately alkaline in reaction. The C horizon is brown, dark brown, dark grayish brown, and grayish brown and is mottled in shades of brown. It is silt loam or very fine sandy loam in texture. It is neutral to moderately alkaline in reaction.

Bruin soils are associated with Commerce, Crevasse, Sharkey, and Tunica soils. They are better drained and coarser textured than Commerce soils. Bruin soils are finer textured and have a much higher available water capacity than the sandy Crevasse soils. They are better drained than the Sharkey and Tunica soils and do not have the clay B horizon typical of those soils.

Ba—Bruin silt loam. This moderately well drained loamy soil is on the highest parts of the natural levees of the Mississippi River, Walnut Bayou, and Roundaway Bayou. Areas range from about 10 to 500 acres in size. Slopes are 0 to 1 percent. This soil has the profile described as representative for the series. Included with this soil in mapping are small areas of Commerce soils.

This soil is high in natural fertility. Runoff is medium. Permeability is moderate. Plant roots penetrate the soil easily. A seasonally high water table is at a depth of more than 6 feet. Low strength is the main limitation to the use of this soil for foundations.

Most areas of this soil are used for crops. A small acreage is used for pasture and as sites for homes. Suitable crops are cotton, corn, soybeans, grain sorghum, wheat, and truck crops (fig. 4). Suitable pasture plants are common and Coastal bermudagrass, Pensacola bahiagrass, dallisgrass, white clover, tall fescue, and ryegrass.

This soil is well suited to cultivated crops and pasture. It is friable and is easy to keep in good tilth. It can be worked over a wide range of moisture content. Traffic pans develop easily but can be broken by deep plowing or chiseling. Leveling and smoothing of land increase the efficiency of farm equipment. Most crops respond well to nitrogen fertilizer. Capability unit I–1; woodland suitability group 1o4.

BC—Bruin and Commerce soils, frequently flooded. These nearly level to gently undulating soils are between the Mississippi River and its manmade levee and on the islands east of the river. They occupy some of the highest elevations in the area. They are moderately well drained and somewhat poorly drained loamy soils. They are not protected from the Mississippi River and are subject to frequent flooding. These soils receive new depositions from each flood. Flooding occurs on an average of 3 years out of 5. Areas are about 10 to 1,700 acres in size. Slopes are 0.5 to 3 percent. Included with these soils in mapping are small areas of Crevasse, Sharkey, and Tunica soils that make up about 15 percent of the mapping unit.

These areas are about 50 percent Bruin silt loam and 35 percent Commerce silt loam. The pattern and extent of Bruin and Commerce soils are not uniform. Some areas are mostly Bruin soils, some areas are

[3] Italic numbers in parentheses refer to References, p. 42.

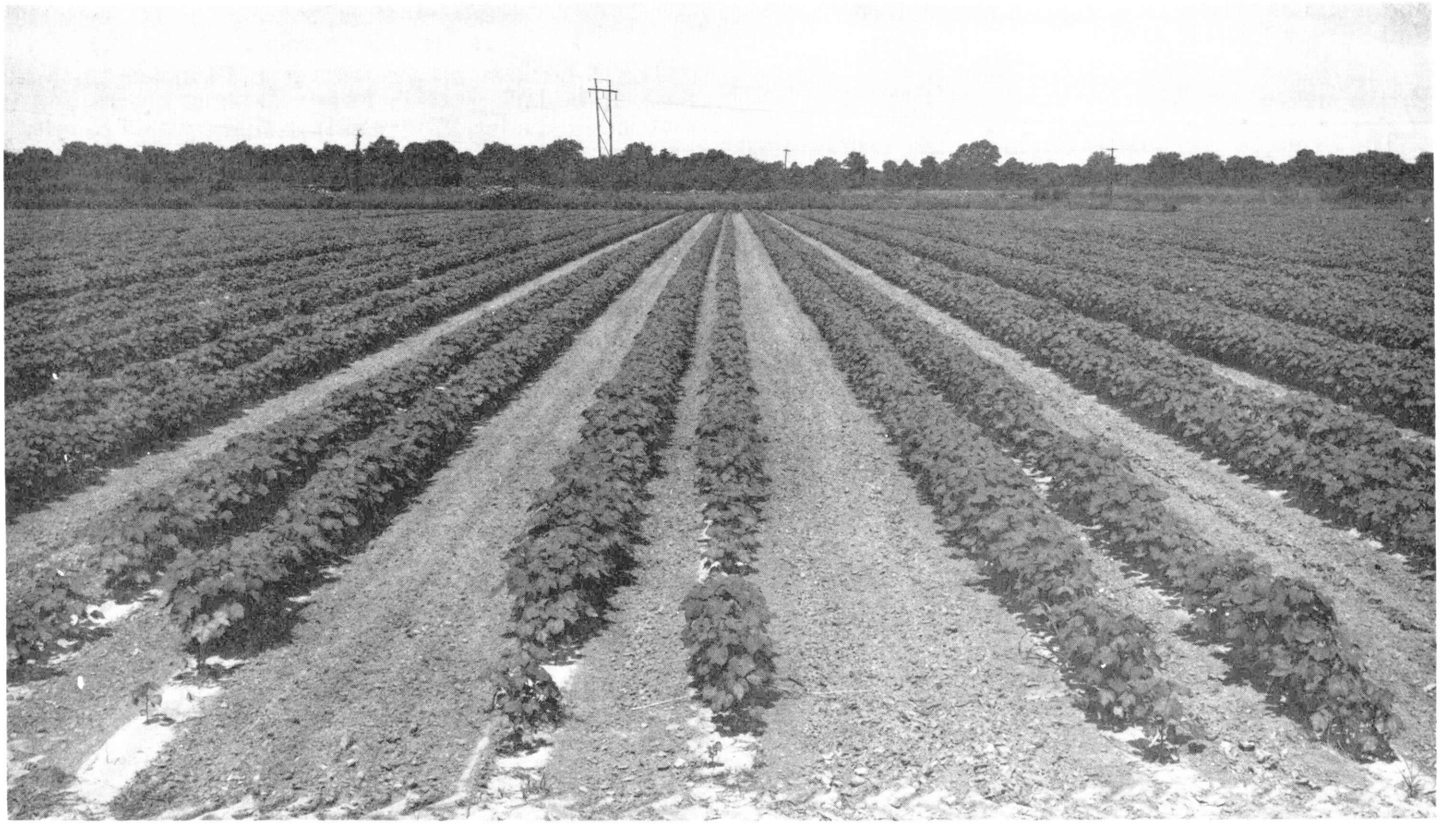

Figure 4.—**Cotton on Bruin silt loam.**

mostly Commerce soils, and other areas have about equal proportions of both soils. The Bruin soils occupy the higher parts of the natural levees, and the Commerce soils occupy the lower parts of the natural levees. The mapped areas are much larger and their composition generally is more variable than in other mapping units in the survey area. Mapping has been controlled well enough, however, that interpretations for the anticipated uses of the soils can be made.

The Bruin soil has a profile similar to the one described as representative for the Bruin series, but the surface layer is thinner and is mildly alkaline in reaction. This soil is high in natural fertility and is moderately well drained. Runoff is medium. Permeability is moderate. Plant roots penetrate the soil easily, and water and air move easily through the soil. The seasonally high water table is at a depth of more than 6 feet. Flooding limits the use of this soil for most purposes.

The Commerce soil has a profile similar to the one described as representative for the Commerce series, but the surface layer is browner, is mildly alkaline, and in some areas is silty clay loam. This soil is high in natural fertility. It is somewhat poorly drained. Surface runoff is medium to slow, and permeability is moderately slow. Plant roots penetrate the soil easily. A seasonally high water table is at a depth of 1.5 to 4 feet during the months of December through April. Flooding is the main limitation for most uses.

Most areas of these soils are used as woodland (fig. 5). A small acreage is used for pasture. Cultivated crops are not grown, because of the hazard of flooding. Flooding also limits the use of these soils for pasture. Common bermudagrass is a suitable pasture plant. Capability unit Vw–3; Bruin soil in woodland suitability group 1o4, and Commerce soil in woodland suitability group 1w5.

Commerce series

The Commerce series consists of somewhat poorly drained, moderately slowly permeable, loamy soils, mostly on the higher parts of the natural levees of the Mississippi River and its distributaries. These soils formed in alluvium desposited by the Mississippi River.

In a representative profile the surface layer is dark grayish-brown silt loam about 7 inches thick. The subsoil extends to a depth of about 48 inches. In sequence downward, it is 9 inches of dark grayish-brown silty clay loam, 22 inches of grayish-brown silt loam, and 10 inches of dark grayish-brown silt loam. The subsoil is mottled throughout in shades of brown.

Most areas of these soils are used for crops. A small acreage is used for pasture, as woodland, and as sites for homes.

Representative profile of Commerce silt loam, in a field, 8 miles southeast of Tallulah, 192 feet east of center of gravel road, 28 feet south of turn row, NW1/4 SE1/4 sec. 22, T. 15 N., R. 14 E.:

Ap—0 to 7 inches, dark grayish-brown (10YR

Figure 5.—**Woodland on Bruin and Commerce soils, frequently flooded.**

4/2) silt loam; weak, medium, subangular blocky structure; friable; few very fine pores; mildly alkaline; abrupt, smooth boundary.

B21—7 to 16 inches, dark grayish-brown (10YR 4/2) silty clay loam; few, fine, faint, dark yellowish-brown mottles; moderate, medium, subangular blocky structure; friable; common very fine pores; mildly alkaline; clear, smooth boundary.

B22—16 to 38 inches, grayish-brown (10YR 5/2) silt loam; common, medium, faint, dark yellowish-brown (10YR 4/4) mottles; moderate, medium, subangular blocky structure; very friable; common fine pores; very dark grayish-brown stains in root channels and voids; moderately alkaline; clear, smooth boundary.

B3—38 to 48 inches, dark grayish-brown (10YR 4/2) silt loam; common, medium, faint, dark-brown (10YR 4/3) mottles; weak, medium, subangular blocky structure; very friable; common fine pores; moderately alkaline; clear, smooth boundary.

C1—48 to 52 inches, dark-gray (10YR 4/1) silt loam; common, fine, faint, dark yellowish-brown mottles; weak, medium, subangular blocky structure; friable; sticky when wet; moderately alkaline; abrupt, smooth boundary.

C2—52 to 56 inches, dark grayish-brown (10YR 4/2) silty clay loam; common, medium, faint, dark-brown (10YR 3/3) mottles; moderate, medium, subangular blocky structure; firm; moderately alkaline; clear, smooth boundary.

A1b—56 to 65 inches, very dark gray (10YR 3/1) silty clay loam; few, fine, faint, dark brown mottles; moderate, medium, subangular blocky structure; firm; moderately alkaline.

The A horizon ranges from 4 to 14 inches in thickness. It is dark grayish-brown or grayish-brown silt loam or silty clay loam. It ranges from medium acid to mildly alkaline in reaction. The B horizon is dark grayish brown or grayish brown and is mottled in shades of brown. It is stratified silty clay loam and silt loam in texture and ranges from slightly acid to moderately alkaline in reaction. The C horizon is dark grayish brown, grayish brown, gray, or dark gray. It is stratified layers of silt loam, silty clay loam, very fine sandy loam, and thin layers of clay less than 10 inches thick. It ranges from neutral to moderately alkaline in reaction. A buried A horizon is in or below the solum.

Commerce soils are associated with Bruin, Crevasse, Sharkey, and Tunica soils. They are more poorly drained and finer textured than Bruin and Crevasse soils. They lack the thick clay B horizon typical of Sharkey and Tunica soils.

Cm—Commerce silt loam. This somewhat poorly drained, nearly level, loamy soil is mostly on the higher parts of natural levees along the Mississippi River, Walnut Bayou, and Roundaway Bayou. Areas range from about 20 to 1,000 acres in size, but most areas are more than 100 acres in size.

This soil has the profile described as representative of the series. It is high in natural fertility. Runoff is medium to slow. Permeability is moderately slow. Plant roots penetrate this soil easily. Water and air move somewhat slowly through the soil. A seasonally high water table is at a depth of 1.5 to 4 feet during the months of December through April. Wetness and low strength are the main limitations for most uses.

Included with this soil in mapping are small areas of Bruin silt loam, Commerce silty clay loam, and Tunica soils. Also included, on old Indian campground sites, are small areas of soils that have dark-colored layers that extend to a depth of as much as 20 inches.

Most areas of this soil are used for crops and pasture. A small acreage is used as sites for homes. Suitable crops are cotton, corn, soybeans, grain sorghum, wheat, oats, and truck crops (fig. 6). Suitable pasture plants are common and Coastal bermudagrass, dallisgrass, Pensacola bahiagrass, tall fescue, white clover, and ryegrass. This soil is friable and easy to keep in good tilth. It can be worked over a wide range of moisture content. Traffic pans develop easily but can be broken up by deep plowing or chiseling. A surface drainage system is needed for most cultivated crops. Smoothing and leveling of land improve surface drainage and increase the efficiency of farm equipment (fig. 7). Most crops respond well to nitrogen fertilizer. Capability unit IIw–1; woodland suitability group 1w5.

Cn—Commerce silty clay loam. This somewhat poorly drained loamy soil is mostly on the middle part of natural levees in slight depressions. Areas range from about 10 to 700 acres is size. Slopes are 0 to 1 percent.

This soil has a profile similar to the one described as representative for the series, but the surface layer is silty clay loam. Natural fertility is high. Runoff is slow. Permeability is moderately slow. Plant roots penetrate this soil fairly easily. A seasonally high water table is at a depth of 1.5 to 3 feet during the months of Decem-

Figure 6.—**Soybeans on Commerce silt loam.**

Figure 7.—**Land leveling operation on Commerce silt loam.**

ber through April. This soil can be worked only over a fairly narrow range of moisture content. It dries out slower than Commerce silt loam or Bruin silt loam. Water stands in low areas for short periods after heavy rains. Wetness and low strength are the main limitations for most uses.

Included with this soil in mapping are small areas of Bruin silt loam, Commerce silt loam, and Sharkey and Tunica soils.

Most areas of this soil are used for crops and pasture. Suitable crops are cotton, corn, soybeans, grain sorghum, wheat, and oats. Suitable pasture plants are common and Coastal bermudagrass, dallisgrass, Pensacola bahiagrass, tall fescue, white clover, and ryegrass. This soil is fairly easy to work, but it may become cloddy if worked when wet. Good tilth is somewhat difficult to maintain, because of the silty clay loam surface layer. Surface drainage is needed for both crops and pasture. Leveling and smoothing of land increase the efficiency of farm equipment and improve surface drainage. Most crops respond well to nitrogen fertilizer. Capability unit IIw–3; woodland suitability group 1w5.

Co—Commerce silty clay loam, gently undulating. This somewhat poorly drained loamy soil is on low parallel ridges and in swales. The ridges are 1 to 3 feet high and are 50 to 200 feet wide. They make up 60 percent of the area. The swales are slightly depressional and are 25 to 150 feet wide. They make up 40 percent of the area. Areas are about 10 to 900 acres in size. Slopes are 0 to 3 percent.

This soil has a profile similar to the one described as representative for the series, but the surface layer is silty clay loam. It is high in natural fertility. Runoff is medium on the ridges and is slow in the swales. Permeability is moderately slow. The swales remain wet for long periods, which may delay planting. Plant roots penetrate the soil easily. A seasonally high water table is at a depth of 1.5 to 3.0 feet during the months of December through April. This soil can be worked only over a fairly narrow range of moisture content. It generally dries out more slowly than the associated Bruin and Commerce silt loams because of slow runoff and wetness in the swales. Wetness, low strength, and short irregular slopes are the main limitations for most uses.

Included with this soil in mapping are small areas of Bruin silt loam, Commerce silt loam, Sharkey and Tunica soils, and soils that are browner than this Commerce soil. Some soils that have slopes of more than 3 percent are also included.

Most areas of this soil are used for crops and pasture. Suitable crops are cotton, corn, soybeans, grain sorghum, wheat, and oats. Suitable pasture plants are common and Coastal bermudagrass, dallisgrass, Pensacola bahiagrass, ryegrass, white clover, and tall fescue. Short irregular slopes and wetness in the swales make management somewhat difficult. Drainage is needed to remove excess water from the swales. Smoothing and leveling of land improve drainage and increase efficiency of farm equipment. Most crops respond well to nitrogen fertilizer. Capability unit IIw–5; woodland suitability group 1w5.

Crevasse series

The Crevasse series consists of excessively drained, rapidly permeable soils that are sandy throughout. These soils are on recent natural levees and sandbars that border the Mississippi River or its former channel. They formed in sandy alluvium deposited by the river.

In a representative profile the surface layer is brown fine sand about 5 inches thick. The underlying material is grayish-brown, dark-brown, and brown fine sand.

Most areas of these soils are used for woodland. A small acreage is used for pasture.

Representative profile of Crevasse fine sand in an area of Crevasse soils, frequently flooded, in a pasture, 11 miles east of Tallulah and 5 miles north of Mound, 450 feet north of pasture fence and 399 feet east of cultivated field, in the southeast corner of Spanish land grant, sec. 23, T. 17 N., R. 14 E.:

Ap—0 to 5 inches, brown (10YR 5/3) fine sand; few, fine, faint, dark grayish-brown mottles; weak, fine, granular structure; loose; mildly alkaline; clear, smooth boundary.

C1—5 to 13 inches, grayish-brown (10YR 5/2) fine sand; weak, fine, granular structure; loose; some sand grains are yellowish brown; moderately alkaline; clear, smooth boundary.

C2—13 to 29 inches, dark-brown (10YR 4/3) fine sand; loose; few streaks of pale brown about 1/8 to 1/16 inch wide and about 1/4 to 1/2 inch apart; moderately alkaline; clear, smooth boundary.

C3—29 to 60 inches, brown (10YR 5/3) fine sand; few, fine, faint, yellowish-brown mottles; weak, fine, granular structure; loose; moderately alkaline.

The A horizon ranges from 4 to 10 inches in thickness. It is brown, very dark grayish-brown, or yellowish-brown fine sand, sand, or loamy sand. It is slightly acid to moderately alkaline in reaction. The C horizon is dark grayish-brown, brown, grayish-brown, dark-brown, or brownish-yellow fine sand, sand, or loamy sand. It is neutral to moderately alkaline in reaction. Mottles in shades of brown occur in places throughout the profile.

Crevasse soils are associated with Bruin, Commerce, Tunica, and Sharkey soils and Udipsamments. They are coarser textured and better drained than Bruin, Commerce, Tunica, and Sharkey soils. They contain more silt and clay than Udipsamments.

Cr—Crevasse soils, frequently flooded. These soils are between the Mississippi River and its protective levee. They are also on the island east of the Mississippi River. They are excessively drained and are sandy throughout. Crevasse soils are not protected by the Mississippi River levee system, and most areas are subject to periodic flooding that may leave new depositions or cause scouring. These soils are in nearly level to gently undulating areas about 5 to 300 acres in size. Most areas are less than 100 acres in size. Slopes are 0 to 3 percent.

Included with these soils in mapping are large areas of similar soils that have silt loam layers to a depth of 20 inches. Also included are small areas of Bruin, Commerce, and Sharkey soils and Udipsamments.

These soils are low in natural fertility. Little runoff occurs, because of the rapid water intake rate. Permeability is rapid. Plant roots penetrate the soil easily. The water table is at a depth of more than 6 feet, except when the Mississippi River is at high stage. Crevasse soils are droughty. The hazard of flooding, droughtiness, and poor traction are the main limitations of these soils for most uses.

Most areas of these soils are used for woodland (fig. 8). A small acreage is used for pasture. These soils are not well suited to cultivated crops, because they are droughty, they are subject to flooding, and they do not provide good traction for farm equipment. Common bermudagrass is a suitable pasture plant, but grazing is limited in most areas of these soils because of flooding. Growth of pasture is severely restricted during dry periods in summer and early in fall. Capability unit Vw–2, woodland suitability group 2s6.

Dundee series

The Dundee series consists of somewhat poorly drained, moderately slowly permeable soils. These soils formed in loamy sediment on the higher parts of natural levees bordering former channels and distributaries of the Mississippi River.

In a representative profile the surface layer is dark-

Figure 8.—**A young stand of sweetgum on Crevasse soils, frequently flooded.**

brown silt loam about 9 inches thick. The subsoil extends to a depth of about 33 inches. It is grayish-brown silty clay loam in the upper 5 inches and grayish-brown loam below. It is mottled throughout in shades of brown.

Most areas of these soils are used for crops. A small acreage is used for woodland and pasture.

Representative profile of Dundee silt loam, in a field, 12 miles west of Tallulah and 2 miles southwest of Waverly, 51 feet north of gravel road, 1,200 feet west of State Highway No. 577, SW¼SE¼ sec. 27, T. 17 N., R. 10 E.:

Ap1—0 to 4 inches, dark-brown (10YR 4/3) silt loam; few, fine, faint, pale-brown mottles; weak, medium, subangular blocky structure; friable; slightly acid; abrupt, smooth boundary.

Ap2—4 to 9 inches, dark-brown (10YR 4/3) silt loam; few, fine, faint, dark yellowish-brown and yellowish-brown mottles; massive; friable; slightly acid; abrupt, smooth boundary.

B21t—9 to 14 inches, grayish-brown (10YR 5/2) silty clay loam; common, fine, distinct, strong-brown mottles and few, fine, faint, dark yellowish-brown mottles; moderate, medium, subangular blocky structure; friable; many fine pores; common discontinuous clay films; medium acid; clear, smooth boundary.

B22t—14 to 25 inches, grayish-brown (10YR 5/2) loam; common, medium, distinct, strong-brown (7.5YR 5/6) mottles and common, fine, faint, yellowish-brown mottles; moderate, medium, subangular blocky structure; friable; common fine pores; common discontinuous clay films; strongly acid; clear, smooth boundary.

B3t—25 to 33 inches, grayish-brown (10YR 5/2) loam; common, medium, faint, yellowish-brown (10YR 5/6) mottles and common, fine, distinct, strong-brown mottles; moderate, medium and coarse, subangular blocky structure; friable; common fine pores; common patchy clay films; strongly acid; clear, smooth boundary.

C1—33 to 56 inches, light brownish-gray (10YR 6/2) silt loam; common, medium, distinct, dark-brown (7.5YR 4/4) mottles; weak, medium, subangular blocky structure; very friable; few fine pores; few patchy clay films in voids and root channels; few, soft, black concretions; medium acid; clear, smooth boundary.

C2—56 to 65 inches, light brownish-gray (10YR 6/2) silt loam; few, fine, faint, yellowish-brown and dark yellowish-brown mottles; weak, medium, subangular blocky structure; very friable; few, soft, black concretions; slightly acid.

The A horizon ranges from 4 to 10 inches in thickness. It is dark brown, dark grayish brown, or grayish brown and is mottled in shades of brown. It is silt loam or silty clay loam in texture and is slightly acid to medium acid in reaction. The B horizon is grayish brown or dark grayish brown and is mottled in shades of brown. It is silty clay loam, loam, or silt loam in texture and is medium acid to strongly acid in reaction. Clay films range from patchy to almost continuous on faces of peds. The C horizon is grayish brown, light brownish gray, or dark grayish brown and is mottled in shades of brown. It is generally stratified. It is silt loam, very fine sandy loam, loam, or silty clay loam in texture, but in places it has layers of silty clay or clay less than 10 inches thick. It is medium acid to neutral in reaction.

Dundee soils are associated with Tensas, Tunica, and Sharkey soils. They do not have the thick silty clay or clay B horizon that is typical of Tensas and Tunica soils. Dundee soils are better drained and are coarser textured than Sharkey soils. They are similar in color and texture to Commerce soils but are more acid and are more strongly developed.

Dd—Dundee silt loam. This soil is mainly on the highest parts of natural levees along Joes Bayou and Bayou Macon. It is a somewhat poorly drained, loamy soil. Areas range from about 10 to 600 acres in size, but most areas are more than 40 acres. Slopes are 0 to 2 percent.

This soil has the profile described as representative of the series. It is medium in natural fertility. Runoff is slow, and permeability is moderately slow. Plant roots penetrate the soil easily. A seasonally high water table is at a depth of 1.5 to 2 feet during the months December through April. Wetness and low strength are the main limitations for most uses.

Included with this soil in mapping are small areas of Dundee silty clay loam, Tensas, Tunica, and Sharkey soils. Also included are small areas of soils, on old Indian campground sites, that have dark-colored layers to a depth of as much as 20 inches.

Most areas of this soil are used for crops. A small acreage is used for pasture and woodland. Suitable crops are cotton, corn, soybeans, grain sorghum, wheat, oats, and truck crops. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, Pensacola bahiagrass, ryegrass, tall fescue, white clover, and dallisgrass. This soil is easy to work and responds well to management. It can be worked over a wide range of moisture content. Traffic pans develop easily under cultivation but can be broken by deep plowing or chiseling. A surface drainage system is needed in places to remove water from depressions. Smoothing and leveling of the land improve surface drainage and increase the efficiency of farm equipment. Nitrogen, lime, and other fertilizers are commonly needed for cultivated crops and pasture. Capability unit IIw-2, woodland suitability group 2w5.

De—Dundee silty clay loam. This somewhat poorly drained, loamy soil is mainly on natural levees of Joes Bayou and Bayou Macon. Areas are about 10 to 800 acres in size. Slopes are 0 to 1 percent.

This soil has a profile similar to the one described as representative of the series, but it has a silty clay loam surface layer. It is medium in natural fertility. Runoff is slow. Permeability is moderately slow. Plant roots penetrate this soil easily. A seasonally high water table is at a depth of 1.5 to 2.5 feet during the months of December through April. Wetness and low strength are the main limitations for most uses.

Included with this soil in mapping are small areas of Dundee silt loam and Tensas and Sharkey soils. Some small areas of soils that have slopes of 1 to 3 percent are also included.

Most areas of this soil are used for crops. A small acreage is used for woodland (fig. 9). Suitable crops are cotton, corn, soybeans, grain sorghum, wheat, and oats. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, Pensacola bahiagrass, ryegrass, dallisgrass, white clover, and tall fescue. This soil can be worked only over a fairly narrow range of moisture content. It commonly becomes cloddy if worked when wet. This soil is fairly easy to work, but it is somewhat difficult to keep in good tilth. Water stands in depressions for short periods after heavy rains. Surface drainage is needed for cultivated crops and pasture. Leveling and smoothing of the land improve surface drainage and increase the efficiency of farm equipment. This soil is low in nitrogen and is low to moderate in phosphorus and potassium. Nitrogen, lime, and other fertilizers are generally needed for cultivated crops and pasture. Capability unit IIw–4, woodland suitability group 2w5.

Ds—Dundee-Sharkey complex, gently undulating. These somewhat poorly drained loamy soils and poorly drained clayey soils are on low parallel ridges and in swales. The ridges are 1 foot to 3 feet high and 100 to 250 feet wide. The swales are slightly depressional and range from 25 to 200 feet in width. They drain slowly and remain wet for long periods. Dundee silt loam and silty clay loam are on the crests and sides of the ridges, and Sharkey clay is in the swales. Areas range from about 10 to 1,000 acres in size, but most areas are more than 40 acres. Slopes are 0 to 3 percent.

The Dundee soils make up about 55 percent of this mapping unit. They are medium to high in natural fertility. Permeability is moderately slow. The seasonally high water table is at a depth of 1.5 to 2.5 feet during the months of December through April. Water drains readily from the Dundee soils that are on the ridges and accumulates on the Sharkey soils that are in the swales. The Dundee soils generally are medium acid to strongly acid in reaction, but in some areas they are slightly acid to neutral at a depth of more than 30 inches. Wetness and low strength are the main limitations for most uses of the Dundee soils.

The Sharkey soils make up about 35 percent of this mapping unit. They are medium to high in natural fertility. Permeability is very slow. The seasonally high water table is at a depth of 2 feet during the months of December through April. Water stands on the Sharkey soils for short periods following heavy rains. These soils range from medium acid to neutral in the upper 20 inches and from neutral to moderately alkaline below. Wetness, low strength, and a very high shrink-swell potential are the main limitations for most uses.

The areas of Dundee and Sharkey soils are so intermingled and occur in such intricate patterns that they

***Figure 9.*—Woodland on Dundee silty clay loam.**

cannot be shown separately at the scale used in mapping.

Included with these soils in mapping are small areas of Tensas soils on the ridges and Tunica soils in the swales and on the lower slopes.

Most areas of these soils are used for woodland. A small acreage is used for crops and pasture. Suitable crops are cotton, soybeans, wheat, and oats. Suitable pasture plants are common bermudagrass, dallisgrass, Pensacola bahiagrass, white clover, tall fescue, and ryegrass. Drainage is necessary if the swales are used for crops and pasture. Management is somewhat difficult because of short, irregular slopes and wetness in the swales, which delays planting and cultivation. Smoothing and leveling of land improve drainage and increase efficiency of farm equipment. Erosion is a hazard on the ridges. Most crops respond well to fertilizer. Lime is generally needed on the Dundee soils. Capability unit IIIw–6; Dundee soils in woodland suitability group 2w5, and Sharkey soils in woodland suitability group 2w6.

Sharkey series

The Sharkey series consists of poorly drained, very slowly permeable soils that have a clayey or loamy surface layer and a clayey subsoil. These soils formed in clayey slack-water deposits on broad flats and on the lower part of natural levees.

In a representative profile the surface layer is dark grayish-brown clay about 6 inches thick. The subsoil extends to a depth of about 40 inches. It is dark-gray clay mottled in shades of brown. The underlying material is gray clay.

Most of the acreage is used for woodland. The remaining acreage is used for crops and pasture.

Representative profile of Sharkey clay, in a field, 1.5 miles north of Tallulah, 17 feet west of power pole, 342 feet northeast of field road, 1 mile south of road to Deltic headquarters, NW¼NE¼ sec. 44, T. 17 N., R. 13 E.:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) clay; common, fine, faint, dark-gray mottles; massive; firm; mildly alkaline; abrupt, smooth boundary.

B21g—6 to 17 inches, dark-gray (10YR 4/1) clay; common, fine, faint, dark yellowish-brown mottles; moderate, medium, subangular blocky structure; firm; pressure faces and slickensides on most peds; moderately alkaline; clear, smooth boundary.

B22g—17 to 25 inches, dark-gray (10YR 4/1) clay; common, medium, faint, dark yellowish-brown (10YR 4/4) and few, fine, faint, yellowish-brown mottles; moderate, medium, subangular blocky structure; firm; pressure faces apparent but not on every ped; moderately alkaline; clear, smooth boundary.

B3g—25 to 40 inches, dark-gray (10YR 4/1) clay; many, medium, faint, dark yellowish-brown (10YR 4/4) mottles; weak, coarse, subangular blocky structure; firm; slickensides about 3 inches wide with 45 degree angle; moderately alkaline; clear, smooth boundary.

C1g—40 to 49 inches, gray (10YR 5/1) clay; common, medium, faint, dark yellowish-brown (10YR 4/4) mottles; moderate, medium, subangular blocky structure; some coarse, subangular blocky peds; firm; moderately alkaline; clear, smooth boundary.

C2g—49 to 83 inches, gray (10YR 5/1) clay; common, medium, faint, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; firm; few, soft, black concretions; moderately alkaline.

The A horizon ranges from 4 to 10 inches in thickness. It is dark grayish brown, dark gray, or very dark grayish brown and is mottled in shades of brown. It is silty clay loam or silt loam in texture and is medium acid to moderately alkaline in reaction. The B horizon is dark-gray or gray clay that averages more than 60 percent clay content. It is mottled in shades of brown. It is medium acid to moderately alkaline between depths of 10 and 20 inches and is slightly acid to moderately alkaline below. The C horizon is dark-gray, gray, or olive-gray clay and is mottled in shades of brown. Some profiles have loamy material below a depth of 36 inches. The C horizon is slightly acid to moderately alkaline in reaction.

In the Sharkey soils, frequently flooded, strata are present that have a chroma of 2. These browner colors are outside the range defined for the Sharkey series, but this difference does not alter use or management of the soils.

Sharkey soils are associated with Bruin, Commerce, Dundee, Tensas, and Tunica soils. Sharkey soils have finer textured B and C horizons and are more poorly drained than Bruin, Commerce, and Dundee soils. They are more poorly drained and more alkaline than Tensas soils and lack the loamy B and C horizons that are typical of those soils. Sharkey soils lack the loamy C horizon that is typical of the Tunica soils.

Sa—Sharkey silt loam. This poorly drained soil is on the lower parts of natural levees. Areas range from about 10 to 300 acres in size. Slopes are less than 1 percent.

This soil has a profile similar to the one described as representative of the series, but the surface layer is silt loam about 8 inches thick. This soil is high in natural fertility. Runoff is slow. Permeability is very slow. Wetness causes poor aeration and restricts root development. A seasonally high water table is at a depth of 2 feet during the months of December through April. The surface layer is friable, is easy to cultivate, and dries out fairly soon under favorable moisture conditions. The clayey subsoil is difficult to use as construction material because it is sticky when wet and hard when dry. This soil cracks when dry, but the cracks are not so wide at the surface as those in the Sharkey clay. The cracks seal over when wet. Wetness, low strength, and the very high shrink-swell potential of the subsoil are the main limitations for most uses.

Included with this soil in mapping are small areas of Commerce silt loam and Sharkey silty clay loam.

Most areas of this soil are used for crops and pasture. Suitable crops are cotton, corn, soybeans, grain sorghum, oats, wheat, and rice. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, dallisgrass, Pensacola bahiagrass, ryegrass, white clover, and tall fescue. A surface drainage system is needed for cultivated crops and pasture plants. Smoothing and leveling of land improve drainage and increase efficiency of farm equipment. Most crops respond well to nitrogen fertilizer. Capability unit IIIw–3; woodland suitability group 2w6.

Sb—Sharkey silty clay loam. This poorly drained soil is on the lower parts of natural levees. It has a loamy surface layer and a clayey subsoil. Areas range from about 10 to 700 acres in size, but most areas are more than 40 acres. Slopes are less than 1 percent.

This soil has a profile similar to the one described as representative of the series, but the surface layer is silty clay loam about 9 inches thick. The subsoil is clayey throughout. This soil is high in natural fertility. Runoff is slow. Permeability is very slow. Wetness of the subsoil causes poor aeration and restricts root development. The surface cracks when dry and swells and seals over when wet. A seasonally high water table is at a depth of 0 to 2 feet during the months of December through April. Wetness, low strength, and a very high shrink-swell potential are limitations for most uses.

Included with this soil in mapping are small areas of Commerce silty clay loam, Sharkey clay, and Tunica soils.

Most areas of this soil are used for crops and pasture. A small acreage is used for woodland. Suitable crops are cotton, corn, soybeans, grain sorghum, oats, wheat, and rice. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, dallisgrass, Pensacola bahiagrass, ryegrass, white clover, and tall fescue. A surface drainage system is needed for cultivated crops and pasture. Smoothing and leveling of land improve drainage and increase efficiency of farm equipment. This soil is fairly easy to work, but it needs to be worked under favorable moisture conditions to prevent clodding. Most crops respond well to nitrogen fertilizer. Capability unit IIIw–3; woodland suitability group 2w6.

Sc—Sharkey clay. This soil is on lower parts of natural levees, on broad flats, and in depressions. It is poorly drained and is clayey throughout. Areas range from about 20 to 2,800 acres in size, but most areas are more than 200 acres (fig. 10). Slopes are 0 to 1 percent.

This soil has the profile described as representative of the series. It is high in natural fertility. Runoff is slow. Permeability is very slow. A seasonally high water table is at a depth of 0 to 2 feet during the months of December through April. Wetness causes poor aeration and restricts plant root development. This soil cracks when dry and seals over when wet. This soil is sticky when wet and hard when dry, and it is difficult to work. Wetness, low strength, and a very high shrink-swell potential are the main limitations for most uses.

Included with this soil in mapping are small areas of Sharkey silty clay loam and silt loam, small areas of Tensas and Tunica soils, and a few, small, low areas of soils that are subject to flooding.

Most areas of this soil are used for woodland. A fairly large acreage is used for crops, and a small

Figure 10.—Typical area of Sharkey clay that has recently been cleared.

acreage is used for pasture. Suitable crops are cotton, soybeans, grain sorghum, oats, wheat, and rice (fig. 11). Corn is not well suited. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, dallisgrass, ryegrass, white clover, and tall fescue. Adequate stands of Coastal bermudagrass are somewhat difficult to establish. Cultivation and harvesting are sometimes delayed because of wetness. This soil can only be worked within a narrow range of moisture content. In some years plants may suffer from a lack of moisture during dry periods. Most crops respond well to nitrogen fertilizer. Surface drainage is needed for crops and pasture. Smoothing and leveling of land improve drainage and increase efficiency of farm equipment. Capability unit IIIw–1; woodland suitability group 2w6.

Sd—Sharkey clay, undulating. This poorly drained soil is in long and narrow areas in the western part of the parish. Most areas are adjacent to narrow drainageways, but some areas are on ridges and in swales. In places the soil is in a repeating pattern of ridges and swales. The swales have gentle slopes on each side. A drainage ditch is generally in the swales. This soil is clayey throughout. Areas range from 10 to 200 acres in size, but most areas are less than 100 acres. Slopes are 0 to 5 percent.

This soil has the profile similar to the one described as representative of the series. It is high in natural fertility. Runoff is medium on the slopes and very slow in the depressional areas. Permeability is very slow. Wetness causes poor aeration and restricts plant root development. This soil is sticky when wet and is hard when dry. It can be worked only over a narrow range of moisture content. A seasonally high water table is at a depth of 0 to 2 feet during the months of December through April. Wetness, low strength, a very high shrink-swell potential, and short irregular slopes are the main limitations for most uses.

Figure 11.—Harvesting soybeans on Sharkey clay.

Included with this soil in mapping are small areas of Dundee, Tensas, and Tunica soils.

Most areas of this soil are used for crops and pasture. A small acreage is used for woodland. Suitable crops are cotton, soybeans, wheat, and oats. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, tall fescue, Pensacola bahiagrass, white clover, and ryegrass. Adequate stands of Coastal bermudagrass are somewhat difficult to establish. In some years plants may suffer from lack of moisture during dry periods. Good tilth is difficult to maintain. This soil can only be worked within a narrow range of moisture content. The drainage ditches in some swales limit the use of farm equipment. Most crops respond well to nitrogen fertilizer. Surface drainage is needed for crops and pasture. Smoothing and leveling of land improve drainage and increase efficiency of farm equipment. Capability unit IIIw–4; woodland suitability group 2w6.

Sf—Sharkey clay, frequently flooded. This poorly drained clayey soil is in depressional areas throughout the parish. These areas range from one-eighth to one-half of a mile in width and from 200 to 500 acres in size. Slopes are less than 1 percent.

This soil has a profile similar to the one described as representative of the series, but the material below the subsoil is dark gray. It is high in natural fertility. Runoff is very slow. This soil is ponded during winter and spring. Permeability is very slow. The soil is hard when dry and sticky when wet, and it is difficult to work. The soil is frequently flooded by 6 inches to 4 feet or more of water, mostly during winter and early in spring. It is occasionally flooded in summer and early in spring, but it is wet throughout most of the year. When the soil is not flooded, the water table is mainly at a depth of 0 to 3 feet. Flooding, wetness, low strength, and a very high shrink-swell potential are the main limitations for most uses.

Included with this soil in mapping are small areas of Tensas and Tunica soils. Small areas of soils that are not subject to flooding are also included.

Most areas of this soil are used for woodland. Flooding precludes its use for cultivated crops and pasture. Flooding and wetness severely restrict grazing. Common bermudagrass is a suitable pasture plant. Capability unit Vw–1, woodland suitability group 3w6.

SS—Sharkey soils, frequently flooded. These poorly drained soils are in some of the borrow pits from which the soil material has been removed to construct the Mississippi River levee. They are between the Mississippi River and its manmade levee. Areas range from about 10 to 200 acres in size. Slopes are 0 to 2 percent. The composition of this mapping unit is generally more variable than that of the other units in the survey area. Mapping has been controlled well enough, however, to make interpretations for the anticipated uses of the soils.

These soils have profiles similar to the one described as representative of the series, but their surface layer is silty clay loam, clay, or silt loam. These soils are high in natural fertility. Runoff is very slow. Permeability is very slow. These soils are frequently flooded with as much as 3 feet of water, mostly in winter and spring. When these soils are not flooded, the water table is mainly at a depth of 0 to 3 feet. Flooding, wetness, low strength, and a very high shrink-swell potential are the main limitations for most uses.

Included with these soils in mapping are small areas of Commerce and Tunica soils. Some small areas of soils that are not subject to flooding are also included. Borrow pits that contain water throughout the year and do not produce vegetation were mapped as water.

Most areas of these soils are used for woodland and pasture. A lack of suitable outlets limits improvement of drainage. Flooding and wetness severely restrict grazing. Common bermudagrass is a suitable pasture plant. Cultivated crops are not grown, because of the uneven surface and the hazard of flooding. Capability unit Vw–1; woodland suitability group 3w6.

St—Sharkey-Tunica complex, gently undulating. These soils are on low ridges and in swales. They are poorly drained and clayey. Areas range from about 25 to 1,400 acres in size, but most areas are more than 50 acres. The ridges are 1 foot to 3 feet high and 75 to 250 feet wide. They make up 65 percent of the area. The swales are slightly depressional and are 25 to 150 feet wide. They make up 35 percent of the area. Slopes are 0 to 3 percent.

Sharkey clay makes up about 55 percent of this mapping unit. It is on the ridges and in the swales. This soil is high in natural fertility. Permeability is very slow.

Tunica clay makes up about 35 percent of this mapping unit. It is on the ridges. This soil is high in natural fertility. Permeability is very slow in the upper 20 inches.

These soils have profiles similar to the ones described as representative of their respective series, but their surface layer is about 4 inches thick and is dark gray. Water drains readily from the Tunica and Sharkey soils that are on the ridges and accumulates on the Sharkey soil that is in the swales. The Sharkey soil in the swales remains wet for long periods. A seasonally high water table is at a depth of 0 to 2 feet during the months of December through April. Wetness causes poor aeration and restricts plant root development. Wetness, low strength, and a very high shrink-swell potential are the main limitations for most uses. These soils are hard when dry and sticky when wet, and they are difficult to work. They crack when dry and swell and seal over when wet.

Included with these soils in mapping are small areas of Commerce, Dundee, and Tensas soils. Small areas of soils that have slopes that exceed 3 percent are also included.

Most areas of these soils are used for crops and pasture. Suitable crops are cotton, soybeans, wheat, and oats (fig. 12). Corn is not well suited. Because these soils are on ridges and in swales, their use for rice is limited. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, dallisgrass, Pensacola bahiagrass, ryegrass, white clover, and tall fescue. Adequate stands of Coastal bermudagrass are somewhat difficult to establish. Good tilth is difficult to maintain. These soils can be worked only within a narrow range of moisture content. Some of the swales may be flooded by runoff from the higher areas after heavy rains. The soils in the swales need a surface drainage system if they are used for cultivated crops and pasture. Smoothing and leveling of land improve drainage and increase efficiency of farm equipment.

***Figure 12.*—Soybeans on Sharkey-Tunica complex, gently undulating.**

Most crops respond well to nitrogen fertilizer. Capability unit IIIw–4; woodland suitability group 2w6.

SU—Sharkey and Tunica soils, frequently flooded. These poorly drained soils are in some of the lowest elevations between the Mississippi River and its protective levee system and in areas east of the river. These soils are not protected by the levee system. Areas range from 10 to 1,200 acres in size. Slopes are 0 to 3 percent. The composition of this mapping unit generally is more variable than that of other units in the survey area. Mapping has been controlled well enough, however, to make interpretations for the anticipated uses of the soils. These soils could have been mapped separately at the scale used, but this was not considered practical because of the present and projected land use.

Sharkey soils make up about 70 percent of this mapping unit. They are at low elevations on wide flats and in narrow depressions.

Tunica soils make up about 20 percent of this mapping unit. They are on low ridges and on the highest part of the low natural levees.

These soils have profiles similar to the ones described as representative of their respective series, but the surface layer, in places, is clay, silty clay loam, or silt loam. They are high in natural fertility. These soils crack when dry and swell and seal over when wet. Runoff is very slow. When these soils are not flooded, the water table is mainly at a depth of 0 to 3 feet. Permeability is very slow. Flooding, wetness, a very high shrink-swell potential, and low strength are the main limitations for most uses.

Included with these soils in mapping are small areas of Bruin and Commerce soils. Some areas of soils that have stratified layers of silt loam, clay, and silty clay loam are also included.

Most areas of these soils are used for woodland (fig. 13). A small acreage is used for pasture. A suitable pasture plant is common bermudagrass. Cultivated crops are not grown, because of the hazard of flooding. Capability unit Vw–1; woodland suitability group 3w6.

***Figure 13.*—Woodland on Sharkey and Tunica soils, frequently flooded.**

Tensas series

The Tensas series consists of somewhat poorly drained, very slowly permeable soils. These soils formed in clayey sediment and in the underlying loamy sediment that is in slack-water deposits on the lower elevations of the natural levees of Joes Bayou, Bayou Macon, Tensas River, and the former channels of the Mississippi River.

In a representative profile the surface layer is dark grayish-brown clay about 5 inches thick. The subsoil extends to a depth of 49 inches. The upper part is 17 inches of grayish-brown silty clay, and the lower part is 27 inches of grayish-brown silty clay loam and silty loam. The subsoil is mottled throughout in shades of brown.

Most areas of these soils are used for woodland. A small acreage is used for crops and pasture.

Representative profile of Tensas silty clay in a field 12 miles northwest of Tallulah and 0.75 mile east of Joes Bayou, 69 feet east of half section line on the section line between sections 13 and 24, NW¼NE¼ sec. 24, T. 17 N., R. 11 E.:

Ap1—0 to 2 inches, dark grayish-brown (10YR 4/2) silty clay; few, fine, faint, yellowish-brown mottles; weak, medium, subangular blocky structure; friable; few fine pores; medium acid; abrupt, smooth boundary.

Ap2—2 to 5 inches, dark grayish-brown (10YR 4/2) silty clay; few, fine, faint, yellowish-brown mottles; massive; firm; medium acid; abrupt, smooth boundary.

B21t—5 to 16 inches, grayish-brown (10YR 5/2) silty clay; common, medium, distinct, strong-brown (7.5YR 5/6) and few, fine, faint, gray mottles; moderate, medium, subangular blocky structure; firm; common fine pores; thick discontinuous clay films; medium acid; clear, smooth boundary.

B22t—16 to 22 inches, grayish-brown (10YR 5/2) silty clay; many, medium, distinct, strong-brown (7.5YR 5/6) mottles; moderate, medium, subangular blocky structure; firm; common fine pores; common patchy clay films on ped surfaces and root channels; medium acid; clear, smooth boundary.

IIB31t—22 to 29 inches, grayish-brown (10YR 5/2) silty clay loam; common, medium, distinct, strong-brown (7.5YR 5/6) mottles; moderate, medium, subangular blocky structure; firm; common fine pores; common patchy clay films; some root channels filled with very dark gray material; very few, fine, brown concretions; medium acid; clear, smooth boundary.

IIB32t—29 to 37 inches, grayish-brown (10YR 5/2) silt loam; common, medium, distinct, strong-brown (7.5YR 5/6) mottles and few, fine, faint, yellowish-brown mottles; weak, medium, subangular blocky structure; firm; common fine pores; common patchy clay films; few, fine, black concretions; few root channels filled with very dark gray (10YR 3/1) material; slightly acid; clear, smooth boundary.

IIB33t—37 to 49 inches, grayish-brown (10YR 5/2) silt loam; common, medium, distinct, dark-brown (7.5YR 4/4) mottles; weak, medium, subangular blocky structure; friable; few fine pores; thin patchy clay films on some ped faces and in a few root channels; slightly acid; clear, smooth boundary.

IIC1—49 to 63 inches, grayish-brown (10YR 5/2) silt loam; common, medium, faint, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; slightly sticky; few, fine, black concretions; neutral; clear, smooth boundary.

IIC2—63 to 67 inches, brown (10YR 5/3) very fine sandy loam; common, medium, faint, grayish-brown (10YR 5/2) mottles; weak, medium, subangular blocky structure; nonsticky; mildly alkaline.

The A horizon ranges from 4 to 7 inches in thickness. It is dark grayish brown or grayish brown and has mottles in shades of brown. It ranges from medium acid to neutral in reaction. The B1 and B2t horizons are grayish brown or dark grayish brown. Some dark-gray and gray layers occur in places, particularly in and adjacent to Indian mounds. Mottles are in shades of brown. Texture is mostly silty clay, but it ranges to clay. Clay films range from common patchy to almost continuous. These horizons range from very strongly acid to medium acid in reaction. Combined thickness of the clayey A and B2 horizon is 18 to 27 inches. The IIB3t horizon is grayish brown and dark grayish brown and has mottles in shades of brown. It is silty clay loam, silt loam, or very fine sandy loam. Reaction ranges from medium acid to slightly acid. The IIC horizon is grayish brown or brown and has mottles in shades of brown. It is silt loam and very fine sandy loam that has layers of silty clay loam and ranges from slightly acid to neutral above a depth of 60 inches in reaction. Some profiles are mildly alkaline below a depth of 60 inches.

Tensas soils are associated with Dundee, Sharkey, and Tunica soils. Tensas soils are finer textured in the surface layer and in the upper part of the subsoil than Dundee soils. They are more acid and are better drained than Sharkey and Tunica soils. They are coarser textured in the lower part of the B horizon than Sharkey and Tunica soils.

Ta—Tensas silty clay. This somewhat poorly drained soil is mostly on nearly level areas on the lower parts of the natural levees of Bayou Macon, Joes Bayou, and the Tensas River. It is clayey in the upper part of the profile and loamy in the lower part. Areas range from about 10 to 900 acres in size, but most areas are more than 40 acres. Slopes are 0 to 1 percent.

This soil has the profile described as representative of the series. It is medium in natural fertility. Runoff is medium to slow. Permeability is very slow. A seasonally high water table is at a depth of 1 foot to 3 feet during the months of December through April. This soil cracks when dry and swells and seals over when wet. A very high shrink-swell potential in the upper 22 inches, wetness, and low strength are the main limitations for most uses.

Included with this soil in mapping are small areas of Dundee, Sharkey, and Tunica soils. Also included are small areas of soils on old Indian campground sites. These soils have dark-colored layers to a depth of as much as 20 inches. Small areas of soils that have slopes that exceed 1 percent are also included.

Most areas of this soil are used for woodland. A small acreage is used for crops and pasture. Suitable crops are cotton, soybeans, grain sorghum, wheat, oats, and rice. Corn is not well suited. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, dallisgrass, ryegrass, white clover, and tall fescue. Adequate stands of Coastal bermudagrass are somewhat difficult to establish. In some years plants may suffer from a lack of moisture during dry periods in summer and fall. Good tilth is difficult to maintain, because of the high clay content in the surface layer. The soil can only be worked within a narrow range of moisture content and generally becomes cloddy when worked. It is hard when dry, sticky when wet, and is difficult to work. Complete fertilizers, as well as lime, are needed. Adequate drainage is needed if the soil is used for row crops and pasture. Smoothing and leveling of land improve drainage and increase efficiency of farm equipment. Capability unit IIIw-2; woodland suitability group 2w6.

Ts—Tensas-Sharkey complex, gently undulating. These somewhat poorly drained and poorly drained soils are on low parallel ridges and in swales. Areas range from about 10 to 2,300 acres in size, but most areas are more than 100 acres. Slopes are 0 to 3 percent. The ridges are 1 foot to 3 feet high and 100 to 200 feet wide. They make up about 55 percent of this mapping unit. The swales are slightly depressional and are 50 to 300 feet wide.

Tensas silty clay has a profile similar to the one described as representative of the Tensas series. It is on ridges and side slopes. This soil is medium in natural fertility. Water drains readily from this soil and accumulates on the Sharkey soils in the swales. This soil has a seasonally high water table at a depth of 1 foot to 3 feet during the months of December through April. Permeability is very slow. Shrink-swell potential is very high in the upper 22 inches and low to moderate below. Wetness causes poor aeration and restricts plant root development. A very high shrink-swell potential, wetness, and low strength are the main limitations for most uses.

The Sharkey soils have a profile similar to the one described as representative of the Sharkey series, but the surface layer is silty clay loam and clay. These soils are in the swales. They are high in natural fertility. Permeability is very slow. Shrink-swell potential generally is very high throughout the profile. A seasonally high water table is at a depth of 0 to 2 feet during the months of December through April. Wetness causes poor aeration and restricts plant root development. A very high shrink-swell potential, wetness, and low strength are the main limitations for most uses.

Included with these soils in mapping are small areas of Dundee and Tunica soils and small areas of Sharkey soils that flood during winter and spring.

Most areas of these soils are used for woodland. A small acreage is used for crops and pasture. Suitable crops are cotton, wheat, soybeans, and oats. Corn is not well suited. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, dallisgrass, Pensacola bahiagrass, ryegrass, white clover, and tall fescue. Adequate stands of Coastal bermudagrass are somewhat difficult to establish. In some years plants may suffer from lack of moisture during dry periods in summer and fall. The short irregular slopes, the texture of the surface layer, and the wetness in the swales make tillage operations difficult. A surface drainage system is needed in the swales for cultivated crops and pasture. Smoothing and leveling of land improve drainage and increase efficiency of farm equipment. The soils are hard when dry and sticky when wet. They can be worked within a narrow range of moisture content. They are difficult to work. The surface layer cracks when dry and seals over when wet. Complete fertilizers, as well as lime, are needed on the Tensas soil. Sharkey soils respond well to nitrogen fertilizer. Capability unit IIIw-5; woodland suitability group 2w6.

Tunica series

The Tunica series consists of poorly drained, very slowly permeable soils on the lower part of natural levees. These soils formed in clayey sediment that is underlain by loamy sediment.

In a representative profile the surface layer is dark grayish-brown clay about 8 inches thick. The subsoil is about 22 inches of dark-gray clay. The underlying material is stratified dark-gray and grayish-brown silty clay loam and silt loam mottled in shades of brown.

Most areas of these soils are used for woodland and crops. A small acreage is used for pasture.

Representative profile of Tunica clay, in woodland, 4.5 miles northeast of Waverly, 40 feet south of gravel road, NE¼SE¼ sec. 33, T. 18 N., R. 11 E.:

A11—0 to 3 inches, dark grayish-brown (10YR 4/2) clay; few, fine, faint, dark-brown mottles; moderate, medium, subangular blocky structure; firm; few fine pores; mildly alkaline; clear, smooth boundary.

A12—3 to 8 inches, dark grayish-brown (10YR 4/2) clay and common, medium, faint, dark yellowish-brown (10YR 4/4) mottles and few, fine, faint, yellowish-brown mottles; moderate, medium, subangular blocky structure; firm; few fine pores; neutral; clear, smooth boundary.

B21g—8 to 17 inches, dark-gray (10YR 4/1) clay; common, medium, faint, dark yellowish-brown (10YR 4/4) mottles and few, fine, faint, yellowish-brown mottles; moderate, medium, subangular blocky structure; firm; neutral; clear, smooth boundary.

B22g—17 to 26 inches, dark-gray (10YR 4/1) clay; common, medium, faint, dark yellowish-brown (10YR 4/4) mottles; weak, medium, subangular blocky structure; firm; few, fine, brown concretions; mildly alkaline; clear, smooth boundary.

IIC1—26 to 32 inches, dark-gray (10YR 4/1) silty clay loam; common, medium, faint, brown (10YR 5/3) mottles and few yellowish-brown mottles; weak, medium, subangular blocky structure; firm; mildly alkaline; abrupt, smooth boundary.

IIC2—32 to 38 inches, grayish-brown (10YR 5/2) silt loam; many, medium, faint, brown (10YR 5/3) mottles; weak, medium, subangular blocky structure; friable; fine and medium pores; mildly alkaline; clear, smooth boundary.

IIC3—38 to 53 inches, grayish-brown (10YR 5/2) silt loam; common, medium, faint, brown (10YR 5/3) mottles and few, fine, faint, yellowish-brown mottles; weak, medium, subangular blocky structure; friable; few fine pores; mildly alkaline; clear, smooth boundary.

IIC4—53 to 76 inches, grayish-brown (10YR 5/2) silt loam; common, medium, faint, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; very friable; few fine pores; few streaks of gray; moderately alkaline.

The solum ranges from 20 to 34 inches in thickness. The profile is mottled in shades of brown. The A horizon is 4 to 9 inches thick. It is dark grayish-brown, dark-gray, or very dark grayish-brown clay, silty clay, silty clay loam, or silt loam. It ranges from medium acid to mildly alkaline in reaction. The B horizon is dark-gray or gray clay. It ranges from slightly acid to mildly alkaline. The IIC horizon is dark gray and grayish brown. It is silty clay loam, silt loam, or very fine sandy loam in texture. Stratification is common. The IIC horizon ranges from neutral to moderately alkaline in reaction.

Tunica soils are associated with Bruin, Commerce, Sharkey, and Tensas soils. Tunica soils have a finer textured B horizon than Bruin and Commerce soils. They lack the clayey C horizon of Sharkey soils. Tunica soils are finer textured in the lower part of the B horizon than Tensas soils and are less acid.

Tu—Tunica clay. This nearly level soil is on the lower parts of natural levees. It is poorly drained and is clayey in the surface layer and in the subsoil and loamy in the underlying material. Areas range from about 10 to 1,400 acres in size, but most areas are more than 60 acres. Slopes are 0 to 1 percent.

This soil is high in natural fertility. Runoff is slow. Permeability is very slow in the clayey surface layer and in the subsoil and moderate in the loamy underlying material. A seasonally high water table is at a depth of 0 to 2 feet during the months of December through April. Wetness causes poor aeration and restricts plant root development. This soil has very high shrink-swell potential in the clayey surface layer and in the subsoil. It cracks when dry and seals over when wet. A very high shrink-swell potential, low strength, and wetness are the main limitations for most uses.

Included with this soil in mapping are small areas of Commerce, Sharkey, and Tensas soils. Also included are small areas of soils on old Indian campground sites. These soils have dark-colored layers as much as 20 inches deep. Small areas of Tunica silt loam and silty clay loam are also included.

Most areas of this soil are used for woodland. A small acreage is used for crops and pasture. Suitable crops are cotton, grain sorghum, soybeans, wheat, oats, and rice. Corn is not well suited. Suitable pasture plants are common bermudagrass, Coastal bermudagrass, dallisgrass, tall fescue, Pensacola bahiagrass, white clover, and ryegrass. Adequate stands of Coastal bermudagrass are difficult to establish. Surface drainage is needed for crops and pasture. Smoothing and leveling of land improve drainage and increase efficiency of farm equipment. This soil is sticky when wet and hard when dry, and it is difficult to work. It can be worked only within a narrow range of moisture content. Crops respond well to nitrogen fertilizer. Capability unit IIIw-1; woodland suitability group 2w6.

Udifluvents

Ud—Udifluvents. This unit consists of well drained to somewhat poorly drained soils on spoil banks along Bayou Macon. It consists of highly variable clayey and loamy material dredged from the bayou. The areas are 50 to 300 feet wide, 15 to 30 feet high, and 2 to 12 miles long. Slopes are 3 to 20 percent.

Included with these soils in mapping are small areas of soils that have slopes of more than 20 percent.

These soils are medium in natural fertility. Runoff ranges from slow to rapid, and permeability is moderate to very slow. The depth to the water table is highly variable. The clayey material has a high shrink-swell potential. Wetness, steepness, low strength in places, and the uneven surface are the main limitations to the use of these soils.

About half of the acreage has been partially smoothed and used for pasture. The remaining acreage is steep and rough, and it is mostly in vines and trees. Common bermudagrass is a suitable pasture plant.

These soils are not suited to cultivated crops, because of the uneven surface and the steep slopes. They can be smoothed and used for pasture or planted to desirable trees. Capability unit VIe-1; woodland suitability group 2o6.

Udipsamments

Udipsamments consists of excessively drained, rapidly permeable soils. These soils occupy some of the highest elevations in the parish. They formed in sandy sediment of the Mississippi River and are between the river and the protective levee.

In a representative profile the surface layer is dark yellowish-brown loamy sand about 4 inches thick. The underlying material is brown sand and fine sand mottled in shades of brown.

Most areas of these soils have a sparse cover of weeds, grasses, and a few scrub trees. These areas are used for wildlife habitat and for very limited grazing by livestock.

Representative profile of Udipsamments on Paw Paw Island, 5,520 feet southwest of Louisiana-Mississippi state line near power line, 45 feet southeast of field road, 651 feet east of pasture fence, T. 17 N., R. 2 E.:

A—0 to 4 inches, dark yellowish-brown (10YR 4/4) loamy sand; single grained; very friable; many clear sand grains; common black sand grains; few sand grains in shades of brown; mildly alkaline; clear, smooth boundary.

C1—4 to 8 inches, brown (10YR 5/3) fine sand; common, medium, faint, dark yellowish-brown (10YR 4/4) mottles; single grained; loose; many clear sand grains; common black sand grains and a few sand grains in shades of brown; moderately alkaline; clear, smooth boundary.

C2—8 to 17 inches, brown (10YR 5/3) sand; single grained; loose; horizontal streak of dark-brown (10YR 4/3) fine sand 1/8 to 1/4 inch wide; many clear sand grains; common black sand grains; few sand grains in shades of brown; moderately alkaline; clear, smooth boundary.

C3—17 to 60 inches, brown (10YR 5/3) sand; single grained; loose; few, very thin, dark-brown strata throughout; many clear sand grains; common black sand grains and few sand grains in shades of brown; moderately alkaline.

The A horizon ranges from 4 to 6 inches in thickness. It is dark yellowish brown, brown, or grayish brown and is mottled in shades of brown. It is neutral to moderately alkaline in reaction and is fine sand or loamy sand in texture. The C horizon is brown or light yellowish brown and is mottled in shades of brown. It is mildly alkaline or moderately alkaline in reaction and is sand or fine sand in texture.

Udipsamments are associated with Bruin, Commerce, and Crevasse soils. They are coarser textured than Bruin and Commerce soils. Udipsamments contain less silt and clay than Crevasse soils.

Us—Udipsamments. These soils are on the highest elevations in the parish between the Mississippi River and the protective levees, but they are subject to occasional flooding. They are excessively drained, sandy soils that formed in sandy alluvium deposited by the Mississippi River. Areas range from about 5 to 450 acres in size. Slopes are 0 to 5 percent.

Included with these soils in mapping are small areas of Bruin, Commerce, and Crevasse soils and small areas of soils that are rarely flooded.

These soils are low in natural fertility. Runoff is very slow because of the high water intake rate of the soil. Permeability is rapid. The water table is below a depth of 60 inches. Plants suffer from lack of moisture in spring, summer, and fall and in dry periods during winter.

Most areas of these soils have a sparse cover of weeds, grasses, and a few scrub trees (fig. 14). These areas are used mostly for wildlife habitat and for very limited grazing by livestock. Droughtiness, poor traction, and rapid percolation of water are the main limitations for most uses.

Droughtiness severely limits the use of these soils for cultivated crops or woodland, and livestock grazing is generally limited to early in spring. Poor traction in the loose, dry sand makes the operation of equipment very difficult. These soils receive no runoff or moisture recharge by seepage from the river or nearby lakes. Capability unit VIs-1, not placed in a woodland suitability group.

Use and management of the soils

The soils in Madison Parish are used mainly for cultivated crops, woodland, and pasture. This section explains how the soils can be managed for these purposes, discusses the use and management of the soils for wildlife, and gives facts about the characteristics of the soils that are significant in building local roads, pond reservoir areas, and similar engineering structures. This section also defines the capability classification used by the Soil Conservation Service, in which the soils are grouped according to their suitability for crops, and gives estimated yields per acre of the principal crops grown under a high level of management.

General principles of soil management

Important practices that can be used in managing the soils of Madison Parish are described in the following paragraphs.

Fertilizing and liming.—The soils in Madison Parish range from very strongly acid to moderately alkaline in reaction. They are generally low in organic-matter content and in available nitrogen. Nitrogen is normally the only fertilizer needed on the more alkaline soils, such as Bruin, Commerce, Crevasse, Sharkey, and Tunica soils. Nitrogen generally is not needed for legumes. On the more acid soils, such as the Dundee and Tensas soils, a fertilizer that includes nitrogen, phosphorus, and potassium is generally needed. Lime may also be needed. The amount of fertilizer needed depends on the crop to be grown, on the cropping history, on the level of yield desired, on the kind of soil, and on the results of soil tests.

Drainage.—Excess water should be removed from soils such as the poorly drained Sharkey and Tunica soils. In areas that have inadequate surface drainage, planting and cultivation are delayed, adequate stands are difficult to obtain, weeds are difficult to control, crops are drowned out, yields are generally low, and harvesting is delayed (fig. 15). A large acreage of soils in the parish has been drained. The most common method of removing excess water is the use of open

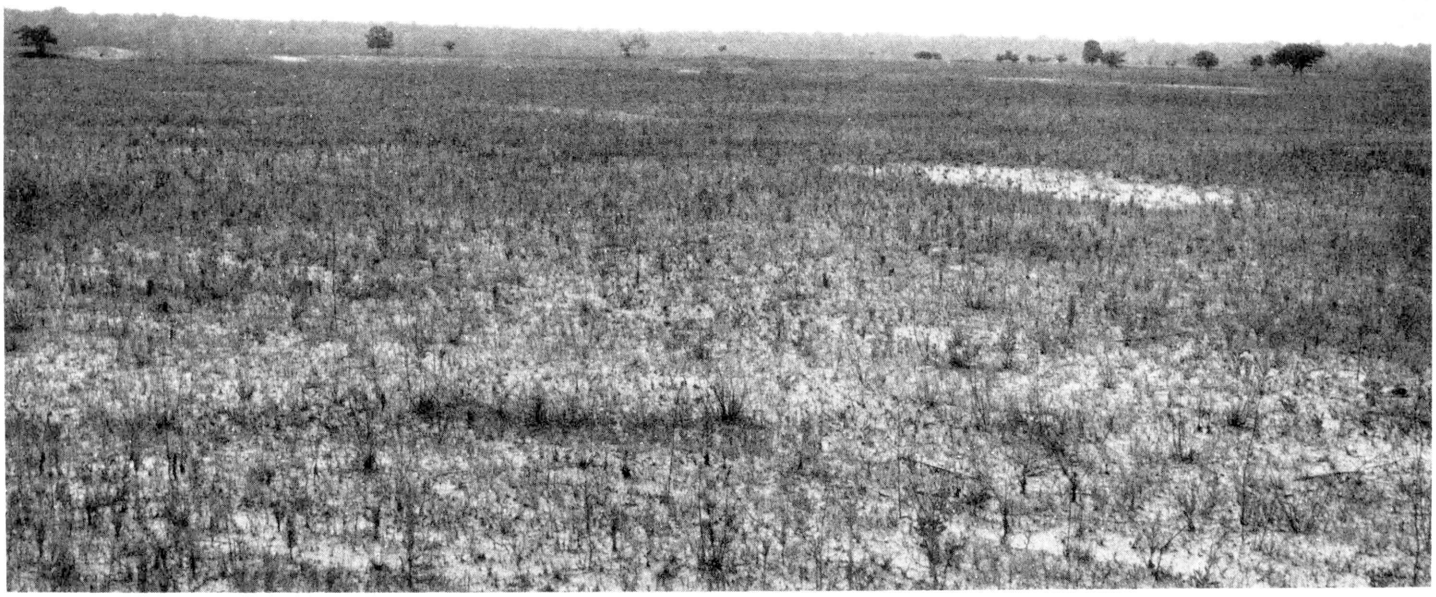

Figure 14.—Typical vegetation on Udipsamments.

Figure 15.—**Inadequate surface drainage on Sharkey clay.**

surface ditches and laterals. An adequate outlet is needed if a drainage system is to function properly. Another method used to improve drainage is leveling and grading of land. This practice consists of precision leveling to a uniform grade. Land grading improves surface drainage and eliminates cross ditches, which makes longer rows possible and increases efficiency of farm equipment.

Maintaining organic-matter content.—Organic matter is an important source of nitrogen. The supply of organic matter in the soils can be temporarily increased 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 (*7*), by adding manure, and by applying the proper amounts of lime and fertilizer.

Tillage.—Excessive tillage destroys the soil structure. Clods form on some of the cultivated clayey soils, and a compact layer develops in the loamy soils. This compact layer, generally known as a traffic pan or a plowpan, develops just below plow depth. Deep plowing or chiseling helps to break up this pan. The soils can be protected from beating rains by the use of tillage implements that stir the surface and leave crop residue on top. This residue helps to reduce surface crusting, increases infiltration, controls erosion, and reduces runoff.

Flood control.—A manmade levee system along the Mississippi River protects most of the parish from flooding, but a small acreage at a low elevation on the protected side of the levee system is flooded by local accumulations. Dikes and pumps are needed to drain most of these low areas. Most of the acreage between the Mississippi River and its levee system is subject to frequent flooding.

Cropping system.—A suitable cropping system includes a legume to supply nitrogen, a cultivated crop to aid in weed control, a deep-rooted crop to utilize plant nutrients in the subsoil and increase permeability, and a close-growing crop to help maintain the organic-matter content and to reduce erosion.

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 farms. 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 permanent 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 landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops 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 range, 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 broadest grouping, the capability class, is designated by Roman numerals I to VIII. In class I are the soils that have the fewest limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, so shallow, or so otherwise limited that they do not produce worthwhile yields of crops, forage, or wood products. The subclass indicates major kinds of limitations within the classes. Within most of the classes there can be as many as 4 subclasses. The subclasses are indicated by adding a small letter, *e, w, s*, or *c*, to the class numeral, for example, VIe. The letter "e" shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; "w" means that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); "s" shows that the soil is limited mainly because it is shallow, droughty, or stony; and "c" indicates that the chief limitation is climate that is too cold or too dry.

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

Subclasses are further divided into groups called capability units. These are groups of soils that are so much alike that they are suited to the same crops and pasture plants, require about the same management, and generally similar productivity and other responses to management. Capability units are generally identified by numbers assigned locally, for example, IIw–1 or IIIw–1.

The eight classes in the capability system and the subclasses and units in this survey area are described in the list that follows. The unit designation is given in the "Guide to Mapping Units."

Class I soils have few limitations that restrict their use.
- Unit I–1. Moderately well drained, nearly level soils that have a surface layer of silt loam and a subsoil of silt loam.

Class II soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.
- Subclass IIw. Soils moderately limited because of excess water.
  - Unit IIw–1. Somewhat poorly drained, nearly level loamy soils that have a surface layer of silt loam and a subsoil of stratified layers of silt loam and silty clay loam.
  - Unit IIw–2. Somewhat poorly drained, nearly level soils that have a surface layer of silt loam; the subsoil is loamy and is medium acid to strongly acid.
  - Unit IIw–3. Somewhat poorly drained, nearly level soils that have a surface layer of silty clay loam and loamy subsoil.
  - Unit IIw–4. Somewhat poorly drained, nearly level soils that have a surface layer of silty clay loam and a medium to strongly acid loamy subsoil.
  - Unit IIw–5. Somewhat poorly drained, gently undulating soils that have a surface layer of silty clay loam and a loamy subsoil.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
- Subclass IIIw. Soils severely limited for cultivation because of excess water.
  - Unit IIIw–1. Poorly drained, nearly level soils that have a clayey surface layer and clayey subsoil.
  - Unit IIIw–2. Somewhat poorly drained, nearly level soils that have a clayey surface layer; the subsoil is loamy and is medium acid to strongly acid.
  - Unit IIIw–3. Poorly drained, nearly level soils that have a loamy surface layer and a clayey subsoil.
  - Unit IIIw–4. Poorly drained, gently undulating soils that have a clayey surface layer and a clayey subsoil.
  - Unit IIIw–5. Somewhat poorly drained and poorly drained, gently undulating soils that have a clayey surface layer and a clayey subsoil.
  - Unit IIIw–6. Somewhat poorly drained and poorly drained, gently undulating soils that have a loamy or clayey surface layer; the subsoil is loamy or clayey; loamy soils are medium acid, and clayey soils are alkaline.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both (None in Madison Parish).

Class V soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture or range, woodland, or wildlife habitat.
- Subclass Vw. Soils too wet for cultivation; drainage or protection not feasible.
  - Unit Vw–1. Poorly drained, level to gently undulating, frequently flooded soils that have a clayey surface layer and clayey subsoil.
  - Unit Vw–2. Excessively drained, nearly level to gently undulating, frequently flooded sandy soils.
  - Unit Vw–3. Moderately well drained and somewhat poorly drained, frequently flooded soils that have a loamy surface layer and loamy subsoil.

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife habitat.
- Subclass VIe. Soils severely limited for cultivation, chiefly because of risk of erosion unless protective cover is maintained.
  - Unit VIe–1. Steep, loamy and clayey soils.
- Subclass VIs. Soils severely limited for cultivation, chiefly because of sandy texture, excessive drainage, and low available water capacity.
  - Unit VIs–1. Excessively drained, nearly level to gently sloping, droughty, sandy soils.

Class VII soils have very severe limitations that make them unsuited to cultivation and restrict their use mainly to range, woodland, or wildlife food and cover (None in Madison Parish).

Class VIII soils and landforms 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 Madison Parish).

Estimated yields

Table 2 lists estimated yields of the principal crops grown under high level management in Madison Parish. The estimates are based on observations made by farmers, soil scientists, and others who have knowledge of yields in the parish and on research data. The estimated yields are average yields per acre that can be expected by good commercial farmers at the level of management which 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 estimated yields given 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 soil 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 test and crop needs.
7. Suitable crop varieties are used at recommended seeding rates.

Woodland[4]

Merchantable hardwood woodland covers about half of Madison Parish. Use of the soils for row crops,

[4] MAX JOHNSTON, woodland conservationist, Soil Conservation Service, assisted in preparation of this section.

TABLE 2.—*Estimated average yields per acre of principal crops and pasture plants under high level of management*

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

Soil	Crops				Pasture	
	Cotton	Corn	Soybeans	Rice	Common bermudagrass	Coastal bermudagrass
	Lb of lint	*Bu*	*Bu*	*Bu*	*AUM* [1]	*AUM* [1]
Bruin silt loam	950	100	42		8.5	15.5
Bruin and Commerce soils, frequently flooded:						
Bruin					6.5	
Commerce					6.5	
Commerce silt loam	900	95	40		8.5	15.5
Commerce silty clay loam	850	85	40		8.0	15.0
Commerce silty clay loam, gently undulating	800	85	35		7.5	14.5
Crevasse soils, frequently flooded					4.5	
Dundee silt loam	800	90	38		8.0	13.0
Dundee silty clay loam	750	80	38		7.5	11.5
Dundee-Sharkey complex, gently undulating:						
Dundee	725		35		7.5	11.5
Sharkey	600		30		6.5	10.0
Sharkey silt loam	725	80	40	120	7.5	12.0
Sharkey silty clay loam	700	75	40	130	7.0	11.5
Sharkey clay	675		40	130	6.5	10.5
Sharkey clay, undulating	600		35		6.5	10.5
Sharkey clay, frequently flooded					5.0	
Sharkey soils, frequently flooded					5.0	
Sharkey-Tunica complex, gently undulating:						
Sharkey	600		35		6.5	10.5
Tunica	600		35		6.5	10.5
Sharkey and Tunica soils, frequently flooded:						
Sharkey					5.0	
Tunica					5.0	
Tensas silty clay	600		35	120	6.0	10.5
Tensas-Sharkey complex, gently undulating:						
Tensas	575		30		6.0	10.5
Sharkey	600		35		6.5	10.5
Tunica clay	650		40	130	6.5	10.5
Udifluvents					6.0	
Udipsamments						

[1] Animal-unit-month. The amount of forage required to maintain one animal unit (one cow, horse, or mule; or five sheep or goats) per acre for a period of 30 days without damage to pasture.

mainly soybeans, has greatly reduced the acreage of woodland in the parish. From 1962 to 1972, it is estimated that more than 63,000 acres of woodland was cleared. Most of the clearing was done on the clayey soils.

Two forest cover types are represented in Madison Parish. The main type is made up of cherrybark, water oak, sweetgum, pecan, green ash, sugarberry, and American elm. Less extensive is the riverfront type, which mainly consists of eastern cottonwood, American sycamore, and black willow.

In table 3 the suitability of the soils in Madison Parish for woodland is given. This table shows the potential productivity of the soils for important trees, rates the soils for various limitations to management, and lists trees that are suitable for planting.

The soils in table 3 are placed in woodland suitability groups. The purpose of these groups is to assist owners in planning the use of the soils for wood crops. Each group is made up of soils that are suited to the same kind of trees; that need approximately the same kind of management where the vegetation is similar; and that have about the same potential productivity.

Each woodland group is identified by a three-part symbol, such as 1o4, 2w6, or 3s5. The first part of the symbol, always a number, indicates relative potential productivity of the soils in the group: 1, very high; 2, high; 3, moderately high.

These ratings are based on field determinations of average site index. Site index is the height, in feet, that the dominant trees of a given species, on a specified kind of soil, reach in a natural, unmanaged stand in a stated number of years. For the merchantable hardwoods in Madison Parish, the site index is the height reached in 50 years, except for cottonwood, for which the index is the height reached in 30 years, and sycamore, for which the index is the height reached in 35 years.

The second part of the symbol identifying a woodland group is a small letter. This letter indicates an important soil property that imposes a slight, moderate, or severe hazard or limitation in managing the soils of a group for wood crops. A letter *o* shows that the soils have few limitations that restrict their use for trees; *s* shows that the soils are sandy and dry, have little or no difference in texture between surface layer and subsoil (or B horizon), have a low available water capacity, and generally have a low supply of plant nutrients; *w* shows that water in or on the soil, either seasonally or all year, is the chief limitation.

The third part of the symbol indicates the degree of hazards or limitations, and the general suitability of the soil for certain kinds of trees.

The numeral 4 indicates soils that have few if any limitations to management and are best suited to broadleaf trees.

The numeral 5 indicates soils that have one or more moderate limitations to management and are best suited to broadleaf trees.

The numeral 6 indicates soils that have one or more severe limitations to management and are best suited to broadleaf trees.

The hazards or limitations that affect management of soils for woodland are erosion hazard, equipment limitations, and seedling mortality.

Erosion hazard refers to the potential hazard of soil losses in well-managed woodland. The hazard is *slight* if expected soil losses are small; *moderate* if some soil losses are expected and care is needed during logging and construction to reduce soil losses; and *severe* if special methods of operation are necessary for preventing excessive soil losses (*3, 11*).

Equipment limitations are rated on the basis of soil characteristics that restrict or prohibit the use of equipment commonly used in tending and harvesting the trees. The most limiting characteristics are drainage, texture of the surface layer, slope, and depth to the water table. *Slight* means that there is no restriction in the kind of equipment or in the time of year it is used; *moderate* means that use of equipment is restricted for less than 3 months of the year; and *severe* means that special equipment is needed and its use is restricted for more than 3 months of the year.

Seedling mortality refers to the expected degree of mortality of planted seedlings as influenced by kinds of soil when plant competition is not a limiting factor. Considered in the ratings are hazard of flooding, drainage, depth to water table, soil depth and structure, and degree of erosion. Normal rainfall, good planting stock, and proper planting are assumed. A rating of *slight* indicates an expected loss of less than 25 percent of the planted seedlings; *moderate* indicates a loss of 25 to 50 percent of the planted seedlings; and *severe* indicates a loss of more than 50 percent of the seedlings. Special preparation of the site is needed before planting for soils rated severe and for most soils rated moderate.

In the last column is a list of trees suitable to plant for commercial wood production.

Wildlife [5]

The soils of Madison Parish provide food and cover for many forms of wildlife. The suitability of the soils as habitat for wildlife depends mainly on the types of vegetation the soils can produce and on man's use of the land and vegetation.

The most important game and fur-bearing animals in this parish are deer, dove, duck, mink, nutria, quail, raccoon, rabbit, squirrel, and turkey. In the open farming areas, the dove population during winter is good, but because of clean farming, the quail and cottontail rabbit populations are low. The black bear population is limited and does not provide good hunting. Common snipe and woodcock are also present during winter, but they are not hunted extensively. The most common species of game and commercial fish are bowfin or grinnel, buffalo, carp, channel and other catfish, crappie or sacalait, bluegill, gar, gaspergou, largemouth bass, and shellcracker.

Madison Parish has one of the largest deer populations in the State. Because the deer provide excellent opportunities for hunting, most of the larger woodland areas are leased to hunting clubs.

Turkey, squirrel, and swamp rabbit are also hunted extensively in the woodland areas of this parish.

Duck hunting is fair, and the bag is mainly made up

[5] RAY SMITH, JR., biologist, Soil Conservation Service, assisted in preparing this section.

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

Soil series and map symbol	Woodland suitability group	Potential productivity		Limitations of management			Trees to plant
		Important trees	Site index	Erosion hazard	Equipment limitation	Seedling mortality	
Bruin: Ba, BC For Commerce part of BC, see Commerce series.	1o4	Eastern cottonwood American sycamore Sweetgum Black willow Pecan	110 -------- 105 -------- --------	Slight	Slight	Slight	Eastern cottonwood, American sycamore, sweetgum.
Commerce: Cm, Cn, Co.	1w5	Eastern cottonwood Nuttall oak Water oak Pecan American sycamore Sweetgum	115 90 110 -------- -------- 110	Slight	Moderate	Slight	Eastern cottonwood, American sycamore, sweetgum.
Crevasse: Cr	2s6	American sycamore Eastern cottonwood Black willow	-------- 100 --------	Slight	Moderate	Severe	Eastern cottonwood, American sycamore.
Dundee: Dd, De, Ds For Sharkey part of Ds, see Sharkey series, Sa.	2w5	Eastern cottonwood Cherrybark oak Water oak Sweetgum Nuttall oak	100 100 95 100 --------	Slight	Moderate	Slight	Eastern cottonwood, sweetgum, American sycamore.
Sharkey:							
Sa, Sb, Sc, Sd, St For Tunica part of St, see Tunica series, Tu.	2w6	Cherrybark oak Sweetgum Eastern cottonwood Water oak Pecan American sycamore Green ash American elm Sugarberry	90 90 100 90 -------- -------- 85 -------- --------	Slight	Severe	Moderate	Eastern cottonwood, water oak, sweetgum, American sycamore, green ash.
Sf, SS, SU For Tunica part of SU, see Tunica series.	3w6	Eastern cottonwood Nuttall oak Green ash Sugarberry Overcup oak Water hickory	95 80 75 -------- -------- --------	Slight	Severe	Severe	Eastern cottonwood, green ash.
Tensas: Ta, Ts For Sharkey part of Ts, see Sharkey series, Sa.	2w6	Cherrybark oak Sweetgum Eastern cottonwood Water oak Pecan American sycamore Green ash American elm Sugarberry	100 100 105 95 -------- -------- 80 -------- --------	Slight	Severe	Moderate	Eastern cottonwood, sweetgum, American sycamore, green ash.
Tunica:							
Tu	2w6	Cherrybark oak Sweetgum Eastern cottonwood Water oak Pecan American sycamore Green ash American elm Sugarberry	90 90 100 90 -------- -------- 85 -------- --------	Slight	Severe	Moderate	Eastern cottonwood, sweetgum, American sycamore, green ash.
Tunica part of SU	3w6	Eastern cottonwood Nuttall oak Green ash Sugarberry Overcup oak Water hickory	95 80 75 -------- -------- --------	Slight	Severe	Severe	Eastern cottonwood, green ash.

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

Soil series and map symbol	Woodland suitability group	Potential productivity		Limitations of management			Trees to plant
		Important trees	Site index	Erosion hazard	Equipment limitation	Seedling mortality	
Udifluvents: Ud.	2o6	Eastern cottonwood Sweetgum	90 90	Severe	Moderate	Moderate	Eastern cottonwood.
Udipsamments: Us.[1]							

[1] Unsuited for commercial woodland because of droughtiness.

of mallard, wood duck, pintail, and widgeon. Most of the duck hunting is done over flooded land.

Trapping of furbearers is light, but a few mink, nutria, raccoon, and otter are taken.

Madison Parish is also the home of two animals that appear on the list of rare and endangered species—the alligator and the red wolf. Alligators are in the bayous and lakes of most of the parish, but the red wolf is limited to a small area on the river side of the Mississippi River levee.

The largest and most important lakes of this parish are Bear, Indian, Despair, Buck, Judd, and One lakes. These lakes are small but provide most of the fishing in this parish. Several bayous also furnish limited fishing. Fishing can be considered moderate to poor in this parish.

Soils directly influence the 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 vegetation for wildlife habitat are: (1) thickness of soil useful to crops, (2) surface texture, (3) available water capacity to a depth of 40 inches, (4) wetness, (5) hazard of flooding, (6) slope, and (7) permeability of the soil to air and water.

In table 4, the soils in this survey area are rated according to their suitability for producing six elements of wildlife habitat for three kinds of wildlife. The ratings indicate relative suitability for various habitat elements. The main purpose of the rating is to provide information needed for the development of wildlife habitat, but the ratings can also be used to improve existing habitat.

Definitions of the suitability ratings of soils used for wildlife habitat are as follows:

Good means the element of the wildlife habitat is generally easily created, improved, and maintained. Few or no limitations affect management of habitat in this category, and satisfactory results are expected when the soil is used for the prescribed purpose.

Fair means the element of the wildlife habitat can be created, improved, or maintained in most places. Moderate intensity of management and fairly frequent attention may be required for satisfactory results.

Poor means that limitations for the element of the wildlife habitat are rather severe. Habitats can be created, improved, or maintained in most places, but management is difficult and requires intensive effort.

Very poor means that limitations for the element of wildlife habitat are very severe and that unsatisfactory results are to be expected. It is either impossible or impractical to create, improve, or maintain habitats on soils in this category.

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 the soils, or present distribution of wildlife and people. For this reason, selection of an area to be developed for wildlife habitat requires an inspection of the site.

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

Domestic grasses and legumes.—This group consists of grasses and legumes that are established by planting. They provide food and cover for wildlife. Examples of grasses are Pensacola bahiagrass and ryegrass. Examples of legumes are vetch and clover.

Wild herbaceous upland plants.—This group consists of native or introduced perennial grasses, forbs, and weeds that provide food and cover for upland wildlife.

Hardwood trees, shrubs, and vines.—These plants are nonconiferous trees, shrubs, and woody vines that produce food for wildlife in the form of fruits, nuts, buds, catkins, or browse. These plants commonly grow in the wild, but they may be planted and developed through wildlife management programs.

Wetland food and cover plants.—In this group are annual and perennial herbaceous plants that grow wild on moist and wet sites. They provide food and cover mostly for wetland wildlife. Examples of these plants are smartweed, wild millet, sedges, rushes, and grasses. Submerged and floating aquatics are not included in this category.

Shallow water developments.—These developments are impoundments for controlling water, generally not more than three feet deep, to create a habitat that is suitable for waterfowl or crawfish. These areas are designed to be drained, planted, and then flooded to produce the proper feeding conditions for waterfowl or crawfish.

Table 4 rates soils according to their suitability as habitat for the three kinds of wildlife in the parish; openland, woodland, and wetland wildlife. These ratings are based upon the ratings made for the habitat

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

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	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Bruin:									
Ba	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
BC:									
Bruin part	Poor	Fair	Fair	Good	Poor	Poor	Fair	Good	Poor.
Commerce part	Poor	Fair	Fair	Good	Fair	Fair	Fair	Good	Fair.
Commerce: Cm, Cn, Co.	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Crevasse: Cr	Poor	Fair	Fair	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Dundee:									
Dd, De	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Ds:									
Dundee part	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
Sharkey part	Fair	Fair	Fair	Good	Good	Fair	Fair	Good	Fair.
Sharkey:									
Sa, Sb, Sc	Fair	Fair	Fair	Good	Good	Good	Fair	Good	Good.
Sd	Fair	Fair	Fair	Good	Good	Fair	Fair	Good	Fair.
Sf, SS	Poor	Fair	Fair	Good	Fair	Fair	Poor	Fair	Fair.
St:									
Sharkey part	Fair	Fair	Fair	Good	Good	Poor	Fair	Good	Fair.
Tunica part	Fair	Fair	Fair	Good	Good	Poor	Fair	Good	Fair.
SU:									
Sharkey part	Poor	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair.
Tunica part	Poor	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair.
Tensas									
Ta	Fair	Fair	Fair	Good	Good	Good	Fair	Good	Good.
Ts:									
Tensas part	Fair	Fair	Fair	Good	Good	Poor	Fair	Good	Fair.
Sharkey part	Fair	Fair	Fair	Good	Good	Poor	Fair	Good	Fair.
Tunica: Tu	Fair	Fair	Fair	Good	Good	Good	Fair	Good	Good.
Udifluvents: Ud.	Fair	Fair	Poor	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
Udipsamments: Us.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.

elements. For example, soils rated poorly suited for shallow water developments are rated poorly suited for wetland wildlife.

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

Woodland wildlife consists of birds and mammals that normally live in wooded areas of hardwood trees, coniferous trees, and shrubs. Woodcocks, thrushes, wild turkey, vireos, deer, swamp rabbits, squirrels, and raccoon are examples of woodland wildlife.

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

Engineering[6]

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 properties of soils highly important in en-

[6] MALCOLM E. SIMMONS, engineer, Soil Conservation Service, assisted in preparation of this section.

gineering 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 performance of structures already built with properties of the kinds of 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 tables 5 and 6, which show, respectively, several estimated soil properties significant to engineering and 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 given in tables 5 and 6, and it also can be used to make other useful maps.

This information, however, does not eliminate 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 greater than 6 feet. Also, inspection of sites, especially the small ones, is needed because many delineated areas of a given soil 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 to soil scientists that is not known to all engineers. The Glossary defines many of these terms commonly used in soil science.

Engineering soil classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified (*2*) system, used by the SCS engineers, Department of Defense, and others, and the AASHTO (*1*) system, 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 content. 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; seven classes of fine-grained soils, identified as ML, CL, OL, MH, CH, CL–ML, 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 ranging from A–1 through A–7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation). At the other extreme, in group A–7, are clay soils that have low strength when wet and that are the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. As 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, without group index numbers, is given in table 5 for all soils mapped in the survey area.

Soil properties significant to engineering

Several estimated soil properties significant in engineering are given 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 parishes. Following are explanations of some of the columns in table 5.

Depth to bedrock is not given in table 5, because all of the soils are deep enough over bedrock that bedrock does not affect their use.

Soil texture is described in table 5 in the standard terms used by the U.S. Department of Agriculture. These terms take into account 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 contains 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." "Sand," "silt," "clay," and some of the other terms used in USDA textural classification are defined in the Glossary of this soil survey.

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 state. If the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material changes from the semisolid to plastic state; and the liquid limit, from a plastic to a liquid state. 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

TABLE 5.—*Estimated 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. fully the instructions for referring to other series that appear in the first column

Soil series and map symbols	Depth from surface	USDA texture	Classification	
			Unified	AASHTO
	Inches			
*Bruin: Ba, BC. For properties of Commerce part of BC, see Commerce series.	0–11	Silt loam	ML	A–4
	11–71	Silt loam, very fine sandy loam	ML, CL–ML	A–4
Commerce: Cm, Cn, Co.	0–7	Silt loam, silty clay loam	ML, CL, CL–ML	A–4, A–6, A–7–6
	7–16	Silty clay loam	CL, ML, CL	A–6
	16–65	Stratified silt loam, very fine sandy loam, silty clay loam and clay.	CL–ML	A–4, A–6
Crevasse: Cr.	0–60	Fine sand, sand, loamy sand	SP–SM	A–3
*Dundee: Dd, De, Ds. For properties of Sharkey part of Ds, see Sharkey series.	0–9	Silt loam or silty clay loam	ML, CL, CL–ML	A–4, A–6, A–7–6
	9–25	Silty clay loam, silt loam, loam	CL	A–6, A–7–6
	25–65	Silt loam, silty clay loam, loam, very fine sandy loam.	CL–ML, CL, ML	A–4, A–6
*Sharkey: Sa, Sb, Sc, Sd, Sf, SS, St, SU. For properties of Tunica part of St and SU, see Tunica series.	0–6	Silt loam, silty clay loam, clay	CL–ML, CL, CH, ML	A–4, A–6, A–7–6
	6–40	Clay	CH	A–7–6
	40–83	Clay, silty clay loam, silt loam	CH, CL, CL–ML	A–7–6, or A–6
*Tensas: Ta, Ts. For properties of Sharkey part of Ts, see Sharkey series.	0–5	Silty clay	CH, CL	A–7–6
	5–22	Silty clay, clay	CH	A–7–6
	22–63	Silt loam, very fine sandy loam, silty clay loam.	CL–ML, CL	A–4, A–6
Tunica: Tu.	0–8	Clay or silty clay	CH, CL	A–7–6
	8–26	Clay	CH	A–7–6
	26–76	Silt loam, very fine sandy loam, silty clay loam.	CL, CL–ML	A–4, A–6
Udifluvents: Ud.	(2)	Silt loam, silty clay loam, silty clay, clay.	CL–ML, CL, CH	A–4, A–6, A–7–6
Udipsamments: Us.	0–60	Sand or fine sand	SP	A–3

[1] Nonplastic.
[2] Too variable to rate.

soil, expressed in pH values. 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 basis of those 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.

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 having this rating.

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 Madison 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, and severe. *Slight* means soil properties generally favorable for the rated use, or in other words, limitations that are minor and easily overcome. *Moder-*

properties of the soils

The soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow care- of this table. The symbol < means less than; the symbol > means more than]

Percentage less than 3 inches passing sieve—				Liquid limit	Plasticity index	Reaction	Perme-ability	Available water capacity	Shrink-swell potential
No. 4	No. 10	No. 40	No. 200						
				Pct		*pH*	*Inches per hour*	*Inch per inch of soil*	
100	100	95–100	85–100	<23	[1] NP–3	6.1–7.8	0.6–2.0	0.21–0.23	Low.
100	100	95–100	55–100	<28	NP–7	6.6–8.4	0.6–2.0	0.18–0.23	Low.
100	100	100	75–100	<45	NP–23	5.6–7.8	0.2–2.0	0.20–0.23	Low to moderate.
100	100	100	85–100	32–45	11–23	6.1–8.4	0.2–0.6	0.20–0.22	Low to moderate.
100	100	100	75–100	23–37	3–15	6.6–8.4	0.2–0.6	0.20–0.23	Low to moderate.
100	100	90–100	5–12	-----------	NP	6.1–8.4	6.0–20.0	0.03–0.06	Very low.
100	100	95–100	75–95	<45	NP–22	5.6–6.5	0.6–2.0	0.18–0.20	Low to moderate.
100	100	95–100	75–100	35–48	13–25	5.1–6.0	0.2–0.6	0.18–0.20	Low to moderate.
100	100	85–100	55–95	<40	NP–18	5.6–7.3	0.2–2.0	0.18–0.20	Low to moderate.
100	100	100	95–100	<85	NP–50	5.6–8.4	<2.0	0.18–0.22	Low to very high.
100	100	100	95–100	56–85	36–50	5.6–8.4	<0.06	0.18–0.20	Very high.
100	100	100	95–100	25–85	5–50	6.1–8.4	<0.20	0.18–0.22	Moderate to very high.
100	100	100	95–100	46–60	22–35	4.5–6.0	<0.06	0.18–0.20	Very high.
100	100	100	95–100	51–75	26–45	4.5–6.5	<0.06	0.18–0.20	Very high.
100	100	100	80–100	25–40	5–17	5.6–7.3	0.2–2.0	0.20–0.22	Low to moderate.
100	98–100	95–100	90–100	45–75	20–45	5.6–7.8	<0.06	0.15–0.20	Very high.
100	98–100	95–100	90–100	51–75	25–45	6.1–7.8	<0.06	0.15–0.20	Very high.
100	95–100	75–95	51–90	25–40	5–18	6.6–8.4	0.6–2.0	0.18–0.21	Low to moderate.
100	100	100	90–100	25–65	5–40	([2])	([2])	([2])	([2])
100	100	90–95	0–4	-----------	NP	6.6–8.0	6.0–20.0	<0.05	Very low.

ate means that some soil properties are unfavorable but can be overcome or modified by special planning and design. *Severe* means soil properties so unfavorable and so difficult to correct or overcome as to require major soil reclamation, special designs, or intensive maintenance. For some uses, the rating of severe is divided to obtain ratings of severe and very severe. *Very severe* means one or more soil properties so unfavorable for a particular use that overcoming the limitations is most difficult and costly and commonly not practical for the rated use.

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

Following are explanations of some of the columns in table 6.

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 its response of plants when fertilizer is applied; and absence of substances toxic to plants. Texture of the soil material is a characteristic that affects suitability, but also considered in the ratings is damage that will result at the area from which topsoil is taken.

Roadfill 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.

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 and depth to permeable material.

Dwellings without basements and small commercial buildings, as rated in table 6, are not more than three

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. fully the instructions for referring to other series

Soil series and map symbols	Suitability as a source of—		Degree and kind of limitations for—		
	Topsoil	Roadfill	Pond reservoir areas	Dwellings without basements	Septic tank absorption fields
*Bruin:					
Ba	Good	Fair: low strength.	Moderate: seepage.	Slight	Moderate: percs slowly.
BC For Commerce part, see Commerce series.	Good	Fair: low strength.	Moderate: seepage.	Very severe: floods.	Severe: floods.
Commerce:					
Cm	Good	Fair: wet, low strength, shrink-swell.	Moderate: seepage.	Moderate: wet, low strength, shrink-swell.	Severe: wet, percs slowly.
Cn, Co	Fair: too clayey.	Fair: wet, low strength, shrink-swell.	Moderate: seepage.	Moderate: wet, low strength, shrink-swell.	Severe: percs slowly, wet.
Commerce part of BC	Good	Fair: wet, low strength, shrink-swell.	Moderate: seepage.	Very severe: floods.	Severe: floods, percs slowly, wet.
Crevasse: Cr	Poor: too sandy.	Good	Severe: seepage.	Very severe: floods.	Severe: floods.
*Dundee:					
Dd	Fair: thin layer.	Fair: wet, low strength, shrink-swell.	Moderate: seepage.	Moderate: wet, low strength, shrink-swell.	Severe: wet, percs slowly.
De, Ds For Sharkey part of Ds, see Sharkey series, Sa.	Fair: too clayey.	Fair: wet, low strength, shrink-swell.	Moderate: seepage.	Moderate: wet, low strength, shrink-swell.	Severe: wet, percs slowly.
*Sharkey:					
Sa, Sb, Sc, Sd, St For Tunica part of St, see Tunica series, Tu.	Poor: wet, too clayey.	Poor: wet, low strength, shrink-swell.	Slight	Severe: wet, shrink-swell, low strength.	Severe: wet, percs slowly.
Sf, SS, SU For Tunica part of SU, see Tunica series.	Poor: wet, too clayey.	Poor: wet, low strength, shrink-swell.	Slight	Very severe: floods, shrink-swell, low strength, wet.	Severe: floods, percs slowly, wet.
*Tensas: Ta, Ts For Sharkey part of Ts, see Sharkey series, Sa.	Poor: too clayey.	Poor: shrink-swell, low strength.	Slight	Severe: shrink-swell, low strength, wet.	Severe: percs slowly, wet.
Tunica:					
Tu	Poor: wet, too clayey.	Poor: wet, low strength, shrink-swell.	Slight	Severe: wet, shrink-swell, low strength.	Severe: wet, percs slowly.
Tunica part of SU	Poor: wet, too clayey.	Poor: wet, shrink-swell, low strength.	Slight	Very severe: floods, shrink-swell, low strength, wet.	Severe: floods, percs slowly, wet
Udifluvents: Ud. Too variable to rate.					
Udipsamments: Us	Poor: too sandy.	Good	Severe: seepage.	Very severe: floods.	Severe: floods.

interpretations of the soils

The soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow care-
that appear in the first column of this table]

Degree and kind of limitations for—Continued							
Sewage lagoons	Local roads and streets	Small commercial buildings	Sanitary landfills (trench type)	Camp areas	Picnic areas	Playgrounds	Paths and trails
Moderate: seepage.	Moderate: low strength.	Slight	Slight	Slight	Slight	Slight	Slight.
Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
Severe: wet.	Moderate: wet, low strength, shrink-swell.	Moderate: wet, low strength, shrink-swell.	Severe: wet.	Moderate: wet, percs slowly.	Moderate: wet.	Moderate: wet, percs slowly.	Moderate: wet.
Severe: wet.	Moderate: wet, low strength, shrink-swell.	Moderate: wet, low strength, shrink-swell.	Severe: wet.	Moderate: wet, percs slowly, too clayey.	Moderate: wet, too clayey.	Moderate: wet, percs slowly, too clayey.	Moderate: wet, too clayey.
Severe: floods, wet.	Severe: floods.	Severe: floods.	Severe: floods, wet.	Severe: floods.	Moderate: floods, wet.	Severe: floods.	Moderate: floods, wet.
Severe: floods, seepage.	Severe: floods.	Severe: floods.	Severe: too sandy, floods, seepage.	Severe: too sandy, floods.	Severe: too sandy, floods.	Severe: too sandy, floods.	Severe: too sandy, floods.
Severe: wet.	Moderate: wet, low strength, shrink-swell.	Moderate: wet, low strength, shrink-swell.	Severe: wet.	Moderate: percs slowly, wet.	Moderate: wet.	Moderate: percs slowly.	Moderate: wet.
Severe: wet.	Moderate: wet, low strength, shrink-swell.	Moderate: wet, low strength, shrink-swell.	Severe: wet.	Moderate: wet, percs slowly, too clayey.	Moderate: wet, too clayey.	Moderate: wet, percs slowly, too clayey.	Moderate: wet, too clayey.
Slight	Severe: wet, shrink-swell, low strength.	Severe: wet, shrink-swell, low strength.	Severe: wet, too clayey.	Severe: wet, too clayey, percs slowly.	Severe: wet, too clayey.	Severe: wet, too clayey, percs slowly.	Severe: wet, too clayey.
Severe: floods.	Severe: wet, shrink-swell, floods, low strength.	Severe: wet, shrink-swell, floods, low strength.	Severe: floods, too clayey, wet.	Severe: floods, percs slowly, too clayey, wet.	Severe: floods, too clayey, wet.	Severe: floods, percs slowly, too clayey, wet.	Severe: floods, too clayey, wet.
Slight	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength, wet.	Severe: too clayey, wet.	Severe: too clayey, percs slowly.	Severe: too clayey, wet.	Severe: wet, too clayey, percs slowly.	Severe: wet, too clayey.
Severe: wet.	Severe: wet, shrink-swell, low strength.	Severe: wet, shrink-swell, low strength.	Severe: too clayey, wet.	Severe: wet, percs slowly, too clayey.	Severe: too clayey.	Severe: percs slowly, too clayey.	Severe: too clayey.
Severe: floods.	Severe: floods, wet, low strength, shrink-swell.	Severe: floods, wet, shrink-swell, low strength.	Severe: floods, wet, too clayey.	Severe: floods, too clayey, percs slowly, wet.	Severe: floods, too clayey, wet.	Severe: floods, too clayey, percs slowly, wet.	Severe: floods, too clayey, wet.
Severe: seepage, floods.	Severe: floods.	Severe: floods.	Severe: too sandy, floods.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.

stories high and are supported by foundation footings placed in undisturbed soil. The features that affect the rating of a soil for dwellings and small commercial buildings are those that relate to 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.

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 of effluent and construction and operation of the system. Properties that affect absorption are permeability, depth to 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. Large rocks or boulders increase construction costs.

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, and slope. The soil properties that affect the embankment are the engineering properties of the embankment material as interpreted from the Unified Soil Classification.

Local 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 the workability and quantity of cut and fill material available. The AASHTO and Unified classifications of the soil material, and also the shrink-swell potential, indicate traffic supporting capacity. Wetness and flooding affect stability of the material. Slope and wetness affect ease of excavation and amount of cut and fill needed to reach an even grade.

Sanitary landfill (trench type) is a method of disposing of refuse in dug trenches. 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 soil properties that affect suitability for landfill are ease of excavation, hazard of polluting ground water, and trafficability. The best soils have moderately slow permeability, withstand heavy 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, and 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.

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 rains but not dusty when dry.

Picnic areas are attractive natural or landscaped tracts used primarily 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; do not have slopes or stoniness that greatly increases 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 rains but not dusty when dry. If grading and leveling are required, depth to rock is important.

Paths and trails are used for local and cross country travel by foot or horseback. Design and layout should require little or no cutting and filling. The best soils are at least moderately well drained, are firm when wet but not dusty when dry, are flooded not more than once during the season of use, have slopes of less than 15 percent, and have few or no rocks or stones on the surface.

Formation and classification of the soils

This section discusses the major factors of soil formation as they have existed in Madison Parish and provides the classification of the soils of the parish according to the system used by the National Cooperative Soil Survey.

Factors in soil formation

The characteristics of the soil at any given place are determined by (1) the physical and mineralogical composition of the parent material; (2) the climate under which the soil material has accumulated and existed since accumulation; (3) the plant and animal life on and in the soil; (4) the relief, or lay of the land; and (5) the length of time the forces of soil development have acted on the soil material.

Climate and vegetation are the active factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and bring about the development of genetically related horizons. The effects of climate and vegetation are conditioned by relief. The parent material also affects the kind of profile that can be formed and, in extreme instances, determines it almost entirely. Finally, time is needed for the changing of the parent material into a soil profile. Generally, a long time is required for the development of distinct horizons.

Parent material

The alluvium on the Mississippi River alluvial plain has a wide range in texture. When the river overflows its banks and spreads out, the coarser soil particles are deposited nearest the river. This accounts for the slightly higher strips, known as natural levees, along the river channel (*5, 6*). The Crevasse and Bruin soils formed in the sandy and loamy material deposited in these areas. As the floodwater continues to spread and moves more slowly, it drops loamy sediment, such as silt mixed with a small amount of clay and fine sand. The Commerce soils formed in this kind of material. These soils are somewhat poorly drained. As the floodwater finally drains away, it leaves low depressions and old river channels filled with standing water. The clay and fine silt particles settle out of this muddy, still water, leaving clayey slackwater deposits. The poorly drained and very slowly permeable Sharkey and Tunica soils formed in this kind of material.

Between the Mississippi River and its natural levee system are deposits of sand, silt, and clay called pointbar deposits. Crevasse soils formed on the young pointbar deposits that are stabilized.

The pattern of coarser sediment near the channel and fine sediment in the backswamps is common along the Mississippi River, along Walnut, Roundaway, and Joes Bayou, and along old abandoned river courses. Many old abandoned cutoffs and oxbow lakes are evidence of former river courses. In places where natural levees have been cut out, silty or sandy sediment has been spread over the backswamp clays. Thus, the normal pattern of sediment distribution has been destroyed, and in places, beds of alluvium of widely contrasting textures have been superimposed. An example of soils that formed in this type of parent material is Sharkey silt loam, which formed in silt loam over clay.

In general the soils that formed in silty and sandy parent material have a lower capacity to hold nutrients than those that form in clay, but they are productive because of their greater ability to transmit water. They contain an abundance of weatherable minerals that release the nutrients needed for plant growth.

In Madison Parish the dominant clay minerals of the soils that formed in alluvium are montmorillonite, mica-illite, and vermiculite. Less significant and in smaller amounts are feldspar, quartz, and oxides and hydroxides of iron.

Time

Long periods of time are usually required for soil formation. The length of time that soil-forming forces have been able to act on parent material is commonly reflected in the characteristics of the soils. The soils in Madison Parish range from young soils that have little or no development to older soils that have somewhat pronounced development.

The action of the soil-forming factors is reflected in the soil profile, which is a succession of horizons, or layers, from the surface down to unaltered parent material. The horizons differ in one or more properties, such as color, texture, thickness, structure, consistence, porosity, or reaction.

The placement of the soils within the nationwide soil classification system is based in part upon the presence or absence of certain diagnostic horizons. The diagnostic horizons of the soils of Madison Parish are ochric epipedons, cambic horizons, and argillic horizons.

An ochric epipedon is a surface horizon that is typically light colored and contains some organic matter. All the soils in the parish have an ochric epipedon. The Crevasse soils, for example, have an ochric epipedon over parent material that is only slightly altered. These soils retain most of the characteristics of their alkaline, sandy parent material.

The argillic and cambic horizons are typical subsoil horizons, but after erosion or land leveling, they may be at the surface. A cambic horizon is one in which the soil forming processes have altered the parent material enough to form structure, to liberate free iron oxides, and to form silicate clays but show little evidence of clay translocation. It is neutral to moderately alkaline in reaction. The Bruin and Sharkey soils are examples of soils that have a cambic horizon.

An argillic horizon is one that has a significant accumulation of silicate clay. The clay films on the surfaces of peds indicate a downward movement of clay from the surface. The argillic horizons bear little resemblance to the original parent material. Dundee and Tensas soils are examples of older soils that formed in the same kind of parent material as the Commerce and Tunica soils.

Relief

The shape of the landscape influences soil formation because it affects drainage, erosion, plant cover, and soil temperature (*10*).

Most of Madison Parish is nearly level or has a slope of less than 2 percent. In some parts, mainly in areas of ridge-swale relief, the slope is as much as 5 percent.

The variations in relief, even though slight, affect the soils of the parish. For example, Bruin and Commerce soils formed in loamy parent material. The nearly level Bruin soils are on the highest part of the natural levees and receive no extra runoff from surrounding areas. They are moderately well drained and have a brown, mottled, moderately well developed subsoil. Most of the nearly level Commerce soils are not as high on the natural levee as the Bruin soils and receive some runoff from surrounding areas. The Commerce soils have a seasonal high water table, are somewhat poorly drained, and have a dark grayish-brown, mottled, moderately well developed subsoil.

Ridges and swales are low and parallel and are generally several hundred feet long and no more than 250 feet wide. The difference in elevation between the ridges and swales is about 1 to 5 feet. In some areas water stands in the swales for short periods after heavy rains during winter and early in spring. An example of a soil that has a ridge-swale relief is Dundee-Sharkey association, gently undulating.

Living organisms

Plants, animals, insects, bacteria, fungi, and microorganisms are important in the formation of soils. Among the changes they cause are gains in content of organic matter and nitrogen, gains or losses in content of plant nutrients, and changes in structure and porosity. Vegetation generally has a greater effect on soil formation than other living organisms.

The soils of Madison Parish formed dominantly under a dense stand of hardwood trees. These soils are moderate to low in organic-matter content.

Grass vegetation influenced the development of the soils in several small areas in the parish. In these areas the soils contain a large amount of organic matter and have dark-colored layers to a depth of as much as 20 inches. These areas are in tracts 3 to 40 acres in size on old Indian campground sites, generally in the vicinity of Indian mounds. Presumably, the Indians built these mounds in natural clearings that were covered with grass. Because of the small extent, these dark-colored soils were included with the Commerce, Dundee, Tensas, and Tunica soils in mapping.

Climate

The warm, moist climate of Madison Parish promotes rapid soil development. As a result of high rainfall, leaching is rather intense, and soluble and colloidal materials move downward in the soil. Plant remains decompose rapidly, and the organic acids thus produced hasten development of clay minerals and removal of carbonates. Soil development is hastened further because the soil is not frozen for prolonged periods.

The climate is relatively uniform throughout the parish, so climate alone does not account for differences among the soils within the parish.

Classification of 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. Because this system is under continual study, readers interested in developments of the current system should search the latest literature available. Classification of the soils in this survey is based upon Soil Taxonomy (*12*).

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that the soils of similar genesis, or mode of origin, are grouped. In table 7, the soil series of Madison Parish are placed in 4 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 subdivided into suborders that are based primarily on those soil characteristics that seem to produce classes with 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 water-logging, or soil differences resulting 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 have 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).

SUBGROUP: Great groups are subdivided into subgroups, one representing 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 of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Haplaquents (a typical Haplaquent).

FAMILY: Soil families are separated within a subgroup primarily 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, reactions, 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 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 is a group of soils that have major horizons that, except for texture of the surface layer, are similar in important characteristics and in arrangement in the profile.

General nature of the parish

Madison Parish, once a part of Carroll, Franklin, Richland, and Tensas Parishes, was established by Acts of the Louisiana State Legislature in 1839 and 1861. Madison Parish was named after the fourth President of the United States. The first parish seat was established at Richmond, 2 miles south of what is now the town of Tallulah. Richmond became a flourishing town and was the most important trade center between Vicksburg, Mississippi, and Monroe, Louisiana. Tallulah, the present parish seat, was founded in 1857.

The population of Madison Parish has steadily increased. In 1972 it was 15,065. Tallulah has a population of 10,326. The remaining population is in rural areas.

Two railroad lines serve Madison Parish. The Illinois Central runs east and west, and the Missouri Pacific runs north and south. Two United States highways and numerous State and parish roads serve the parish. The Mississippi River, which runs along the eastern boundary of the parish, is a navigable waterway for large barges. It also provides transportation for industry.

Farming

Farming has always been dominant in Madison Parish. The first farms were large and were planted to cotton, rice, and small grain. The Civil War and its aftermath changed the economic order of Madison Parish. Many people moved away during this period, and many plantations were idle. In recent years large tracts of land have been cleared and planted mainly to soybeans. Cotton, soybeans, timber, rice, and small grain are the main cash crops. Corn has not been grown extensively.

The total number of farms in Madison Parish decreased from 735 in 1959 to 443 in 1969. The total land used for farming increased from 206,893 acres in 1959 to 242,575 acres in 1969. The average size of farms increased from 282 acres in 1959 to 548 acres in 1969.

Physiography and geology [7]

Madison Parish is on the Mississippi River alluvial plain. The Mississippi River and its abandoned channels form the eastern boundary of the parish, and Bayou Macon forms the western boundary.

Elevation in the parish averages about 80 feet above sea level along the northern boundary and about 60 feet along the southern boundary. An elevation 10 feet or more higher than these averages occurs along the natural levee of the Mississippi River on the eastern side of the parish.

The soils in Madison Parish formed in alluvial deposits. The origin and age of the alluvial deposits in the parish have been identified (*5*). The youngest and lowest of these deposits occur in a small area between Little Tensas Bayou and Joes Bayou. The Sharkey and Tunica soils formed in this area.

By about 5,000 years ago, the gradient of the Mississippi and Arkansas Rivers had decreased to the extent that the rivers changed from braiding streams to meandering streams of the modern form. The decrease in gradient was caused by the postglacial rising of the sea level. One of the earliest discernible meandering courses of the Mississippi River is marked by the course of the Tensas River, which extends southward through the central part of the parish. The Walnut-Roundaway Bayou course represents a subsequent meander belt of the Mississippi River farther east. Finally, about 1,000 years ago, because of a diversion near Vicksburg, the present Mississippi River meander belt was established (*8*).

Each of these meander belts is several miles wide and consists of low, parallel ridges and swales. These ridges and swales represent topographic irregularities formed by deposition on point bars as the river migrated laterally. They appear on topographic maps as arcuate patterns (meander scrolls) the same size as

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TABLE 7.—*Classification of the soils* [1]

Soils	Family	Subgroup	Order
Bruin	Coarse-silty, mixed, thermic	Fluvaquentic Eutrochrepts	Inceptisols.
Commerce	Fine-silty, mixed, nonacid, thermic	Aeric Fluvaquents	Entisols.
Crevasse	Mixed, thermic	Typic Udipsamments	Entisols.
Dundee	Fine-silty, mixed, thermic	Aeric Ochraqualfs	Alfisols.
Sharkey	Very fine, montmorillonitic, nonacid, thermic	Vertic Haplaquepts	Inceptisols.
Tensas	Fine, montmorillonitic, thermic	Vertic Ochraqualfs	Alfisols.
Tunica	Clayey over loamy, montmorillonitic, nonacid, thermic.	Vertic Haplaquepts	Inceptisols.
Udifluvents [2]		Udifluvents	Entisols.
Udipsamments [2]		Udipsamments	Entisols.

[1] Classification as of October 1972.
[2] Classified at the Great Group level only.

the meanders of the streams that form them. These deposits are obscured in some places by overlying natural levee deposits that slope gently but evenly away from the final stream courses. Natural levees are caused by deposition during overflow.

Though the origin of the deposits in the Tensas, Walnut, Roundaway, and modern Mississippi meander belts is the same, the soils associated with them reflect their varying ages. The Tensas and Dundee soils are on the oldest meander belt; Commerce, Bruin, and Sharkey soils occur on the modern meander belt.

The Arkansas River shifted its meander belt during the last 5,000 years in a fashion similar to that of the Mississippi. Only one of its courses, an early one, extends southwest through the western part of Madison Parish. Joes Bayou and Bayou Macon downstream are relics of this course, which has pronounced but narrow natural levees that are largely obscured by more recent Mississippi River deposits.

Natural resources

Timber, water, oil, and gas are the main natural resources of Madison Parish. Large areas of woodland have good stands of hardwood trees, and most of the woodland has been developed to support the lumber and pulpwood industries. One large sawmill is located in Tallulah. The woodland also supports a large population of white-tailed deer.

The Mississippi River, perennial streams, lakes, and drilled wells provide an adequate supply of water for livestock, ranching and farming, and domestic and other uses.

A small oil field is located in the western part of the parish. Pipelines transport the oil and gas produced in this field to other locations for processing.

One gravel deposit is located about 5 miles south of Mound, between the Mississippi River and its protective levee system. Sand and other nonplastic material can be obtained from bar deposits along the Mississippi River.

Climate

Madison Parish is in a subtropical, transitional climatic region that is affected alternately by cold, dry air flowing southward and by warm, moist air flowing northward. Changes in direction of flow frequently bring significant, and sometimes abrupt, weather changes (table 8).

Summers are consistently warm, but maximum temperatures exceeding 100° F are uncommon. At Tallulah, a temperature of 105° was recorded in August 1909. Temperatures of 90° or warmer may be expected each year from May to early in October. Some years have less than 50 days or more than 120 days when the temperature reaches 90°.

Winters are comparatively mild, although absolute minimum temperatures are quite low. Most years have 1 day or more when the minimum temperature drops to 20° or colder. At Tallulah, a temperature of −12° was recorded on February 2, 1951. Temperatures of 32° or colder may be expected from late in October to early in April (table 9). Some years may have less than 30 days to more than 65 days when the temperature drops to 32° or colder. Cold spells are usually brief, and only about 1 year in 2 has 1 day or more when the temperature does not rise above 32°. The ground freezes briefly to a shallow depth during spells of colder weather.

Precipitation occurs on about 2 days out of 7 on an annual basis. Rainfall is mainly in the form of showers. Infrequent periods of prolonged, steady rain occur during winter and spring.

During the cooler months the weather pattern commonly follows the sequence of rain; low temperatures;

TABLE 8.—*Temperature and precipitation*

[Data recorded at Tallulah 2SW]

Month	Temperature				Precipitation		
	Average daily maximum	Average daily minimum	Average maximum	Average minimum	Average monthly total	One year in 10 will have— Less than—	One year in 10 will have— More than—
	°F	°F	°F	°F	In	In	In
January	57	36	77	18	4.7	1.5	8.4
February	61	39	78	21	5.0	2.1	8.4
March	68	45	82	28	5.9	2.9	10.1
April	77	54	87	37	5.3	1.9	9.4
May	84	61	92	47	4.6	1.7	8.1
June	90	68	96	57	3.5	1.0	6.7
July	92	70	97	62	4.2	1.4	7.5
August	92	69	97	58	3.3	.6	7.1
September	87	63	95	46	2.6	.6	4.8
October	79	50	89	32	2.7	.3	6.2
November	68	42	83	23	4.2	.9	8.8
December	59	37	77	20	5.4	2.5	8.8
Year	76	53	98	14	51.4	35.9	67.3

TABLE 9.—*Probabilities of last freezing temperatures in spring and first in fall*

[Data recorded at Tallulah 2SW]

Probability	Dates for given probability and temperature		
	24° F or lower	28° F or lower	32° F or lower
Spring:			
1 year in 10 later than	March 10	March 27	April 8
2 years in 10 later than	February 28	March 20	April 2
5 years in 10 later than	February 8	March 5	March 22
Fall:			
1 year in 10 earlier than	November 3	October 28	October 14
2 years in 10 earlier than	November 7	October 30	October 20
5 years in 10 earlier than	November 24	November 11	October 29

moderate temperatures; a few clear, mild days; and more rain.

Snowfall is relatively rare. Measurable amounts of snow occur in less than 1 year out of every 2, and accumulation averages about 2 inches per year. Several years may pass with no snow accumulation. Snowfalls of several inches have been measured in some storms during December, January, and February. Infrequent glaze or ice storms have caused widespread damage.

Thunderstorms may occur during any season. Most months have 1 day or more that have thunder, and the annual average is 60 to 70 days. Almost all summer days that have rain also have thunder and lightning in the afternoon and evening. These days are most common during June and July. Fall and winter have far fewer thunderstorms. The cool-season thunderstorms are commonly associated with passing fronts and squall lines. These storms may occur at any hour, and they usually are accompanied by stronger winds than those that occur during summer. Rainfalls of about 6 inches in a 12-hour period can be expected to occur once in 10 years.

During the warmer months, northerly and westerly winds occasionally bring extended periods of hot, dry weather. Droughts lasting more than 1 month have been recorded in some parts of the parish. Harvests are often assisted by dry weather in fall.

Data on evaporation from Class A pans provide some information on water loss from soils and crops. The mean annual pan evaporation is about 60 inches. Of that amount, 69 percent, or about 41.5 inches, evaporates during the period of May through October. Pan evaporation is a maximum, or potential, value; actual mean open-lake evaporation is about 45 inches. The actual moisture loss is less because availability of soil moisture is often limited.

Annual mean relative humidity is about 72 percent. Humidity of less than 30 percent averages only about 2 percent of the hours during the year and less than that in summer. Humidity of more than 80 percent averages about 40 percent of the annual hours and is most frequent early in the morning. At times heavy fog occurs at night and early in the morning, but it rarely lasts throughout the day.

Sunshine averages about 63 percent of the possible annual total, or slightly less than 2,800 hours per year.

Windspeed is mainly less than 10 miles per hour, but gusts may exceed 40 miles per hour during storms. Winds are mainly southerly during the summer and northerly during the winter. Based on measurements at a standard instrument elevation of 30 feet, it is estimated that a sustained windspeed of 70 to 75 miles per hour occurs an average of once in 50 years.

Ground water

The Mississippi River alluvial aquifer of Pleistocene age is the most important ground-water reservoir in Madison Parish. The aquifer underlies the entire parish and is capable of yielding a large quantity of fresh ground water in all areas of the parish, except in a narrow strip extending 3 miles east of Quebec to just west of Tallulah. In this small area the aquifer contains saline water that has chloride concentrations as high as 1,400 milligrams per liter. The top of the aquifer ranges from a depth of 10 feet in the western part of the parish to a depth of 50 feet in the eastern part of the parish. Thickness of the aquifer ranges from 60 feet in the western part of the parish to 140 feet in the eastern part. The aquifer is predominantly sand and gravel. The layers of coarser sediment are thicker in buried stream channels.

The fine sand, silt, and clay deposits of Holocene age that overlie the Pleistocene deposits yield a small quantity of water. Locally, clay confines water to the Mississippi River alluvium and retards recharge. The more permeable surface deposits permit recharge from precipitation and from local streams. These deposits are considered part of the Mississippi River alluvial aquifer.

The water level in the Mississippi River alluvial aquifer is commonly at a depth of less than 25 feet. Annual water-level fluctuations are greatest near the Mississippi River and smallest in areas least affected by streams. During most of the year, ground water is discharged from the aquifer to the rivers and bayous in the parish. During high stages of these streams, some water flows from the streams into the aquifer.

The uses of ground water from the Mississippi River alluvial aquifer in this parish and the average quantity pumped in millions of gallons per day in 1970 were as follows (*4*): irrigation, 6.04; industrial, 4.0; public supply, 0.80; rural-domestic, 0.20; and livestock, 0.13. The aquifer is capable of yielding a large quantity of water. Pumping tests in the Tallulah area (*9*) indicate that a properly constructed and developed well that is screened in the lower, more permeable part of the aquifer is capable of yielding as much as 7,000 gallons per minute. At this rate of pumping, the drawdown 1,000 feet from the pumping well would only be about 5 feet after continuous pumping for 12 ½ days. Yields of 4,000 gallons per minute have been obtained. The aquifer is an excellent source of ground water for irrigation and for industries that require large amounts of low-temperature (66°–68° F) water for cooling.

Water from the Mississippi River alluvial aquifer is generally a very hard, calcium bicarbonate type that has a high content of iron. Treatment to reduce iron content and hardness is required for most domestic, municipal, and industrial uses. Hardness ranges from 100 to 800 milligrams per liter but generally is 300 to 400 milligrams per liter. Iron content ranges from about 1 to 20 milligrams per liter but generally is 3 to 5 milligrams per liter. Other chemical constituents found in freshwater in the aquifer are generally less than the limits set by the U.S. Public Health Service for water to be used as a public supply. The water is well suited for irrigation of crops grown in the parish.

Most of the aquifers underlying the alluvium contain salty water. In the extreme eastern part of the parish, electrical-log data indicate that the Sparta Sand of Tertiary age may contain fresh ground water locally. Water samples were collected from several test holes drilled by the Louisiana Department of Public Works between Omega and Mound. At Omega, at a depth of 1,320 feet, the chloride concentration was 330 milligrams per liter, and the color was 180 units. (One unit of color equals the color produced by 1 milligram of platinum per liter of water.) Between Omega and Mound, at a depth of 1,785 feet, the chloride concentration was 380 milligrams per liter, and the color was 150 units. The chloride concentration exceeds the recommended limit of 250 milligrams per liter specified by the U.S. Public Health Service for drinking water. In addition, the color is objectionable for most uses.

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Glossary

Alluvial plain (geology). A plain built up on a valley bottom and extending from valley wall to valley wall, consisting of material deposited by a stream.

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

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Cemented.—Hard; little affected by moistening.

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

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

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

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

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

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called normal field capacity, normal moisture capacity, or capillary capacity.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—few, common, and many; size—fine, medium, and coarse; and contrast—faint, distinct, and prominent. The size measurements are of the diameter along the greatest dimension. Fine indicates less than 5 millimeters (about 0.2 inch); medium, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and coarse, more than 15 millimeters (about 0.6 inch).

Natural levee. A levee formed as a result of sedimentation caused by stream bank overflow.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Poorly graded. Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

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

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

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

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

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

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

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

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

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

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

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Well graded. Refers to a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

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