United States
Department of
Agriculture

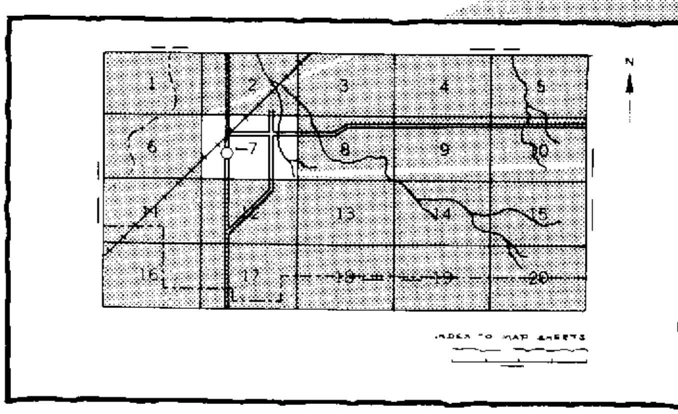
Soil
Conservation
Service

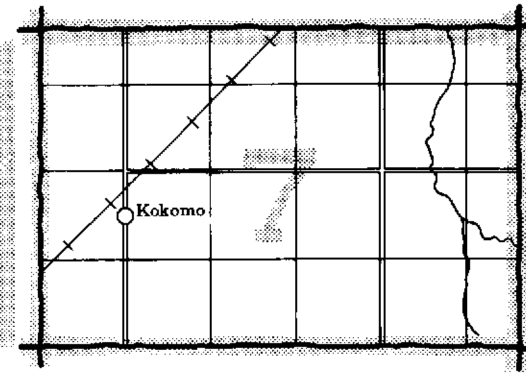
In cooperation with
Louisiana Agricultural
Experiment Station and
the Louisiana Soil and Water
Conservation Committee

Soil Survey of East Carroll Parish, Louisiana

HOW TO USE

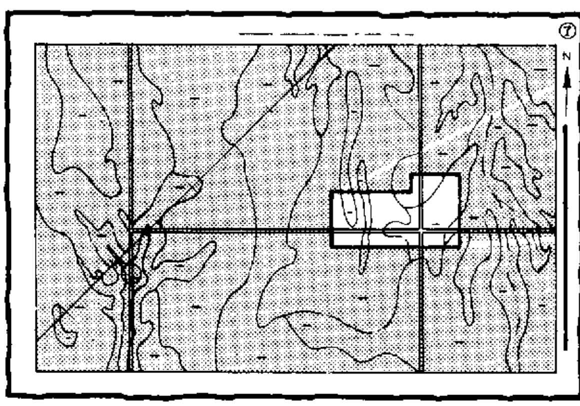
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

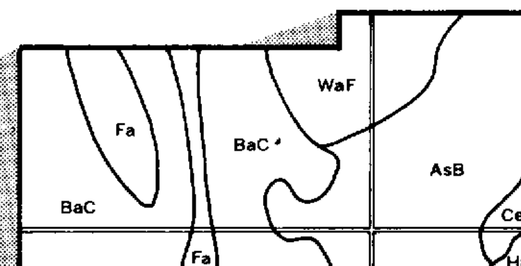




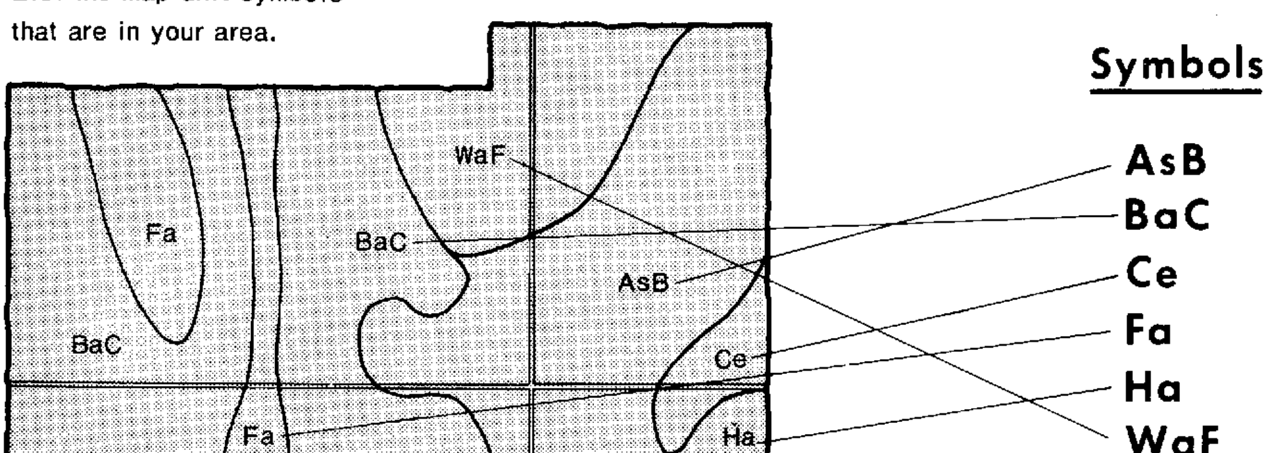
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



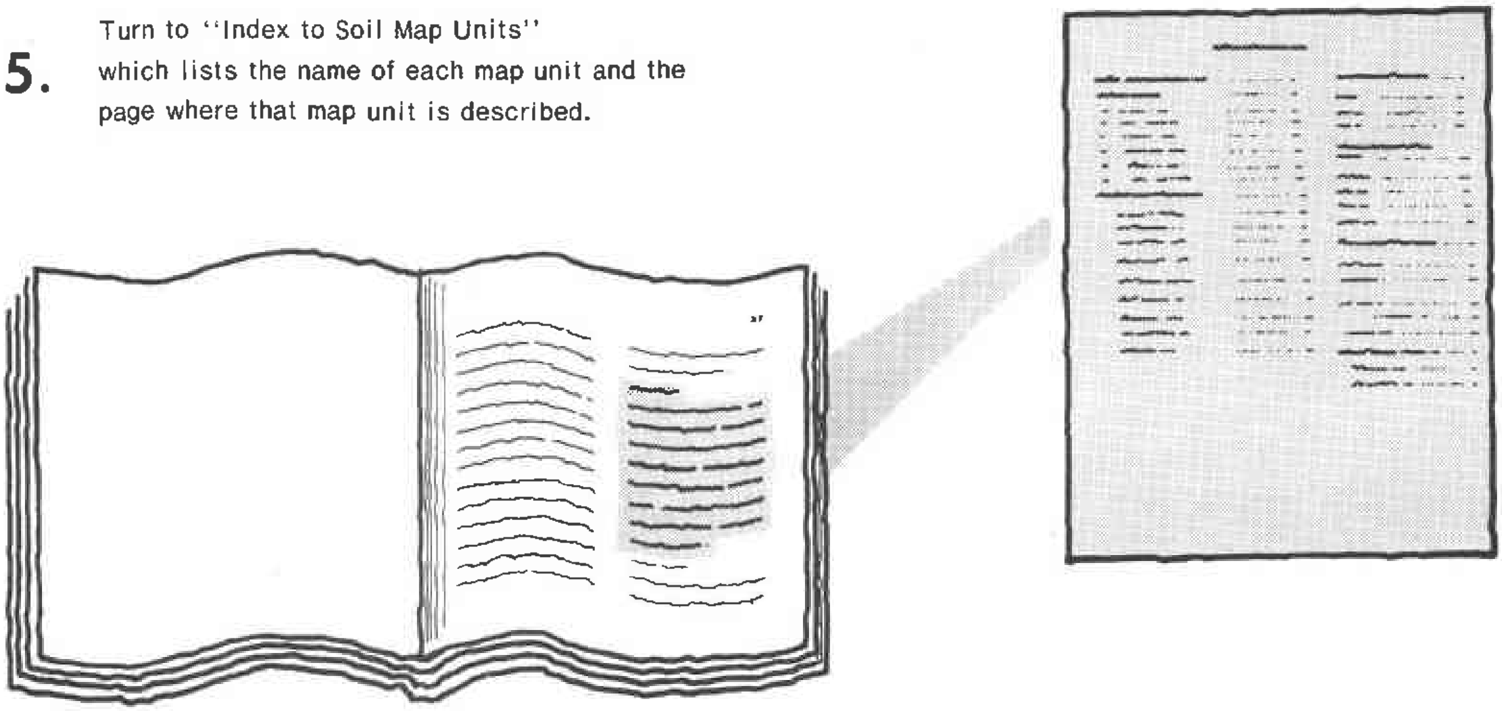


4. List the map unit symbols that are in your area.

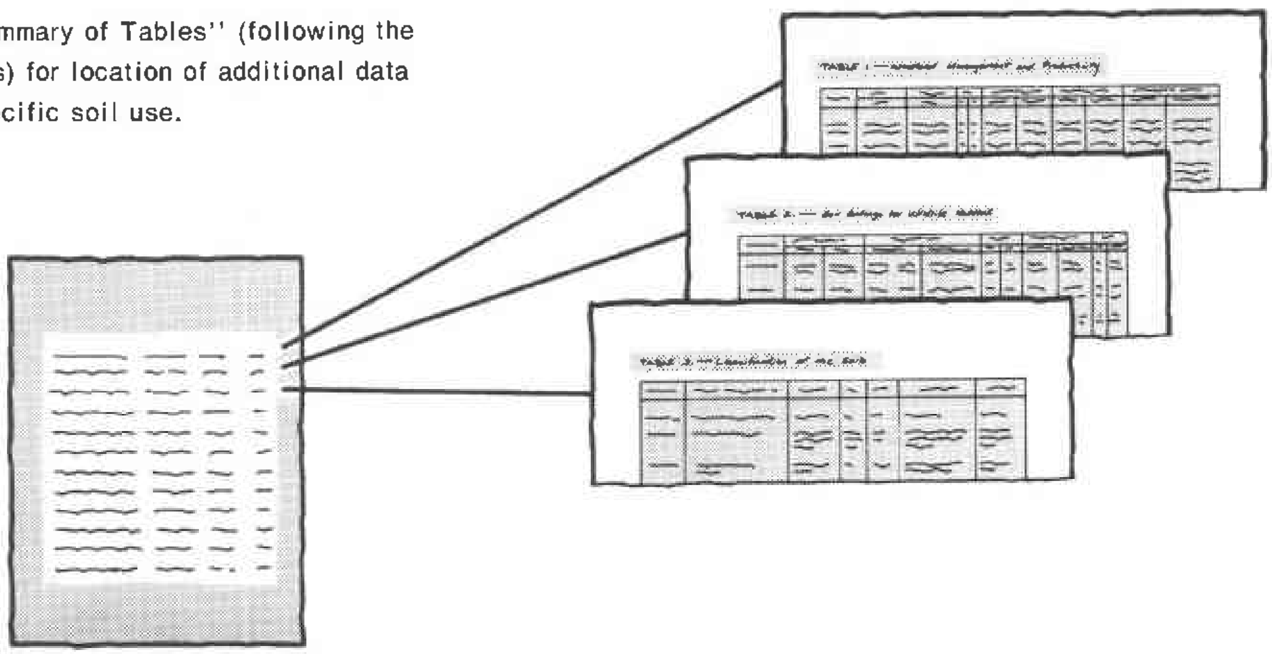


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

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

Major fieldwork for this soil survey was completed in 1984. Soil names and descriptions were approved in 1984. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1984. This soil survey was made cooperatively by the Soil Conservation Service, the Agronomy Department, Louisiana Agricultural Experiment Station, Louisiana State University Agricultural Center, and the Louisiana Soil and Water Conservation Committee. It is part of the technical assistance furnished to the East Carroll Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Cotton is one of the major crops grown on Commerce silt loam in East Carroll Parish.

Contents

Soil Series

Issued February 1988

Index to Map Units

Summary of Tables

Foreword

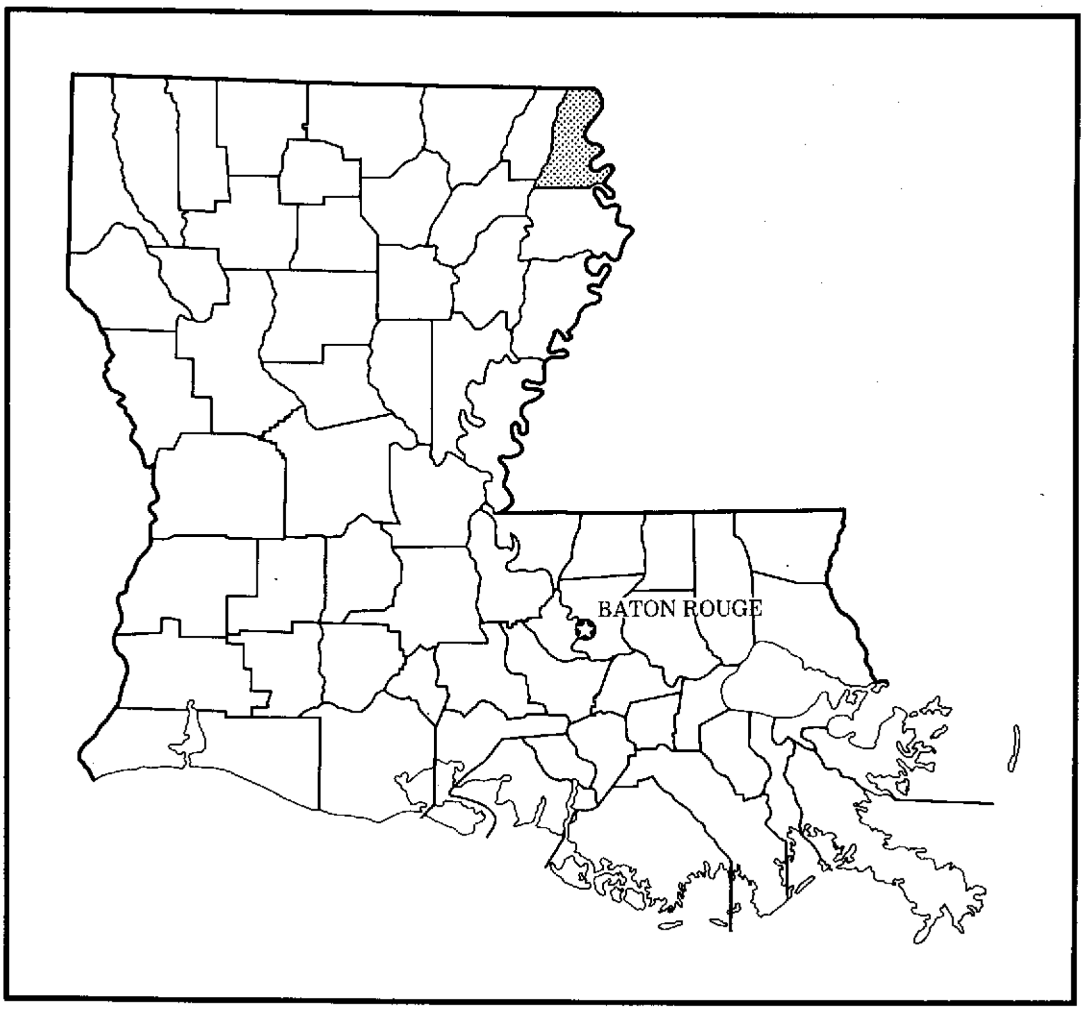
This soil survey contains information that can be used in land-planning programs in East Carroll Parish. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Horace J. Austin
State Conservationist
Soil Conservation Service



Location of East Carroll Parish in Louisiana.

Soil Survey of East Carroll Parish, Louisiana

By E. Thurman Allen, Teresa May, and Emmett F. Reynolds, Soil Conservation Service; and Douglas Gillett, Louisiana Soil and Water Conservation Committee

United States Department of Agriculture, Soil Conservation Service
In cooperation with
Agronomy Department, Louisiana Agricultural Experiment Station, Louisiana State University Agricultural Center; and
Louisiana Soil and Water Conservation Committee

EAST CARROLL PARISH is in the extreme northeastern corner of Louisiana, about 50 miles northeast of Monroe. The total area is 291,377 acres, of which 275,840 acres is land and 15,537 acres is water in the form of lakes, rivers, reservoirs, and waterways. The Mississippi River and the state of Mississippi form the eastern boundary, and Bayou Macon forms the western boundary. The state of Arkansas borders East Carroll Parish on the north, and Madison Parish borders the parish on the south. In 1980 the population was 11,772, according to the Bureau of the Census. Lake Providence, with a population of 6,361, is the largest city and the parish seat. The parish is chiefly rural.

The parish is entirely within one physiographic area, the level to gently undulating alluvial plains of the Mississippi River and its distributaries. Elevations range from about 50 feet above sea level on the level, clayey backswamp areas along the Tensas River in the south-central part of the parish, to about 115 feet above sea level on the loamy natural levees of the Mississippi River in the northern part of the parish.

The soils on these alluvial plains range from sandy to clayey and from excessively drained to poorly drained. An extensive manmade earthen levee system protects about 85 percent of the parish from flooding by the Mississippi River. The soils on the unprotected side of the levee are used as woodland, mainly for recreation and wildlife habitat. Most of the soils that are protected from flooding are used as cropland. A small acreage is used for homesites, woodland, pasture, or industrial sites.

Descriptions, names, and delineations of soils in this survey do not fully agree with those on soil maps for adjacent parishes in Louisiana or counties in Arkansas and Mississippi. Differences are the result of better information on soils, modifications in series concepts, intensity of mapping, or the extent of soils within the survey.

This survey updates a soil survey of East Carroll Parish that was published in 1909.

General Nature of the Parish

This section gives general information concerning climate, history, agriculture, industry, water resources, and transportation in East Carroll Parish.

Climate

Prepared by the National Climatic Data Center, Asheville, North Carolina.

East Carroll Parish has long, hot summers because moist tropical air from the Gulf of Mexico persistently covers the area. Winters are cool and fairly short, with only a rare cold wave that moderates in 1 or 2 days. Precipitation is fairly heavy throughout the year and prolonged droughts are rare. Precipitation in summer is adequate for most crops.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Lake Providence, Louisiana in the period 1951 to 1979. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 47 degrees F, and the average daily minimum temperature is 37 degrees. The lowest temperature on record, which occurred at Lake Providence on January 12, 1962, is -5 degrees. In summer the average temperature is 81 degrees, and the average daily maximum temperature is 92 degrees. The highest recorded temperature, which occurred at Lake Providence on September 1, 1951, is 110 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 50 inches. Of this, 25 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 19 inches. The heaviest 1-day rainfall during the period of record was 5.35 inches at Lake Providence on March 21, 1955. Thunderstorms occur on about 65 days each year, and most occur in summer.

The average seasonal snowfall is 2 inches. The greatest snow depth at any one time during the period of record was 5 inches. On an average of 1 day, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 90 percent. The sun shines 65 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 9 miles per hour, in spring.

Locally severe storms, including tornadoes, strike occasionally in or near the parish. They are of short duration and cause variable and spotty damage. Every few years in summer or autumn, a tropical depression or a remnant of a hurricane that has moved inland causes extremely heavy rains for 1 to 3 days.

History

Carroll Parish was established in 1832. In 1877, the parish was divided into East and West Carroll Parishes. Bayou Macon was the dividing line between the two new parishes. East Carroll Parish is named for Charles Carroll, a wealthy Maryland plantation owner and a signer of the Declaration of Independence.

Indians originally lived in the area. Unknown "mound builders" occupied the area between 300 B.C. and 500 A.D. Archeologists have investigated several of their campsites, which are mainly along streams and lakes. However, erosion and agricultural activities have destroyed many of the mounds. One of the first settlers to arrive was Joe Dempsey, for whom Joes Bayou is named.

Around 1833, the first town of Providence was drafted to become the Parish seat. The town's name is derived from two legends. The first legend concerns a band of pirates that used an old river bend cutoff as a fortress to raid boats on the Mississippi River. It is said that the surviving members of the crew would give thanks to Providence for sparing them from the pirates. The second legend concerned westward-bound settlers. After crossing the Mississippi River, they would thank Providence for a safe trip and the bountiful food supply in the area now known as Lake Providence.

Lake Providence played a vital role in prolonging the Civil War. General U.S. Grant planned to bypass the Southern guns at Vicksburg, Mississippi, by digging a canal from the lake cutoff to the Mississippi River. He then planned to use the Tensas River and other streams for passage of Federal gunboats. However, General Grant had to abandon his project. The canal became a health hazard because it was an ideal breeding habitat for mosquitoes, and in 1953, the canal was filled in.

Agriculture has always been a major enterprise in the parish, employing most of the working population. At one time, lumber production was a thriving industry in East Carroll Parish. Several oil and natural gas lines cross the parish.

Agriculture

East Carroll Parish is primarily an agricultural area. Records dating back to the early 1800's show that the loamy sediment along Joes Bayou and the Mississippi River was the first soil used for agriculture. Cotton was the principal crop. Before the Civil War, East Carroll Parish led the state in cotton production.

In 1969, there were 445 farms in East Carroll Parish according to the U.S. Census of Agriculture. The average size of a farm was about 474 acres. In 1978, there were 374 farms with an average size of 629 acres.

Acreage of cropland has been steadily increasing and acreage of woodland and pasture has been decreasing. Improvement of drainage systems throughout the parish has increased the amount of useable cropland so that in 1984, cropland covered 84.3 percent of East Carroll Parish. In 1984, only 12,200 acres of woodland remained in the area west of the levee along the Mississippi River. An additional 25,000 acres of woodland is between the levee and the Mississippi River. Most of the pasture has been converted to row crops. The only significant acreage of pasture in the parish is on the earthen levee along the Mississippi River. About 2,000 acres of pasture remain west of the levee.

In 1982, 135,000 acres of soybeans, 50,062 acres of cotton, and 10,728 acres of rice were planted in East Carroll Parish according to the Louisiana Summary of Agriculture and National Resources. In addition, 43,768 acres of wheat were planted and double-cropped with soybeans. There are also small acreages of corn, grain sorghum, and oats. Although cotton occupies only 21.2 percent of the agricultural land in the parish, its gross value of 25 million dollars is first and is two million dollars higher than the value of soybeans.

The cropland in East Carroll Parish is protected from flooding of the Mississippi River. Records show that attempts were made to build a levee as early as 1858. However, flooding on the Mississippi River was recognized as a national problem by 1917, and Congress authorized federal funds for flood control on the river.

The improvement of local river ports has aided agricultural marketing in recent years.

Industry

Industries in East Carroll Parish are mostly agriculture-related, and include grain elevators, cotton gins, compresses and warehouses, a seed company, and a pepper sauce manufacturer. Agricultural products are shipped from the Lake Providence Port.

A sawmill, a mobile home factory, and a small gas field are also in the parish.

Water Resources

Surface Water

The principal sources of surface water in East Carroll Parish are the Mississippi River, Bayou Macon, Tensas River, Joes Bayou, Lake Providence, and numerous other lakes and bodies of water on the unprotected side of the Mississippi River levee.

Lake Providence has a surface area of about 1,230 acres. The average flow rate of Bayou Macon is about 500 cubic feet per second. By contrast, the average flow rate of the Mississippi River is 570,000 cubic feet per second *(15)*.

Generally, the quality of water in these streams and lakes is good. Lake Providence has had high concentrations of pesticides (DDD, DDE, and DDT) and chloridane. Concentrations of low dissolved oxygen can be present in deeper parts of Lake Providence because of seasonal stratification.

Nearly all the surface water in East Carroll Parish is used for irrigation.

Ground Water

East Carroll Parish has an abundance of fresh ground water. The main aquifers in the parish are the Mississippi River Alluvial Aquifer (MRAA) in Pleistocene age sediment and the aquifers in the Jackson and Claiborne Groups of Eocene age. Water-producing formations in the Claiborne Group are the Cockfield, Cook Mountain, Sparta Sands, and Cane River Formations.

The MRAA and the Cockfield Formation are the only aquifers from which water is being removed in East Carroll Parish. In 1980, about 44.4 million gallons per day were removed from these aquifers, with more than 43 million gallons of this total pumped from the MRAA *(17)*.

The Jackson Group is in the southeast corner of the parish and has a maximum thickness of about 175 feet. This sediment is not considered a source for ground water in East Carroll Parish because of the fine-grained texture and limited occurrence.

The Cockfield Formation is composed of lignitic sands and clays. In East Carroll Parish it ranges between about 300 and 500 feet thick. The aquifer in this formation has been utilized only to a small extent, but it is a potential source of moderate to large quantities of ground water. Ground water in this formation is replenished in the outcrop area and by leakage from aquifers that lie over the formation.

Water from the Cockfield Formation ranges from soft to hard, depending upon sample depth. Hardness ranges from 1 part per million (ppm) in water from deeper wells to 300 ppm in water sampled from the upper part of the aquifer. Average hardness is about 120 ppm. Chloride content ranges from 10 to 113 ppm, averaging 55 ppm. Iron content ranges from 0.1 to 4.7 ppm, averaging 1.2 ppm.

The Cook Mountain Formation is immediately below the Cockfield Formation. It is 110 to 175 feet thick. This formation is not a source of ground water in East Carroll Parish because of the depth of the formation and because the fine-grained sediment does not yield sufficient quantities of water.

The thick Sparta Sands are below the Cook Mountain Formation. They are about 650 to 820 feet thick. The color and chemical quality makes the water undesirable for most uses. However, these sands yield large quantities of water and could be used for industrial purposes.

The Cane River Formation is at the base of the Sparta Sands and is about 300 to 370 feet thick. This formation is about 2,000 feet below sea level in the south end of East Carroll Parish. It is not a source of ground water because it mainly has clays and thin sands and has saltwater.

The shallow Mississippi River Alluvial Aquifer (MRAA) is the largest source of fresh water in the parish. It is composed of fine or medium sand in the upper part and medium or coarse sand and gravel in the lower part. This aquifer ranges from 20 to 135 feet thick. Well yields range from 250 to 7,000 gallons per minute. Water from the MRAA typically is a hard to very hard, calcium bicarbonate type that is high in iron content. Water levels generally are less than 30 feet below the land surface. The maximum annual water level fluctuations are as much as 20 feet near the Mississippi River, and minimum annual fluctuations are less than 2 feet in interstream areas.

This aquifer is replenished by subsurface inflow from the north; infiltration from lateral movement from rivers and streams, especially the Mississippi River during flood stage; and from rainfall filtering through the relatively permeable surface soils that lie over the aquifer. Discharge from the MRAA is by lateral movement into streams, downward movement into the tertiary aquifers, a southward subsurface outflow through the MRAA, evapotranspiration in vegetated areas where the ground water level is near the surface, and artificial discharge by pumping.

The MRAA ground water generally is extremely hard, averaging 200 to 400 milligrams of calcium carbonate per liter. This extremely hard water is east of Transylvania and in the southeast corner of the parish. Water having concentrations of iron, averaging from 5 to 10 milligrams per liter, is adjacent to the Mississippi River. Water in areas farther west of the Mississippi River has concentrations of iron that average from 1 to 5 milligrams per liter. Chloride content is at acceptable levels and averages from 5 to 50 milligrams per liter.

Transportation

Travel and trade in East Carroll Parish has always been largely dependent upon the Mississippi River. Until the turn of the century, ferries were necessary for crossing the Mississippi River and Bayou Macon. Today, the Lake Providence Port serves river and barge traffic. The Missouri Pacific Railroad extends north and south and is used for freight shipments.

Federal, state, and parish highways cross East Carroll Parish. Bus routes provide regular passenger and freight service. An airport provides service for agriculture and business operations.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; and the kinds of crops and native plants growing on the soils. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called soils of minor extent.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed, and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The soils in the survey area vary widely in their suitability for major land uses. Table 4 shows the extent of the map units shown on the general soil map. It lists the suitability of each, in relation to that of the other map units, for major land uses and shows soil properties that limit use. Soil suitability ratings are based on the practices commonly used in the survey area to overcome soil limitations. These ratings reflect the ease of overcoming the limitations. They also reflect the problems that will persist even if such practices are used.

Each map unit is rated for *cultivated crops, pastureland, woodland, urban uses,* and *intensive recreation areas*. Cultivated crops are those grown extensively in the survey area. Pastureland refers to land that produces either native grasses or tame grasses and legumes for livestock grazing. Woodland refers to areas of native or introduced trees. Urban uses include residential, commercial, and industrial developments. Intensive recreation areas are campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic.

The boundaries of the general soil map units in East Carroll Parish were matched, where possible, with those of previously published surveys of Chicot County, Arkansas; Issaquena County, Mississippi; and Madison Parish, Louisiana. In a few places, however, the lines do not join, and the names of the map units differ. The differences resulted mainly because of changes in soil series concepts, differences in map unit design, and changes in soil patterns near the survey area boundaries. The boundaries of the general soil map units in East Carroll Parish do not match those of the previously published survey of West Carroll Parish, Louisiana, because the two parishes are separated by a wide, perennial stream.

Soil Descriptions

The general soil map units in this survey have been grouped into two general landscapes. Descriptions of each of the broad groups and the map units in each group follow.

Soils That Are Protected from Most Flooding

The seven map units in this group consist mainly of level to gently undulating, loamy, clayey, and sandy soils along present and former channels and distributaries of the Mississippi River. Slopes range from 0 to 5 percent. Large earthen levees protect these soils from most flooding by the Mississippi River.

These map units make up 84 percent of the land area of the parish. Most of these soils are used for cultivated crops. Wetness and poor tilth are the main limitations.

1. Commerce-Bruin

Level to gently undulating, somewhat poorly drained and moderately well drained soils that are loamy throughout

This map unit consists of soils in high and intermediate positions on the natural levees of the Mississippi River. The landscape consists mainly of long smooth slopes of less than 1 percent. In some places, low, parallel ridges and swales have slopes of 0 to 3 percent.

This map unit makes up about 15 percent of the parish. It is about 80 percent Commerce soils, 12 percent Bruin soils, and 8 percent soils of minor extent.

Commerce soils are in high and intermediate positions on the natural levees. These soils are somewhat poorly drained. The surface layer is dark brown silt loam or silty clay loam. The subsoil is dark grayish brown and grayish brown silty clay loam and silt loam, or it is gray and grayish brown silty clay loam and silt loam. The underlying material is grayish brown silt loam, or it is gray and grayish brown silty clay loam, silt loam, and very fine sandy loam.

Bruin soils are in high positions on the natural levees. These soils are moderately well drained. The surface layer is brown and dark brown silt loam. The subsoil is dark brown silt loam. The underlying material is dark brown to pale brown very fine sandy loam and loamy fine sand.

Of minor extent are the somewhat poorly drained Newellton soils and the poorly drained Sharkey and Tunica soils. These soils are in low positions on the natural levees and in backswamps.

The soils of this map unit are used mainly for crops. Small acreages are used as pasture or homesites.

The soils are well suited to crops and pasture. The loamy surface layer, high fertility, and level to gently undulating slopes favor these uses. Wetness is the main limitation. A surface drainage system can improve these soils for use as cropland.

The soils of this map unit are well suited to use as woodland. Limitations of these soils for this use are few.

The soils are moderately well suited to use as homesites and for intensive recreation uses. The main limitations are wetness, moderately slow permeability, and moderate shrink-swell potential.

2. Crevasse-Sharkey

Level to gently undulating, excessively drained soils that are sandy throughout and poorly drained soils that have a sandy surface layer and clayey subsoil

This map unit consists of sandy soils in areas where floodwater from the Mississippi River had breached the natural levees. It also consists of clayey soils in low positions on natural levees and in backswamps. The landscape consists mainly of parallel, low ridges and shallow swales. Slopes range from 0 to 3 percent.

This map unit makes up about 2 percent of the parish. It is about 61 percent Crevasse soils, 26 percent Sharkey soils, and 13 percent soils of minor extent.

Crevasse soils are in areas where floodwater had breached the natural levees along the Mississippi River. These soils are excessively drained. The surface layer is dark brown loamy fine sand. The underlying material is brown and dark brown loamy fine sand and fine sand.

Sharkey soils are in low positions on natural levees and in backswamps. These soils are poorly drained. The surface layer is dark grayish brown loamy fine sand. The subsoil is dark gray clay.

Of minor extent are the moderately well drained Bruin soils, the somewhat poorly drained Commerce soils, and the poorly drained Tunica soils. The Bruin and Commerce soils are in high and intermediate positions on natural levees. The Tunica soils are in slightly higher positions than those of the Sharkey soils.

The soils of this map unit are used mostly as pasture. A small acreage is used for crops and homesites.

The soils are poorly suited to crops and moderately well suited to pasture. The main limitations are wetness in spring and droughtiness in summer. Low fertility also limits crop and forage production.

The soils of this map unit are moderately well suited to use as woodland. The main concerns are seedling mortality caused by soil droughtiness and equipment use limitations caused by the sandy surface.

The soils are moderately well suited to use as homesites and for intensive recreation uses. The main limitations are very slow permeability and very high shrink-swell potential in the Sharkey soils and wetness in the Crevasse and Sharkey soils. Droughtiness in the Crevasse soils also limits growth of lawn and landscape plants.

3. Tensas-Dundee-Sharkey

Level to gently undulating, somewhat poorly drained and poorly drained soils that have a clayey surface layer and clayey and loamy subsoil, soils that are loamy throughout, and soils that have a clayey or loamy surface layer and clayey subsoil

This map unit consists of soils on natural levees and in backswamps along Joes Bayou and Bayou Macon. The landscape consists mainly of long smooth slopes of less than 1 percent. In some places, parallel, low ridges and swales have slopes of 0 to 3 percent.

This map unit makes up about 13 percent of the parish. It is about 47 percent Tensas soils, 41 percent Dundee soils, 10 percent Sharkey soils, and 2 percent soils of minor extent.

Tensas soils are on low, broad ridges and in low positions on natural levees. They are somewhat poorly drained. The surface layer is dark grayish brown and grayish brown silty clay and clay. The subsoil is grayish brown silty clay in the upper part and brown silty clay loam and silt loam in the lower part.

Dundee soils are in high and intermediate positions on natural levees. They are somewhat poorly drained. The surface layer is dark brown silt loam or dark grayish brown silty clay loam. The subsoil is dark grayish brown and grayish brown silt loam, clay loam, loam, or silty clay loam. The underlying material is light brownish gray, gray, and grayish brown silt loam or silty clay loam.

Sharkey soils are in swales and on broad flats. They are poorly drained and have a surface layer of dark grayish brown and dark gray clay or dark grayish brown silty clay loam. The subsoil is dark gray clay.

Of minor extent are the poorly drained Tunica soils in positions similar to those of the Tensas soils.

The soils of this map unit are mainly used for crops. Soybeans, wheat, and cotton are the main crops. A few areas are used as pasture and homesites.

The soils are moderately well suited to crops and well suited to pasture. Wetness and poor tilth are the main limitations. A surface drainage system and conservation tillage are needed.

The soils of this map unit are well suited to use as woodland. Logging operations are restricted by wetness during the winter and early in spring.

The soils are poorly suited to use as homesites and for intensive recreation uses. The main limitations are wetness, very slow and moderately slow permeability, and moderate, high, and very high shrink-swell potential. A drainage system is needed to remove excess surface water. Flooding is a hazard in some low-lying areas.

4. Tensas-Sharkey

Level to gently undulating, somewhat poorly drained and poorly drained soils that have a clayey surface layer and clayey and loamy subsoil, and soils that have a clayey or loamy surface layer and clayey subsoil

This map unit consists of soils in low positions on natural levees, broad flats, low ridges, and in shallow swales. These soils are mainly along Bayou Macon.

This map unit makes up about 2.5 percent of the parish. It is about 50 percent Tensas soils, 48 percent Sharkey soils, and 2 percent soils of minor extent.

Tensas soils are on ridges and in low positions on natural levees. These soils are somewhat poorly drained. The surface layer is dark grayish brown and grayish brown silty clay and clay, or very dark grayish brown silty clay. The subsoil is grayish brown silty clay in the upper part and brown silty clay loam and silt loam in the lower part. The underlying material is brown silty clay loam.

Sharkey soils are in swales, on broad flats, and in low positions on natural levees. These soils are poorly drained. The surface layer is dark grayish brown silty clay loam or dark gray clay. The subsoil is dark gray or gray clay.

Of minor extent are the somewhat poorly drained Dundee soils and the poorly drained Tunica soils. Dundee soils are in high and intermediate positions on natural levees. The Tunica soils are in low positions on natural levees.

The soils of this map unit are mostly used for crops, mainly soybeans, cotton, and wheat. A small acreage is used as pasture and homesites.

The soils are moderately well suited to crops and well suited to pasture. Wetness and poor tilth are the main limitations. A drainage system is needed to remove excess surface water. Conservation tillage helps to improve tilth.

The soils of this map unit are well suited to use as woodland. Wetness limits the use of equipment in winter and early in spring.

The soils are poorly suited to use as homesites and for intensive recreation uses. Wetness, high and very high shrink-swell potential, and very slow permeability are the main limitations. A drainage system is needed to remove excess surface water. Flooding is a hazard in some low-lying areas.

5. Sharkey

Level, poorly drained soils that have a clayey or loamy surface layer and clayey subsoil

This map unit consists of soils in backswamps, swales, and in low positions on natural levees. The landscape in most areas consists mainly of long smooth slopes of less than 1 percent. Manmade levees protect these soils from flooding by the Mississippi River, but flooding can occur during periods of unusually heavy rainfall.

This map unit makes up 32 percent of the parish. It is about 98 percent Sharkey soils and 2 percent soils of minor extent.

Sharkey soils have a surface layer of dark grayish brown silty clay loam or dark gray clay. The subsoil is dark gray or gray clay.

Of minor extent are the somewhat poorly drained Commerce, Dundee, Newellton, and Tensas soils, and the poorly drained Tunica soils. All of these soils are in higher positions than the Sharkey soils.

The soils of this map unit are mostly used for crops, mainly soybeans, rice, and wheat. A small acreage is used as pasture and woodland.

The soils are moderately well suited to crops and well suited to pasture. Wetness and poor tilth are the main limitations. A drainage system can remove excess surface water, and conservation tillage can help maintain tilth.

The soils of this map unit are well suited to use as woodland. Wetness limits the use of equipment.

The soils are poorly suited to use as homesites and for intensive recreation uses. The main limitations are wetness, flooding, very high shrink-swell potential, and very slow permeability. Drainage and protection from flooding are needed.

6. Tunica-Sharkey-Newellton

Level to gently undulating, poorly drained and somewhat poorly drained soils that have a clayey surface layer and clayey and loamy subsoil, and soils that have a clayey or loamy surface layer and clayey subsoil

This map unit consists of soils that are on natural levees and low ridges and in swales and backswamps. The landscape mainly consists of long, smooth slopes that are less than 1 percent. In some places, parallel, low ridges and shallow swales have slopes of 0 to 3 percent.

This map unit makes up about 15 percent of the land area of the parish. It is about 45 percent Tunica soils, 27 percent Sharkey soils, 25 percent Newellton soils, and 3 percent soils of minor extent.

Tunica soils are poorly drained. They are mainly on low ridges or in low positions on natural levees. The surface layer is dark grayish brown or very dark grayish brown clay. The subsoil is dark gray clay. The underlying material is grayish brown silt loam and very fine sandy loam or grayish brown silty clay loam.

Sharkey soils are poorly drained. They are in low positions on natural levees and in backswamps. The surface layer is dark grayish brown silty clay loam or dark gray clay. The subsoil is dark gray or gray clay.

Newellton soils are somewhat poorly drained. They are on low ridges and in swales and low positions on natural levees. The surface layer is dark grayish brown clay or silty clay. The subsoil is grayish brown silty clay. The underlying material is grayish brown silty clay loam and silt loam.

Of minor extent are the somewhat poorly drained Commerce, Dundee, and Tensas soils. The Commerce and Dundee soils are in high and intermediate positions on natural levees. The Tensas soils are in positions similar to those of the Newellton and Tunica soils.

The soils of this map unit are used mostly for soybeans, wheat, and rice. A small acreage is in pasture or used as homesites.

The soils are moderately well suited to cultivated crops and well suited to pasture. Wetness is the main limitation. Poor tilth is a limitation where the soils have a clayey surface layer. Drainage is needed to remove excess surface water.

The soils of this map unit are well suited to use as woodland. Wetness limits the use of equipment in winter and early in spring.

The soils of this map unit are poorly suited to use as homesites and for intensive recreation uses. The main limitations are wetness, slow and very slow permeability, and high and very high shrink-swell potential. Flooding is a hazard in low places.

7. Newellton-Goldman-Tunica

Level to gently undulating, somewhat poorly drained, moderately well drained, and poorly drained soils that have a clayey surface layer and clayey and loamy subsoil, and soils that have a loamy surface layer and loamy subsoil

This map unit consists of soils on low ridges, in swales, and in high and low positions on natural levees. The landscape, in most places, consists of long, smooth slopes that are less than 1 percent. In some places, low ridges and shallow swales have slopes that range from 0 to 5 percent.

This map unit makes up about 4.5 percent of the land area of the parish. It is about 45 percent Newellton soils, 25 percent Goldman soils, 20 percent Tunica soils, and 10 percent soils of minor extent.

Newellton soils are somewhat poorly drained. They are in low positions on natural levees and in swales. The surface layer is dark grayish brown clay or silty clay. The subsoil is grayish brown silty clay. The underlying material is grayish brown silty clay loam and silt loam.

Goldman soils are moderately well drained. They are on low ridges and in high positions on natural levees. The surface layer is dark grayish brown silt loam or dark brown silty clay loam. The subsoil is dark yellowish brown and dark brown or brown and yellowish brown silt loam and very fine sandy loam. The underlying material is dark brown loamy fine sand and grayish brown very fine sandy loam or brown loamy fine sand.

Tunica soils are poorly drained. They are in low positions on natural levees and on low ridges. The surface layer is dark grayish brown or very dark grayish brown clay. The subsoil is dark gray clay. The underlying material is grayish brown silt loam and very fine sandy loam or grayish brown silty clay loam.

Of minor extent are the somewhat poorly drained Commerce soils and poorly drained Sharkey soils. Commerce soils are in positions similar to those of the Goldman soils. Sharkey soils are in swales, backswamps, and low positions on natural levees.

The soils of this map unit are well suited to pasture and cultivated crops. The main crops are cotton, soybeans, and wheat. The main limitations are uneven slopes and wetness. Erosion is a hazard on sloping soils.

The soils are well suited to use as woodland. Wetness limits the use of equipment in winter and early in spring.

The soils of this map unit are poorly suited to use as homesites and for intensive recreation uses. The main limitations are wetness, moderate to very slow permeability, and moderate and high shrink-swell potential.

Soils That Are Frequently Flooded

The two map units in this group consist mainly of level to gently undulating, loamy, clayey, and sandy soils along present channels and distributaries of the Mississippi River. Slopes range from 0 to 3 percent. The soils are unprotected and are subject to frequent flooding.

These map units make up about 16 percent of the land area of the parish. Most acreage is used for the production of hardwood trees and as habitat for wildlife. Wetness and frequent flooding are the main limitations for woodland, agricultural, and urban uses.

8. Commerce-Crevasse-Bruin

Gently undulating, somewhat poorly drained, excessively drained, and moderately well drained soils that are loamy or sandy throughout

This map unit consists of soils mainly between the channel of the Mississippi River and its manmade levee. These soils are subject to scouring by floodwater that causes deposition or loss of soil material. Slopes range from 0 to 3 percent.

This map unit makes up about 12 percent of the parish. It is about 30 percent Commerce soils, 25 percent Crevasse soils, 19 percent Bruin soils, and 26 percent soils of minor extent.

Commerce soils are in high and intermediate positions on natural levees. These soils are somewhat poorly drained. The surface layer is dark brown silty clay loam and silt loam. The subsoil is dark grayish brown and grayish brown silt loam and silty clay loam. The underlying material is grayish brown silt loam.

Crevasse soils are on sandbars and on the sandy splays that formed where former floodwaters breached the natural levees of the Mississippi River. These soils are excessively drained. The surface layer is dark brown fine sand. The underlying material is brown and dark brown loamy fine sand and fine sand.

Bruin soils are in high positions on natural levees. These soils are moderately well drained. The surface layer is brown and dark brown silt loam. The subsoil is dark brown silt loam. The underlying material is dark brown to pale brown very fine sandy loam and loamy fine sand.

Of minor extent are the somewhat poorly drained Newellton soils and the poorly drained Tunica and Sharkey soils. The Newellton soils are in low positions on natural levees. The Tunica and Sharkey soils are in low positions on the natural levees and in backswamps.

The soils of this map unit are used mostly as woodland. A few small areas have been cleared and are used for pasture, hay, or crops.

The soils are moderately well suited to the production of hardwood trees. Frequent flooding limits logging operations and increases seedling mortality.

The soils of this map unit are poorly suited to crops and pasture, and they are generally not suited to use as homesites or for intensive recreation uses. Frequent flooding is the main hazard. Protection from flooding is generally not feasible.

9. Sharkey-Tunica-Newellton

Level to gently undulating, poorly drained and somewhat poorly drained soils that have a clayey or loamy surface layer and clayey subsoil

The soils of this map unit are mainly between the Mississippi River and its manmade levee. These soils are subject to scouring by floodwater that causes deposition or loss of soil material. A few areas of the Sharkey soils are in abandoned stream channels and are subject to frequent flooding caused by runoff. Slopes range from 0 to 3 percent.

This map unit makes up about 4 percent of the land area of the parish. It is about 47 percent Sharkey soils, 38 percent Tunica soils, 12 percent Newellton soils, and 3 percent soils of minor extent.

Sharkey soils are poorly drained. They are in low positions on natural levees and in swales, backswamps, and abandoned stream channels. The surface layer is dark grayish brown or dark gray clay. The subsoil is dark gray and gray clay.

Tunica soils are poorly drained. They are on low ridges and in low positions on natural levees. The surface layer is dark grayish brown clay. The subsoil is grayish brown or dark gray clay. The underlying material is grayish brown silty clay loam and grayish brown or light brownish gray silt loam.

Newellton soils are somewhat poorly drained and are on low ridges, in swales, and in low positions on natural levees. The surface layer is dark grayish brown silty clay or silty clay loam. The subsoil is dark gray clay. The underlying material is gray silt loam and grayish brown silty clay loam.

Of minor extent are the moderately well drained Bruin soils, the somewhat poorly drained Commerce soils, and the excessively drained Crevasse soils. These soils are in higher positions than the Sharkey, Tunica, and Newellton soils.

Most soils of this map unit are in hardwoods and provide habitat for woodland wildlife. A few small areas have been cleared and are used as cropland.

The soils are moderately well suited to woodland. Frequent flooding limits logging operations and increases seedling mortality.

The soils of this map unit are poorly suited to crops and pasture. Frequent flooding is a hazard. Wetness and poor soil tilth are limitations to these uses.

The soils of this map unit are not suited to use as homesites and for intensive recreation uses. The hazard of flooding is generally too severe for these uses.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Commerce silty clay loam is one of several phases in the Commerce series.

Some map units are made up of two or more major soils. These map units are called soil complexes, soil associations, or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Bruin-Commerce silt loams, gently undulating, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Commerce and Bruin soils, frequently flooded, is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description.

The boundaries of the detailed soil map units in East Carroll Parish were matched, where possible, with those of previously published surveys of Chicot County, Arkansas; Issaquena County, Mississippi; and Madison Parish, Louisiana. In a few places, the lines do not join and there are some differences in the names of the map units. These differences result mainly from changes in soil series concepts, differences in map unit design, and changes in soil patterns near survey area boundaries. The boundaries of detailed soil map units in East Carroll Parish were not matched with those of the previously published survey of West Carroll Parish, Louisiana, because the two parishes are separated by a wide, perennial stream.

On the detailed soil maps, all of the soil areas in East Carroll Parish are mapped at the same level of detail, except for areas of CR—Commerce and Bruin soils, frequently flooded, NT—Newellton and Tunica soils, frequently flooded; and TT—Tunica and Sharkey soils, freqently flooded. Frequent flooding so limits the use and management of these areas that separating each soil would be of little value to the land user.

Table 5 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and suitabilities for many uses. The Glossary defines many of the terms used in describing the soils.

Ar—Arents, loamy and clayey. This map unit consists of well drained to somewhat poorly drained soils on spoil banks along Bayou Macon. The soil material was dredged from the bayou. The soils range from clay to sandy loam, and they are stratified in most places. Areas range from 50 to 200 feet wide, 15 to 30 feet high, and 1 mile to 6 miles long. Some areas have been smoothed and are 5 to 15 feet high and about 150 feet wide. Slopes range from 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 have medium fertility. Runoff ranges from slow to rapid, and permeability ranges from moderate to very slow. The depth to the high water table is variable. The clayey material has high shrink-swell potential. Wetness, slope, low strength for roads, and the uneven surface are the main limitations for most uses of these soils.

Most of these soils are in steep and rough areas, and are used mostly for annuals and small trees. Small acreages have been partly smoothed for use as pasture or for crops, such as wheat and soybeans. Common bermudagrass is a suitable pasture plant.

Unless these soils are smoothed to reduce slope gradients, they are not suited to cultivated crops because of the uneven surface and the moderately steep slopes. Where these soils are smoothed, they can be used as pasture, cropland, or woodland.

These soils are not assigned to interpretive groups.

Br—Bruin silt loam. This level, moderately well drained soil is in high positions on natural levees along the Mississippi River and its distributaries. The areas are irregular in shape and range from 10 to 850 acres. Slopes are dominantly less than 1 percent.

Typically, the Bruin soil has a brown silt loam surface layer about 6 inches thick. The subsoil extends to a depth of about 30 inches and is brown, mottled silt loam. The underlying material to a depth of about 60 inches is yellowish brown and grayish brown, mottled silt loam and very fine sandy loam.

Included with this soil in mapping are a few small areas of Commerce, Newellton, Sharkey, and Tunica soils. These areas make up about 10 percent of the map unit. The Commerce and Newellton soils are somewhat poorly drained. The Commerce soils are in slightly lower positions than the Bruin soil and have more clay in the subsoil. The Newellton soils are in lower positions, and they have a clayey subsoil. The Sharkey and Tunica soils are poorly drained. These soils are in lower positions and have a clayey subsoil. Also included are small areas of Bruin soil that have slopes of more than 1 percent.

The Bruin soil has high fertility. Water and air move through this soil at a moderate rate. Water runs off the surface slowly. A seasonal high water table is not within 6 feet of the surface. Adequate water is available to plants in most years. This soil has low shrink-swell potential. The surface layer is neutral, and the subsoil and the underlying material are mildly alkaline.

This soil is used mainly for cultivated crops. In a few areas, it is used as pasture or homesites.

This soil is well suited to cultivated crops. Cotton is the main crop (fig. 1), but soybeans, wheat, corn, and vegetables are also grown. This soil is friable and easy to keep in good tilth. It can be worked throughout a wide range of moisture content. Excessive cultivation can cause a tillage pan to form. This pan can be broken by subsoiling when the soil is dry. Conservation tillage and crop residue left on the soil or regular additions of other organic matter improve fertility and help to maintain tilth and organic matter content. Most crops and pasture plants respond well to fertilizer.

This soil is well suited to use as pasture. It has few limitations for this use. Suitable pasture plants are coastal bermudagrass, common bermudagrass, Pensacola bahiagrass, winterpeas, vetch, and red clover. With good management, tall fescue can be grown on these soils. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and soil in good condition. Periodic mowing and clipping helps to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Fertilizer is needed for optimum growth of grasses and legumes.

This soil is well suited to use as woodland, but because it is also suited to cropland, most areas have been cleared for crops or pasture. Suitable trees are American sycamore, eastern cottonwood, and sweetgum.

This soil has good potential as habitat for openland and woodland wildlife. Providing small, undisturbed, and vegetated areas near cropland can improve the habitat for quail and rabbits. Planting appropriate vegetation or propagating the natural growth of desirable plants can create or improve habitat for woodland wildlife.

This soil is well suited to intensive recreation uses. It has few limitations for these uses. Restricting vehicle and foot traffic to designated areas can help maintain adequate plant cover that will enhance the beauty of the area.

This soil is well suited to use as building sites, for local roads and streets, and for most sanitary facilities. It has few limitations to these uses. Preserving the existing plant cover or revegetating disturbed areas around construction sites as soon as possible helps to control soil erosion.

This Bruin soil is in capability class I and in woodland group 10A.

Bu—Bruin-Commerce silt loams, gently undulating. This complex consists of moderately well drained Bruin soil and somewhat poorly drained Commerce soil. Both soils are on natural levees along the Mississippi River and its distributaries. Bruin soil is on low ridges that range from 1.5 to 3 feet high and from 30 to 200 feet wide. Commerce soil is in swales that range from 20 to 175 feet wide. The individual areas of this complex range from about 200 to 1,150 acres. Slopes range from 0 to 3 percent.

The Bruin soil makes up about 50 percent of the complex and the Commerce soil about 35 percent. Areas of these soils were so intermingled that mapping them separately was not practical at the scale used.

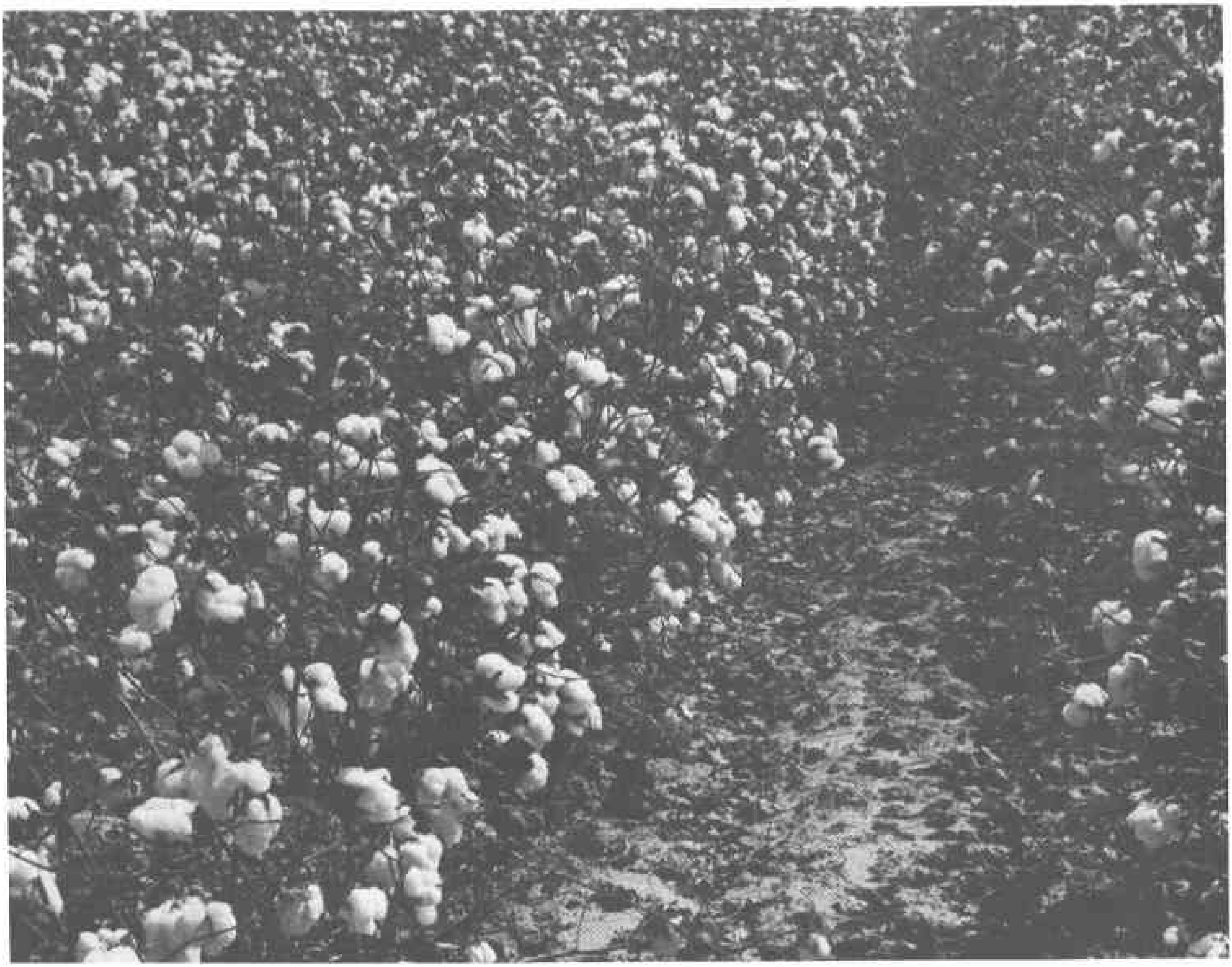


Figure 1.—This cotton growing on Bruin silt loam has been defoliated and is ready to be picked.

Typically, the Bruin soil has a surface layer about 8 inches thick. It is brown silt loam in the upper part and dark brown silt loam in the lower part. The subsoil extends to a depth of about 24 inches and is dark brown, mottled silt loam. The underlying material to a depth of about 65 inches is brown and dark brown, mottled very fine sandy loam and loamy fine sand.

The Bruin soil has high fertility. Water and air move through this soil at a moderate rate. Water runs off the surface at a medium rate. A seasonal high water table is not within 6 feet of the surface. Adequate water is available to plants in most years. This soil dries quickly after rains. The surface layer is slightly acid in the upper part and medium acid in the lower part. The subsoil is neutral or mildly alkaline. The underlying material is mildly alkaline.

Typically, the Commerce soil has a dark grayish brown silt loam surface layer about 6 inches thick. The subsoil to a depth of about 30 inches is dark grayish brown, mottled silty clay loam in the upper part and grayish brown, mottled silt loam in the lower part. The underlying material to a depth of about 60 inches is stratified grayish brown, mottled silt loam and very fine sandy loam.

This Commerce soil has high fertility. Water and air move through this soil at a moderately slow rate. Water runs off the surface slowly. A seasonal high water table is at a depth of about 1.5 feet to 4 feet during December through April. Adequate water is available to plants in most years. This soil has moderate shrink-swell potential. Reaction is neutral throughout.

Included in this map unit are a few small areas of the Crevasse, Newellton, Sharkey, and Tunica soils. These soils make up 15 percent of the map unit. The Crevasse soils are excessively drained and are sandy throughout. The Newellton soils are somewhat poorly drained. The Sharkey and Tunica soils are poorly drained. The included soils are in lower positions than the Bruin and Commerce soils. Newellton, Sharkey, and Tunica soils have a clayey subsoil.

The soils of this complex are used mostly for cultivated crops. In a few areas, they are used as pasture or homesites.

These soils are well suited to cultivated crops. They are limited mainly by wetness in the swales. Land grading and smoothing remove excess water. Cotton, soybeans, grain sorghum, corn, and wheat are the main crops. Excessive cultivation can cause a tillage pan to form. This pan can be broken by subsoiling when the soil is dry. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control erosion.

These soils are well suited to use as pasture. They have few limitations. Suitable pasture plants are coastal bermudagrass, common bermudagrass, tall fescue, Pensacola bahiagrass, and white clover. Fertilizer is needed for optimum growth of grasses and legumes. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth.

These soils are well suited to use as woodland, but because they are also suited to cropland, most areas have been cleared for crops or pasture. Suitable trees are eastern cottonwood, sweetgum, and American sycamore.

The soils of this complex have good potential for use as habitat for openland and woodland wildlife. Planting appropriate vegetation or propagating the natural growth of existing vegetation can create and maintain habitat.

These soils are well suited to recreation uses. They are limited mainly by wetness in the Commerce soil. Good drainage is necessary for intensively used areas, such as playgrounds. Maintaining adequate plant cover can control erosion and sedimentation and enhance the beauty of the area.

The soils in this complex are moderately well suited to urban uses. The main limitations are wetness, moderately slow permeability, and moderate shrink-swell potential. Drainage is needed if roads and building foundations are constructed. If buildings are constructed in areas of this map unit, it is necessary to properly design foundations and footings and divert runoff away from buildings to prevent structural damage caused by shrinking and swelling. Excess water can be removed by using shallow ditches and providing the proper grade for drainage. Wetness and moderately slow permeability are limitations where the soil is used for septic tank absorption fields. Sandy backfill for the trench and long absorption lines help to compensate for the moderately slow permeability. Preserving the existing plant cover or revegetating disturbed areas around construction sites as soon as possible helps to control soil erosion.

These soils are in capability subclass IIw. The Bruin soil is in woodland group 10A, and the Commerce soil is in 13W.

Cm—Commerce silt loam. This level, somewhat poorly drained soil is in high positions on natural levees along the Mississippi River and its distributaries. The areas are irregular in shape and range from 15 to 2,500 acres. Slopes are dominantly less than 1 percent.

Typically, this Commerce soil has a dark brown silt loam surface layer about 6 inches thick. The subsoil extends to a depth of about 33 inches and is dark grayish brown, mottled silty clay loam in the upper part and grayish brown, mottled silt loam in the lower part. The underlying material to a depth of about 65 inches is grayish brown, mottled silt loam.

Included with this soil in mapping are a few small areas of Bruin, Newellton, Sharkey, and Tunica soils. The Bruin soils are moderately well drained. They are in higher positions than the Commerce soil and have a coarser textured subsoil. The Newellton soils are somewhat poorly drained. The Sharkey and Tunica soils are poorly drained. These soils are in lower positions than the Commerce soil and have a clayey subsoil. Also included are small areas of Commerce silty clay loam and Commerce soil that has slopes of more than 1 percent. Included soils make up about 15 percent of the map unit.

This soil has high fertility. Water and air move through this soil at a moderately slow rate. Water runs off the surface slowly. A seasonal high water table is at a depth of about 1.5 feet to 4 feet during December through April. Adequate water is available to plants in most years. This soil has moderate shrink-swell potential. The surface layer and the upper part of the subsoil are neutral. The lower part of the subsoil and the underlying material are mildly alkaline.

This soil is used mainly for cultivated crops. It is also used as pasture or homesites.

This soil is well suited to cultivated crops. The main limitation is wetness. Cotton is the main crop, but soybeans, wheat, corn, and vegetables are also grown. This soil is friable and easy to keep in good tilth. It can be worked throughout a wide range of moisture content. Excessive cultivation can cause a tillage pan to form. This pan can be broken by subsoiling when the soil is dry. Conservation tillage and crop residue left on the soil or regular addition of other organic matter improve fertility and help to maintain tilth and organic matter content. Land grading and smoothing remove excess water. Most crops and pasture plants respond well to fertilizer.

This soil is well suited to use as pasture (fig. 2). It is limited mainly by wetness. Suitable pasture plants are common bermudagrass, coastal bermudagrass, Pensacola bahiagrass, white clover, vetch, and winterpeas. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Fertilizer is needed for optimum growth of grasses and legumes.

This soil is well suited to use as woodland, but because it is also suited to cropland, most areas have been cleared for crops or pasture. Suitable trees are American sycamore, sweetgum, and eastern cottonwood.

This soil has good potential as habitat for openland and woodland wildlife and fair potential for wetland wildlife. Providing small, undisturbed, and vegetated areas near cropland can improve the habitat for quail and rabbits. Planting appropriate vegetation or propagating the natural growth of desirable plants can create or improve habitat for woodland wildlife.

The soil is moderately well suited to recreational development. The main limitations are wetness and moderately slow permeability. Good drainage is necessary for intensively used areas, such as playgrounds. Maintaining adequate plant cover can control erosion and sedimentation and enhance the beauty of the area.

Figure 2.—The large earthen levees along the Mississippi River are used as improved pasture. The area on the protected side of the levee is in Commerce silt loam.

The soil is moderately well suited to urban development. The main limitations are wetness, moderately slow permeability, and moderate shrink-swell potential. Low strength is a limitation for local roads and streets. Drainage is needed if roads and building foundations are constructed. Proper design and backfilling with material that has low shrink-swell potential can minimize the effects of shrinking and swelling. Excess water can be removed by using shallow ditches and providing the proper grade for drainage. Septic tank absorption fields do not function properly during rainy periods because of wetness and moderately slow permeability. Increasing the size of the absorption field can overcome the limitation of moderately slow permeability. Road design and construction can offset the limited ability of the soil to support a load. Preserving the existing plant cover or revegetating disturbed areas around construction sites as soon as possible helps to control soil erosion.

This Commerce soil is in capability subclass IIw and in woodland group 13W.

Co—Commerce silty clay loam. This level, somewhat poorly drained soil is in intermediate positions along natural levees of the Mississippi River and its distributaries. The areas are irregular in shape and range from 10 to 2,000 acres. Slopes are dominantly less than 1 percent.

Typically, this Commerce soil has a dark grayish brown silty clay loam surface layer about 8 inches thick. The subsoil extends to a depth of about 25 inches and is gray, mottled silty clay loam in the upper part; gray silt loam in the middle part; and grayish brown, mottled silt loam in the lower part. The underlying material to a depth of about 70 inches is gray, mottled silty clay loam in the upper part and grayish brown, mottled silty clay loam in the lower part. The lower part is stratified with light brownish gray, mottled silt loam.

Included with this soil in mapping are a few small areas of Bruin, Newellton, and Sharkey soils. The Bruin soils are moderately well drained. They are in higher positions than the Commerce soil and have a coarser textured subsoil. The Newellton soils are somewhat poorly drained. The Sharkey and Tunica soils are poorly drained. These soils are in lower positions and have a clayey subsoil. Also included are small areas of Commerce silt loam and Commerce soil that has slopes of more than 1 percent. Included soils make up about 15 percent of the map unit.

This Commerce soil has high fertility. Water and air move through this soil at a moderately slow rate. Water runs off the surface slowly. A seasonal high water table is at a depth of about 1.5 to 4 feet during December through April. Adequate water is available to plants in most years. This soil has moderate shrink-swell potential. The surface layer is medium acid. The subsoil is slightly acid in the upper and middle parts. The lower part of the subsoil and the upper part of the underlying material are neutral. The lower part of the underlying material is mildly alkaline.

This soil is used mainly for cultivated crops. It is also used as pasture or homesites.

This soil is well suited to cultivated crops. The main limitations are wetness and poor tilth. Cotton and soybeans are the main crops. This soil is difficult to keep in good tilth. It can be worked only within a narrow range of moisture content. This soil is sticky when it is wet and hard when it is dry, and it becomes cloddy if tilled when it is too wet or too dry. Land grading and smoothing can improve surface drainage. Conservation tillage and crop residue left on the soil or regular addition of other organic matter improve fertility and tilth and help to maintain organic matter content. Most crops and pasture plants respond well to fertilizer.

This soil is well suited to use as pasture. Suitable pasture plants are coastal bermudagrass, common bermudagrass, Pensacola bahiagrass, winterpeas, vetch, and red clover. Tall fescue can be used on these soils if good management is practiced. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Fertilizer is needed for optimum growth of grasses and legumes.

This soil is well suited to use as woodland, but because it is also suited to cropland, most areas have been cleared for crops or pasture. Suitable trees are American sycamore, sweetgum, and eastern cottonwood.

This soil has good potential for use as habitat for openland and woodland wildlife and fair potential for wetland wildlife. Few or no soil limitations affect managing wildlife habitat areas. Planting mast-producing trees can create habitat for white-tailed deer and squirrels. Providing undisturbed, vegetated areas near cropland can improve habitat for doves, quail, and rabbits.

This soil is moderately well suited to intensive recreation uses. The main limitations are wetness and moderately slow permeability. Good drainage is necessary for most recreation uses. Maintaining adequate plant cover can control erosion and sedimentation and can enhance the beauty of the area.

This soil is moderately well suited to urban uses. The main limitations are wetness, moderate shrink-swell potential, and moderately slow permeability. Low strength is a limitation for local roads and streets. Excess water can be removed by using shallow ditches and providing the proper grade for drainage. Proper design and backfilling with material that has low shrink-swell potential can minimize the effects of shrinking and swelling. The moderately slow permeability of this soil is a limitation for septic tank absorption fields. Increasing the size of the absorption field can overcome this limitation. Road design and construction can offset the limited ability of the soil to support a load. Preserving the existing plant cover during construction or revegetating disturbed areas around construction sites as soon as possible helps to control soil erosion.

This Commerce soil is in capability subclass IIw and in woodland group 13W.

CR—Commerce and Bruin soils, frequently flooded. This map unit consists of somewhat poorly drained Commerce soil and moderately well drained Bruin soil. These gently undulating soils are on natural levees along the Mississippi River. They are between manmade protection levees and the river. They are subject to frequent flooding. The areas range from about 25 to more than 2,500 acres. Slopes range from 0 to 3 percent.

The Commerce soil makes up about 50 percent of this map unit and the Bruin soil makes up about 35 percent. The Bruin soil is on ridges and in high positions on natural levees. The Commerce soil is in swales and intermediate positions on natural levees. Some areas have mostly Commerce soil, some have mostly Bruin soil, and others have both soils in proportions that differ from one area to another. The composition of this map unit varies between mapped areas, but mapping was controlled well enough to evaluate the soils for the expected use.

Typically, the Commerce soil has a dark grayish brown silty clay loam surface layer about 8 inches thick. The subsoil extends to a depth of about 26 inches and is grayish brown, mottled silt loam in the upper part and grayish brown, mottled silty clay loam in the lower part. The underlying material to a depth of about 60 inches is grayish brown, mottled silt loam.

This Commerce soil has high fertility. Water and air move through this soil at a moderately slow rate. Water runs off the surface at a slow or medium rate. This soil has moderate shrink-swell potential. A seasonal high water table is at a depth of about 1.5 to 4 feet from December to April except during periods of flooding. These soils are subject to frequent flooding for brief to long periods during the cropping season and other times of the year. Flooding occurs more often than twice in 5 years. Floodwaters typically are between 1 foot and 5 feet deep, but exceed 10 feet in places. The soil is neutral throughout.

Typically, the Bruin soil has a of dark grayish brown silt loam surface layer about 6 inches thick. The subsoil to a depth of about 21 inches is dark brown, mottled silt loam in the upper part and brown, mottled silt loam in the lower part. The underlying material to a depth of about 60 inches is grayish brown, mottled silt loam in the upper part; brown, mottled silt loam stratified with fine sandy loam in the middle part; and brown, mottled very fine sandy loam in the lower part.

This Bruin soil has high fertility. Water and air move through this soil at a moderate rate. Water runs off the surface at a medium rate. Adequate water is available to plants in most years. This soil has low shrink-swell potential. A seasonal high water table is not within 6 feet of the surface, except during periods of flooding. These soils are subject to frequent flooding for brief to long periods during the cropping season and other times of the year. Flooding occurs more often than twice in 5 years. Floodwaters typically are 0.5 foot to 3 feet deep, but the depth can exceed 8 feet in places. The soil is neutral throughout.

Included with this soil in mapping are a few small areas of Crevasse, Newellton, Sharkey, and Tunica soils. The Crevasse soils are excessively drained. These soils are on narrow sandbars and are sandy throughout. The Newellton soils are somewhat poorly drained. The Sharkey and Tunica soils are poorly drained. These soils are in low positions and have a clayey subsoil. Also included are a few areas of Bruin soil on high ridges that are subject to occasional flooding during the cropping season. The included soils make up about 15 percent of the map unit.

The soils in this map unit are used mainly as woodland and as habitat for woodland wildlife. A small acreage is used for pasture, crops, or campsites for hunters.

These soils are poorly suited to cultivated crops because of frequent flooding. Short season crops can be grown on high ridges in some years, but the risk of crop loss because of flooding is great. Protection of the soils in this map unit is not practical because the soils are within an area designated to carry water from the Mississippi River during flooding.

These soils are poorly suited to use as pasture mainly because of frequent flooding. The main pasture plant is common bermudagrass.

These soils are moderately well suited to use as woodland. Suitable trees are American sycamore, eastern cottonwood, Nuttall oak, overcup oak, water hickory, water oak, and sugarberry. The main concerns in producing and harvesting timber are moderate equipment use limitations and seedling mortality because of wetness from frequent flooding. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Trees should be water-tolerant and need to be planted or harvested during dry periods.

These soils have good potential for use as habitat for woodland wildlife and fair potential for openland and wetland wildlife. The soils provide habitat for deer, quail, rabbits, squirrels, and turkeys. Planting and protecting oak, pecan, and other mast-producing trees can improve wildlife habitat.

These soils are generally not suited to intensive recreation uses or for building sites, roads, and sanitary facilities. The hazard of flooding is generally too severe for these uses.

The Commerce and Bruin soils are in capability subclass Vw. The Commerce soil is in woodland group 12W, and the Bruin soil is in 9W.

Cs—Crevasse loamy fine sand. This nearly level, excessively drained soil is mainly on splays formed by floodwater from a former breach on natural levees along the Mississippi River. The Crevasse soil is also on remnants of sandbars in some abandoned channels of the Mississippi River. The landscape consists of low ridges and swales. The areas range from about 10 to 2,000 acres. Slopes range from 0 to 2 percent.

Typically, the Crevasse soil has a dark brown loamy fine sand surface layer about 5 inches thick. The underlying material to a depth of about 60 inches is brown loamy fine sand in the upper part and dark brown and brown fine sand in the middle and lower parts.

Included with this soil in mapping are a few small areas of Bruin, Commerce, Sharkey, and Tunica soils. The Bruin soils are moderately well drained. The Commerce soils are somewhat poorly drained. These soils are in slightly higher positions than the Crevasse soil and have a loamy subsoil. The Sharkey and Tunica soils are poorly drained. These soils are in lower positions and have a clayey subsoil. Included soils make up about 15 percent of the map unit.

This Crevasse soil has low fertility. Water and air move through this soil at a rapid rate. Water runs off the surface slowly. This soil dries quickly after rains. A seasonal high water table is at a depth of about 3.5 to 6.0 feet during November through March. This soil has low shrink-swell potential. Adequate water is not available to plants during dry periods in summer and in fall of most years. The surface layer is very strongly acid, the upper part of the underlying material is slightly acid, and the middle and lower parts of the underlying material are mildly alkaline.

This soil is used mainly as pasture. A small acreage is in woodland or used for cultivated crops or as homesites.

This soil is poorly suited to cultivated crops. The main limitations are droughtiness and low natural fertility.

This soil is moderately well suited to use as pasture. The main limitations are droughtiness and low natural fertility. Suitable pasture plants are common bermudagrass, Pensacola bahiagrass, and coastal bermudagrass. Rotation grazing helps to maintain forage quality. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Fertilizer is needed for optimum growth of grasses and legumes.

This soil is moderately well suited to use as woodland. Suitable trees are loblolly pine and eastern cottonwood. The main concerns in producing and harvesting timber are moderate seedling mortality and equipment use limitations. Droughtiness generally reduces seedling survival rates in areas where understory plants are numerous. When the soil is dry, the sandy surface layer limits the use of equipment.

This soil has fair potential for use as habitat for openland wildlife and poor potential for woodland wildlife. Managment that encourages growth of oak trees and desirable understory can improve habitat for white-tailed deer, squirrels, and turkeys. Creating undisturbed, vegetated areas around the edges of cropland and pasture can improve habitat for quail, doves, and rabbits.

This soil is moderately well suited to intensive recreation uses. The main limitations are the sandy surface layer and droughtiness.

This soil is moderately well suited to use as homesites and local roads and streets. Revegetating disturbed areas around construction sites as soon as possible helps to control soil erosion. Plants that tolerate droughtiness are needed if irrigation is not provided.

This Crevasse soil is in capability subclass IIIs and in woodland group 9S.

Cv—Crevasse fine sand, frequently flooded. This gently undulating, excessively drained soil is on the splays formed by floodwater from a former breach on natural levees along the Mississippi River. This soil is also on sandbars. The landscape consists of ridges, swales, and scoured areas near the Mississippi River. This soil is unprotected by manmade levees, and is subject to frequent flooding. Areas near the present channel of the Mississippi River are subject to scouring and thick deposition. The areas range from about 20 to 1,250 acres. Slopes range from 0 to 3 percent.

Typically, the Crevasse soil has a dark brown fine sand surface layer to a depth of about 8 inches. The upper part of the underlying material is brown loamy fine sand to a depth of about 15 inches. The lower part to a depth of about 60 inches is pale brown fine sand.

Included with this soil in mapping are a few small areas of Bruin, Commerce, and Newellton soils. The Bruin soils are moderately well drained. These soils are on some of the ridges and have a loamy subsoil. The Commerce soils are somewhat poorly drained. These soils are also on some of the low ridges and are loamy throughout. The Newellton soils are somewhat poorly drained. These soils are in lower positions than the Crevasse soil and have a clayey subsoil. Included soils make up about 15 percent of the map unit.

This Crevasse soil has low fertility. Water and air move through this soil at a rapid rate. Water runs off the surface slowly. A seasonal high water table is at a depth of about 3.5 to 6 feet during November through March except when altered by flooding. This soil is subject to brief to very long periods of flooding during the cropping season and at other times of the year. The depth of floodwater ranges from 1 foot to 10 feet or more. This soil is neutral throughout.

This soil is used mainly as woodland and as habitat for wildlife. In a few areas, it is used for pasture, campsites, or cultivated crops.

This soil is poorly suited to cultivated crops. Frequent flooding is a hazard. The main limitations are poor accessibility during floods and droughtiness.

This soil is poorly suited to pasture. Frequent flooding is a hazard and accessibility is poor during floods. Droughtiness is a limitation. Common bermudagrass is the main pasture plant.

This soil is moderately well suited to use as woodland. The main concern in producing and harvesting timber is moderate seedling mortality because of frequent flooding and droughtiness. Flooding and poor trafficability can limit equipment use when the soil surface is dry. Eastern cottonwood and loblolly pine are suitable for planting.

This soil has fair potential for use as habitat for openland wildlife and poor potential for woodland wildlife. Management that encourages the growth of oaks and other mast-producing trees can improve habitat for white-tailed deer, squirrels, and turkeys.

This soil is generally not suited to urban uses and intensive recreation uses. The hazard of flooding is generally too severe for these uses.

This Crevasse soil is in capability subclass Vw and in woodland group 9S.

Dd—Dundee silt loam. This level, somewhat poorly drained soil is on natural levees along Joes Bayou, Bayou Macon, and their distributaries. Areas are irregular or narrow in shape and range from 5 to 300 acres. Slopes are dominantly less than 1 percent.

Typically, this Dundee soil has a dark brown silt loam surface layer about 5 inches thick. The subsoil extends to a depth of about 37 inches and is grayish brown, mottled silt loam in the upper part; dark grayish brown and grayish brown, mottled clay loam in the middle part; and grayish brown, mottled loam and silt loam in the lower part. The underlying material to a depth of about 60 inches is light brownish gray, mottled silt loam in the upper part; gray, mottled silty clay loam in the middle part; and grayish brown, mottled silt loam in the lower part.

Included with this soil in mapping are a few small areas of Sharkey, Tensas, and Tunica soils. The Sharkey and Tunica soils are poorly drained. These soils are in lower positions than the Dundee soil and have a clayey subsoil. The Tensas soils are somewhat poorly drained. They are in slightly lower positions and have a subsoil that is clayey in the upper part. Also included are small areas of Dundee silty clay loam and Dundee soil that has slopes of more than 1 percent. Included soils make up about 10 percent of the map unit.

This Dundee soil has medium fertility. Water and air move through this soil at a moderately slow rate. Water runs off the surface slowly. A seasonal high water table is at a depth of about 1.5 to 3.5 feet during January through April. Adequate water is available to plants in most years. Adequate water is not available to plants during dry periods in summer and in fall of some years. This soil has moderate shrink-swell potential. The surface layer and subsoil are very strongly acid. The underlying material is strongly acid in the upper part and neutral in the middle and lower parts.

This Dundee soil is used mostly for cultivated crops. Small acreages are used for pasture or homesites.

This soil is well suited to cultivated crops. The main limitations are the medium fertility and wetness. Cotton is the main crop, but soybeans, wheat, and corn are also grown. Proper row arrangement, field ditches, and grassed outlets are needed to remove excess surface water. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. This soil is friable and easy to keep in good tilth. It can be worked throughout a wide range of moisture content. Excessive cultivation can cause a tillage pan to form. This pan can be broken by subsoiling when the soil is dry. Conservation tillage and crop residue left on the soil or regular addition of other organic matter improve fertility and help to maintain soil tilth and content of organic matter. Returning crop residue to the soil can reduce crusting of the surface and compaction. Crops respond well to lime and fertilizer.

This Dundee soil is well suited to use as pasture. The main limitations are wetness and only medium fertility. Suitable pasture plants are coastal bermudagrass, common bermudagrass, Pensacola bahiagrass, tall fescue, white clover, red clover, winterpeas, and vetch. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed for maximum forage quality. Field ditches can remove excess surface water. Lime and fertilizer promote good growth of forage plants.

This soil is well suited to use as woodland, but because it is also suited to cropland most areas have been cleared for crops or pasture. Suitable trees are cherrybark oak, eastern cottonwood, sweetgum, yellow-poplar, and water oak.

This soil has good potential for use as habitat for openland and woodland wildlife and fair potential for wetland wildlife. Few or no soil limitations affect managing wildlife habitat areas. Planting oak trees and other mast-producing trees can create habitat for white-tailed deer and squirrels. Providing undisturbed, vegetated areas near cropland can improve habitat for doves, quail, and rabbits.

This Dundee soil is moderately well suited to intensive recreation uses. The main limitations are wetness and moderately slow permeability. Good drainage is necessary for most intensive recreation uses. Maintaining adequate plant cover can control erosion and sedimentation and enhance the beauty of the area.

This soil is moderately well suited to use as building sites and for local roads and streets. The main limitations are wetness, moderately slow permeability, and moderate shrink-swell potential. Low strength is a limitation for local roads and streets. Drainage is needed if roads and building foundations are constructed. Excess water can be removed by using shallow ditches and providing the proper grade for drainage. Septic tank absorption fields do not function properly during rainy periods because of wetness and moderately slow permeability. Increasing the size of the absorption field can overcome the moderately slow permeability. Road design and construction can offset the limited ability of the soil to support a load, and buildings and roads can also be designed to offset the effects of shrinking and swelling. Proper design and backfilling with material that has low shrink-swell potential can also minimize the effects of shrinking and swelling. Preserving the existing plant cover during construction or revegetating disturbed areas around construction sites as soon as possible helps to control soil erosion.

This Dundee soil is in capability subclass IIw and in woodland group 12W.

De—Dundee silty clay loam. This level, somewhat poorly drained soil is in intermediate positions on the natural levees along Joes Bayou, Bayou Macon, and their distributaries. Areas are long, irregular, and narrow in shape and range from 10 to 2,500 acres. Slopes are dominantly less than 1 percent.

Typically, this Dundee soil has a dark grayish brown silty clay loam surface layer about 6 inches thick. The subsoil extends to a depth of about 36 inches and is mottled silty clay loam. It is grayish brown in the upper part and dark grayish brown in the lower part. The underlying material to a depth of about 80 inches is light brownish gray, mottled silt loam.

Included with this soil in mapping are a few small areas of Sharkey, Tensas, and Tunica soils. The Sharkey and Tunica soils are poorly drained. These soils are in lower positions than the Dundee soil and have a clayey subsoil. The Tensas soils are somewhat poorly drained. They are in slightly lower positions and have a subsoil that is clayey in the upper part. Also included are small areas of Dundee silt loam and Dundee soil that has slopes of more than 1 percent. Included soils make up about 15 percent of the map unit.

This Dundee soil has medium fertility. Water and air move through this soil at a moderately slow rate. Adequate water is available to plants in most years. Water runs off the surface slowly. A seasonal high water table is at a depth of about 1.5 to 3.5 feet during January through April. This soil has moderate shrink-swell potential. Adequate water is not available to plants during dry periods in summer and in fall of some years. The surface layer is strongly acid. The subsoil is very strongly acid in the upper part and very strongly acid or strongly acid in the lower part. The underlying material is strongly acid or medium acid.

This Dundee soil is used mainly for cultivated crops. In a few areas, it is used as pasture or homesites.

This soil is well suited to cultivated crops. The main limitations are medium fertility and wetness. Cotton, soybeans, and wheat are the main crops. Proper row arrangement, field ditches, and grassed outlets are needed to remove excess surface water. This soil is difficult to keep in good tilth. It can be worked only within a narrow range of moisture content. This soil is slightly sticky when it is wet and hard when it is dry, and it becomes cloddy if tilled when it is too wet or too dry. Land grading and smoothing improve surface drainage, allow more uniform application of irrigation water, and permit more efficient use of farm equipment. Conservation tillage and crop residue left on the soil or regular addition of other organic matter improve fertility and tilth and help to maintain organic matter content. Crops respond to lime and fertilizer.

This Dundee soil is well suited to use as pasture. The main limitations are wetness and medium natural fertility. Suitable pasture plants are coastal bermudagrass, common bermudagrass, Pensacola bahiagrass, tall fescue, white clover, red clover, winterpeas, and vetch. Proper stocking, pasture rotation, and restricted grazing during wet periods help to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed for maximum forage quality. Field ditches can remove excessive surface water. Lime and fertilizer promote good growth of forage plants.

This soil is well suited to use as woodland, but because it is also suited to cropland, most areas have been cleared for crops or pasture. Suitable trees are cherrybark oak, eastern cottonwood, sweetgum, yellow-poplar, and water oak.

This soil has good potential for use as habitat for openland and woodland wildlife and fair potential for wetland wildlife. Few or no soil limitations affect managing wildlife habitat areas. Planting oak trees and other mast-producing trees can create habitat for white-tailed deer and squirrels. Providing undisturbed, vegetated areas near cropland can improve habitat for doves, quail, and rabbits.

This Dundee soil is moderately well suited to recreation uses. The main limitations are wetness and moderately slow permeability. Good drainage is necessary for intensive recreation uses. Maintaining adequate plant cover can control erosion and sedimentation and enhance the beauty of the area.

This soil is moderately well suited to use as building sites and for local roads and streets. The main limitations are wetness, moderately slow permeability, and moderate shrink-swell potential. Low strength is a limitation for local roads and streets. Drainage is needed if roads and building foundations are constructed. Excess water can be removed by using shallow ditches and providing the proper grade for drainage. Septic tank absorption fields do not function properly during rainy periods because of wetness and moderately slow permeability. Increasing the size of the absorption field can overcome the moderately slow permeability. Road design and construction can offset the limited ability of the soil to support a load. Building and road design can offset the effects of shrinking and swelling. Preserving the existing plant cover during construction or revegetating disturbed areas around construction sites as soon as possible helps to control soil erosion. Homesite development should preserve as many trees as possible.

This Dundee soil is in capability subclass IIw and in woodland group 12W.

Go—Goldman silt loam, 1 to 5 percent slopes. This gently sloping, moderately well drained soil is in high positions on natural levees along former channels and distributaries of the Mississippi River. The areas range from about 10 to 100 acres.

Typically, the Goldman soil has a silt loam surface layer about 8 inches thick. It is dark grayish brown in the upper part and dark brown in the lower part. The subsoil extends to a depth of about 32 inches and is dark yellowish brown, mottled silt loam in the upper and middle parts and dark brown, mottled very fine sandy loam in the lower part. The underlying material to a depth of about 60 inches is dark brown, mottled loamy fine sand in the upper part and grayish brown, mottled very fine sandy loam in the lower part.

Included with this soil in mapping are a few small areas of Commerce, Newellton, Sharkey, and Tunica soils. The Commerce soils are somewhat poorly drained. They are in positions similar to those of the Goldman soil, but they have more clay in the subsoil. The Newellton soils are somewhat poorly drained. The Sharkey and Tunica soils are poorly drained. These soils are in lower positions and have a clayey subsoil. Included soils make up about 15 percent of the map unit.

This Goldman soil has medium fertility. Water and air move through this soil at a moderate rate. Water runs off the surface at a medium rate. A seasonal high water table fluctuates between depths of about 3.5 and 5.0 feet during December through April. Adequate water is not available to plants during dry periods in summer and in fall of some years. The surface layer is strongly acid in the upper part and medium acid in the lower part. The subsoil is medium acid throughout. The underlying material is medium acid in the upper part and slightly acid in the lower part.

This soil is used mainly for cultivated crops. Small acreages are used as pasture or homesites.

This soil is well suited to cultivated crops. The main limitation is medium fertility, and erosion is a hazard. Suitable crops are cotton, soybeans, and wheat. This soil is friable and easy to keep in good tilth. It can be worked over a wide range of moisture content. Deep cuts during land grading and smoothing can expose the underlying sands. Traffic pans develop easily, but they can be broken up by deep plowing or chiseling. Crop residue left on the surface helps to conserve moisture, maintain tilth, and control erosion. Most crops respond well to lime and fertilizer. Early fall seeding, conservation tillage, and construction of terraces, diversions, and grassed waterways are effective in controlling erosion.

This soil is well suited to use as pasture. It has few limitations for this use. Suitable pasture plants are common bermudagrass, coastal bermudagrass, Pensacola bahiagrass, white clover, red clover, and vetch. Seedbed preparation needs to be on the contour or across the slope where practical. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Fertilizer and lime are needed for optimum growth of forage.

This soil is well suited to use as woodland, but because it is also suited to cropland, most areas have been cleared for crops or pasture. Suitable trees are eastern cottonwood and American sycamore. This soil has few limitations to the production of timber.

This soil has good potential for use as habitat for woodland and openland wildlife. Planting appropriate vegetation or propagating the natural growth of desirable plants can improve habitat for wildlife.

This soil is moderately well suited to recreation uses. It has few limitations for this use. Maintaining adequate plant cover can control erosion and sedimentation and enhance the beauty of the area.

This soil is moderately well suited to use as building sites, local roads and streets, and most sanitary facilities. The main limitation is wetness. Excess water can be removed by using shallow ditches and providing the proper grade for drainage. Excavation increases the hazard of erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control soil erosion. Properly fertilizing, seeding, mulching, and shaping of the slopes help establish and maintain plant cover.

This Goldman soil is in capability subclass IIe and in woodland group 9A.

Ne—Newellton silty clay. This level, somewhat poorly drained soil is in low positions on natural levees along the Mississippi River and its distributaries. The areas range from about 10 to 700 acres. Slopes are dominantly less than 1 percent.

This Newellton soil has a dark grayish brown silty clay surface layer about 7 inches thick. The subsoil extends to a depth of about 17 inches and is grayish brown clay. The underlying material to a depth of about 60 inches is grayish brown, mottled silty clay loam and silt loam. In places, the surface layer is silty clay loam.

Included with this soil in mapping are a few small areas of Commerce, Goldman, Sharkey, and Tunica soils. The Commerce soils are somewhat poorly drained. The Goldman soils are moderately well drained. These soils are in higher positions than the Newellton soil and are loamy throughout. The Sharkey soils are poorly drained. They are in lower positions and are clayey throughout. The Tunica soils are poorly drained. They are in slightly lower positions and have a thicker clayey subsoil than the Newellton soil. Included soils make up about 10 percent of the map unit.

This Newellton soil has high fertility. Water and air move through the upper part of this soil at a slow rate and through the lower part at a moderately slow or moderate rate. Water runs off the surface slowly. The surface layer of this soil remains wet for long periods after heavy rains. A seasonal high water table fluctuates between depths of about 1 foot and 3 feet during December through April. Adequate water is available to plants in most years. The subsoil has high shrink-swell potential. The surface layer and subsoil are medium acid, and the underlying material is medium acid or strongly acid.

This soil is used mainly for cultivated crops. In a few areas, it is used as pasture or homesites.

This soil is well suited to cultivated crops. The main limitations are wetness and poor tilth. Suitable crops are soybeans, rice, cotton, and small grains. This soil is difficult to keep in good tilth. It can be worked only within a narrow range of moisture content. This soil is sticky when wet and hard when dry, and it becomes cloddy if tilled when it is too wet or too dry. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. Deep cuts during land grading and smoothing can expose loamy material. Flood irrigation is needed if this soil is used to grow rice. Pipe or other drop structures installed in drainage ditches control the water level in rice fields and prevent excessive erosion of the ditches. Lime generally is not needed. Crop residue left on or near the surface reduces runoff and improves tilth and organic matter content.

This soil is well suited to use as pasture. The main limitations are wetness and poor tilth. Suitable pasture plants are common bermudagrass, tall fescue, white clover, and winterpeas. Grasses and legumes grow well if adequate fertilizer is used. Good management promotes optimum vigor and quality of forage plants. Grazing when the soil is wet results in compaction on the surface layer and damage to the plant cover. Field ditches can remove excess surface water. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth.

This soil is well suited to use as woodland, but because it is also suited to cropland, most areas have been cleared for crops or pasture. Eastern cottonwood and American sycamore are suitable for planting. Only trees that can tolerate seasonal wetness should be planted. Because the clayey surface layer is sticky when wet, the use of equipment during wet periods is limited.

This soil has good potential for use as habitat for woodland wildlife and fair potential for openland and wetland wildlife. Management that encourages growth of oaks and desirable understory vegetation can improve habitat for white-tailed deer, squirrels, and turkeys. Constructing shallow ponds can improve the habitat for waterfowl and furbearers. Creating undisturbed, vegetated areas around the edges of cropland can improve the habitat for quail, doves, and rabbits.

This soil is poorly suited to use as homesites, local roads and streets, and most sanitary facilities. The main limitations are wetness, slow permeability, and high shrink-swell potential. Low strength is a limitation for local roads and streets. Drainage is needed if roads and building foundations are constructed. Excess water can be removed by using shallow ditches and providing the proper grade for drainage. Septic tank absorption fields do not function properly during rainy periods because of wetness and slow permeability. Sandy backfill for the trench and long absorption lines help to compensate for the slow permeability. Building and road design and construction can offset the effects of shrinking and swelling. Proper design and backfilling with material that has low shrink-swell potential can minimize the effects of shrinking and swelling.

This soil is poorly suited to recreation uses. The main limitations are wetness, slow permeability, and the clayey surface layer. Good drainage is necessary for intensive recreation uses. Plant cover can be maintained by controlling traffic.

This Newellton soil is in capability subclass IIw and in woodland group 9W.

Ng—Newellton-Goldman complex, 1 to 5 percent slopes. This complex consists of somewhat poorly drained Newellton soil and moderately well drained Goldman soil. These gently undulating soils are on natural levees of abandoned channels along the Mississippi River. The landscape consists of parallel, narrow ridges and swales. Goldman soil is on ridgetops, and Newellton soil is in swales and on side slopes. Goldman soil makes up about 30 percent of the complex. Newellton soil makes up about 50 percent of the complex. These soils are so intermingled that mapping them separately is not practical at the scale used. Areas of this complex range from about 25 to 500 acres.

Typically, Newellton soil has a dark grayish brown clay surface layer about 5 inches thick. The subsoil extends to a depth of about 18 inches and is dark grayish brown and grayish brown, mottled clay. The underlying material to a depth of about 60 inches is grayish brown, mottled silt loam in the upper part and mottled grayish brown and brown loam in the lower part.

The Newellton soil has high fertility. Water and air move through the upper part of this soil at a slow rate and through the lower part at a moderately slow or moderate rate. The surface layer remains wet for long periods after heavy rains. Water runs off the surface at a slow to medium rate. A seasonal high water table is between depths of about 1 foot and 3 feet during December through April. The subsoil has high shrink-swell potential. Adequate water is not available to plants during dry periods in summer and in fall of some years. The surface layer is medium acid. The subsoil and underlying material are slightly acid.

Typically, Goldman soil has a dark brown silty clay loam surface layer about 8 inches thick. The subsoil to a depth of about 30 inches is brown, mottled silt loam in the upper part and mottled brown and yellowish brown very fine sandy loam in the lower part. The underlying material to a depth of about 60 inches is brown, mottled loamy fine sand.

The Goldman soil has medium fertility. Water and air move through this soil at a moderate rate. Water runs off the surface at a medium rate. A seasonal high water table fluctuates between depths of about 3.5 and 5.0 feet during December through April. This soil has moderate shrink-swell potential. Adequate water is not available to plants during dry periods in summer and in fall of most years. The surface layer is medium acid. The subsoil and underlying material are slightly acid.

Included with these soils in mapping are a few small areas of Commerce, Sharkey, and Tunica soils. The Commerce soils are somewhat poorly drained. These soils are in intermediate positions on natural levees near the present channel of the Mississippi River. They contain more clay in the subsoil than the Goldman soil and less clay in the subsoil than the Newellton soil. The Sharkey and Tunica soils are poorly drained. They are in low positions and have a clayey subsoil that is thicker than that in the Newellton soil. The included soils make up about 20 percent of the map unit.

The soils in this complex are used mainly as cropland. Small acreages are used as pasture or homesites.

The soils in this complex are well suited to cultivated crops. Wetness in swales, the erosion hazard on slopes, and the uneven ridge and swale landscape are the main management concerns. Suitable crops are cotton, soybeans, and wheat. The Goldman soil is friable and easy to keep in good tilth. The Newellton soil is difficult to keep in good tilth. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Land grading and smoothing remove excess water, but in places large volumes of soil would have to be moved. Deep cuts during land grading and smoothing can expose sandy layers in places. Using all crop residue, plowing under cover crops, and using a suitable cropping system can help maintain the organic matter content. Crop residue left on the surface also helps to conserve moisture, maintain tilth, and control erosion. Drop structures installed in grassed waterways prevent gullying.

These soils are well suited to use as pasture. Soil erosion is the main hazard, and wetness is the main limitation. Suitable pasture plants are coastal bermudagrass, common bermudagrass, Pensacola bahiagrass, winterpeas, and vetch. Grazing when the soil is wet results in puddling on the surface, poor tilth, and excessive runoff. Proper grazing practices, weed control, and fertilizer are needed for maximum forage quality.

These soils are well suited to use as woodland. Suitable trees are eastern cottonwood and American sycamore. The Goldman soil has few limitations to the production of timber. Wetness and the clayey surface layer in areas of the Newellton soil limit the use of equipment.

These soils have fair to good potential for use as habitat for openland wildlife and good potential for woodland wildlife. Planting or encouraging growth of existing oak trees and suitable understory plants can improve habitat for deer, squirrels, and rabbits.

These soils are poorly suited to intensive recreation uses. The main limitations are wetness and the clayey texture of the surface layer in the Newellton soil. Erosion is a slight hazard in areas of the Goldman soil. Maintaining adequate plant cover helps to control erosion and sedimentation and helps enhance the beauty of the area. Fertilizer and traffic control can help maintain plant cover. Constructing shallow ditches and leveling or providing the proper grade remove excess water.

These soils are poorly suited to urban uses, such as homesites or roads. The main limitations are wetness and high shrink-swell potential. Low strength is a limitation for local roads and streets. Erosion is a slight hazard in areas of Newellton and Goldman soils. The hazard of erosion is increased if the soils are left exposed during site development. Preserving the existing plant cover during construction helps to control erosion. If buildings are constructed in areas of the Newellton soil, it is necessary to properly design foundations and footings and divert runoff away from buildings to prevent structural damage caused by shrinking and swelling. Septic tank absorption fields do not perform properly during rainy periods because of wetness and slow and moderate permeability. Increasing the size of the absorption field helps overcome the moderate and slow permeability.

The soils in this complex are in capability subclass IIe. The Newellton soil is in woodland group 9W, and the Goldman soil is in 9A.

Nm—Newellton-Tunica complex, gently undulating. This complex consists of somewhat poorly drained Newellton soil and poorly drained Tunica soil. These soils are in low positions on the natural levees along the Mississippi River and its distributaries. The landscape consists of parallel ridges and swales. The Newellton soil is on the ridges, and the Tunica soil is in swales and on the lower side slopes of ridges. The Newellton soil makes up about 45 percent of the complex and the Tunica soil about 35 percent. These soils were so intermingled that mapping them separately was not practical at the scale used. Areas of this complex range from about 100 to 800 acres. Slopes range from 0 to 3 percent.

Typically, the Newellton soil has a dark grayish brown silty clay surface layer about 7 inches thick. The subsoil to a depth of about 17 inches is grayish brown, mottled silty clay. The underlying material to a depth of about 60 inches is grayish brown, mottled silty clay loam in the upper part and grayish brown, mottled silt loam in the lower part.

The Newellton soil has high fertility. Water and air move through the upper part of this soil at a slow rate and through the lower part at a moderately slow or moderate rate. Water runs off the surface at a medium rate. Adequate water is available to plants in most years. A seasonal high water table fluctuates between depths of about 1 foot and 3 feet during December through April. This soil dries slowly after heavy rains. The subsoil has high shrink-swell potential. The surface layer and subsoil are medium acid. The underlying material is medium acid in the upper part and medium acid or strongly acid in the lower part.

Typically, the Tunica soil has a very dark grayish brown clay surface layer about 5 inches thick. The subsoil to a depth of about 31 inches is dark gray, mottled clay in the upper part and gray, mottled clay in the lower part. The underlying material to a depth of about 60 inches is grayish brown, mottled silty clay loam.

The Tunica soil has high fertility. Water and air move through the upper part of this soil at a very slow rate and through the lower part at a moderate rate. Water runs off the surface slowly and stands in low places for long periods. Adequate water is available to plants in most years. A seasonal high water table fluctuates between depths of about 1.5 and 3 feet during January through April. This soil dries slowly after heavy rains. The subsoil has high shrink-swell potential. The surface layer of this soil is sticky when wet and hard when dry. It is medium acid. The subsoil and underlying material are slightly acid.

Included with these soils in mapping are a few small areas of Commerce, Goldman, and Sharkey soils. Commerce soils are somewhat poorly drained. Goldman soils are moderately well drained. These soils are in higher positions than Newellton soil and are loamy throughout. The Sharkey soils are poorly drained. They are in lower positions than the Tunica soil and are clayey throughout. Included soils make up about 20 percent of the map unit.

The soils in this complex are used mainly for cultivated crops. In a few areas, they are used as pasture or homesites.

These soils are moderately well suited to cultivated crops. The main limitations are wetness, very slow permeability, poor tilth, and uneven slopes. Suitable crops are cotton, soybeans, and small grains. This soil is difficult to keep in good tilth. It can be worked only within a narrow range of moisture content. Adequate drainage and vegetated outlets should be provided. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. Deep cuts during land grading and smoothing operations can expose loamy material in places. The surface layer of the soils in this complex becomes cloddy if tilled when it is too wet or too dry. Crop residue returned to the soil or regular additions of other organic matter improve fertility, reduce crusting, and increase the water intake rate. Lime is generally needed.

These soils are well suited to use as pasture. The main limitations are wetness and the clayey texture of the surface layer. Wetness limits the choice of plants and the period of grazing. Field ditches can remove excess surface water. Suitable pasture plants are tall fescue, Pensacola bahiagrass, common bermudagrass, improved bermudagrass, winterpeas, and vetch. Proper grazing practices, weed control, and fertilizer are needed for maximum forage quality.

These soils are well suited to use as woodland, but because they are also suited to cropland, most areas have been cleared for crops or pasture. Suitable trees are Nuttall oak, eastern cottonwood, sweetgum, green ash, and American sycamore. The main limitations to producing and harvesting timber are wetness and clayey surface texture. Trees need to be water-tolerant and should be planted or harvested during dry periods. Proper site preparation and spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees can control competing vegetation.

These soils have good potential for use as habitat for woodland wildlife and fair potential for openland wildlife. Encouraging growth of oak trees and desirable understory vegetation can improve habitat for white-tailed deer, squirrels, and turkeys. Constructing shallow ponds can improve the habitat for waterfowl and furbearers. Creating undisturbed, vegetated areas around the edges of cropland can improve the habitat for quail, doves, and rabbits.

These soils are poorly suited to use as homesites, local roads and streets, and most sanitary facilities. The main limitations are wetness, slow and very slow permeability, and high shrink-swell potential. Low strength is a limitation for local roads and streets. Drainage is needed if roads and building foundations are constructed. Excess water can be removed by using shallow ditches and providing the proper grade for drainage. Septic tank absorption fields do not function properly during rainy periods because of wetness and very slow permeability. Sandy backfill for the trench and long absorption lines help to compensate for the slow and very slow permeability. Building and road design and construction offset the effects of shrinking and swelling. Proper design and backfilling with material that has low shrink-swell potential can minimize the effects of shrinking and swelling.

These soils are poorly suited to recreation uses. The main limitations are wetness, slow and very slow permeability, and the clayey surface layer. Good drainage is necessary for intensive recreation uses. Plant cover can be maintained by controlling traffic.

The soils in this complex are in capability subclass IIIw. The Newellton soil is in woodland group 9W, and the Tunica soil is in 8W.

NT—Newellton and Tunica soils, frequently flooded. This map unit consists of somewhat poorly drained Newellton soil and poorly drained Tunica soil. These nearly level soils are in low positions on natural levees. They are on the unprotected side of the levee system along the Mississippi River. The landscape consists of uneven parallel ridges and swales. The Newellton soil is on the ridges, and the Tunica soil is in the swales. Areas of this complex range from about 50 to 550 acres. Slopes range from 0 to 2 percent.

The Newellton soil makes up about 45 percent of the soils of this map unit, and Tunica soil makes up 40 percent. The composition of this map unit varies between mapped areas, but mapping was controlled well enough to evaluate the soils for the expected use.

Typically, the Newellton soil is somewhat poorly drained. It has a dark grayish brown, mottled silty clay surface layer about 8 inches thick. The subsoil to a depth of about 18 inches is dark gray, mottled clay. The underlying material to a depth of about 60 inches is gray, mottled silt loam in the upper part and grayish brown, mottled very fine sandy loam in the lower part. In places, the surface layer is silty clay loam.

The Newellton soil has high fertility. Water and air move through the upper part of this soil at a slow rate and through the lower part at a moderately slow to moderate rate. Water runs off the surface at a medium rate. Adequate water is available to plants in most years. A seasonal high water table is at a depth of about 1 foot to 3 feet during December through April. This soil is frequently flooded for brief to long periods during the cropping season and other times of the year. Flooding occurs more often than twice in 5 years. Floodwaters typically are 3 to 10 feet deep but the depth can exceed 15 feet in places. The subsoil has high shrink-swell potential. The soil is neutral throughout.

Typically, the Tunica soil is poorly drained. It has a dark grayish brown, mottled clay surface layer about 8 inches thick. The subsoil to a depth of about 30 inches is dark gray, mottled clay. The underlying material to a depth of about 60 inches is grayish brown, mottled silty clay loam in the upper part and grayish brown, mottled silt loam in the lower part. In places, the surface layer is silty clay loam.

The Tunica soil has high fertility. Water and air move through the upper part of this soil at a very slow rate and through the lower part at a moderate rate. Adequate water is available to plants in most years. Water runs off the surface slowly. A seasonal high water table is at a depth of about 1.5 to 3 feet during January through April. This soil is subject to brief to long periods of flooding during the cropping season and other times of the year. Flooding occurs more often than twice in 5 years. Floodwaters typically are 4 to 15 feet deep but the depth can exceed 20 feet in places. The subsoil has high shrink-swell potential. The soil is neutral throughout.

Included with these soils in mapping are a few small areas of Bruin, Commerce, and Sharkey soils. The Bruin soils are moderately well drained. The Commerce soils are somewhat poorly drained. These soils are in high positions on the natural levees and are loamy throughout. The Sharkey soils are poorly drained. They are in lower positions than the Newellton and Tunica soils and are clayey throughout. Included soils make up about 15 percent of the map unit.

These soils are used mainly as woodland for timber production and wildlife habitat (fig. 3). In a few areas, they are used for pasture or crops.

These soils are poorly suited to cultivated crops. If these soils are used for cultivated crops, the main limitation is wetness from frequent flooding. It is not feasible to protect these soils from flooding.

These soils are poorly suited to use as pasture. The main limitation is wetness from frequent flooding. The main pasture plant is common bermudagrass. Grazing when the soil is wet causes puddling on the surface and damage to the plant cover. Applying high rates of fertilizer or lime to pastures is generally not practical because of the frequent overflow hazard.

These soils are moderately well suited to use as woodland. Eastern cottonwood and baldcypress are suitable to plant. Careful reforestation after harvesting can reduce competition from undesirable understory plants. Trees should be water-tolerant and need to be planted or harvested during dry periods. Wetness and flooding severely limit the use of equipment during the winter and spring.

These soils have fair to good potential for use as habitat for wetland wildlife. They have fair potential for use as habitat for woodland wildlife. These soils provide

Figure 3.—Native hardwoods stand in an area of Newellton and Tunica soils, frequently flooded. The sparse cover of understory vegetation and water marks on tree trunks indicate that these soils are frequently flooded.

habitat for white-tailed deer, rabbits, squirrels, and turkeys. Planting appropriate vegetation or propagating the natural growth of desirable plants can improve habitat for woodland wildlife. Constructing shallow ponds to provide open water areas for waterfowl and furbearers, such as muskrats, nutria, and otters, can improve habitat for wetland wildlife.

These soils are generally not suited to intensive recreation uses. The main limitations are the hazard of frequent flooding, wetness, and the clayey surface layer. It is not feasible to protect these soils from flooding.

These soils are generally not suited to urban uses, such as building sites, homesites, or sanitary facilities. The hazard of flooding is generally too severe for these uses.

These soils are in capability subclass Vw and in woodland group 7W.

Sa—Sharkey silty clay loam. This level, poorly drained soil is in low positions on the natural levees along the Mississippi River and its distributaries. Areas range from about 10 to 2,100 acres. Slopes are dominantly less than 1 percent.

Typically, this Sharkey soil has a dark grayish brown silty clay loam surface layer about 10 inches thick. The subsoil extends to a depth of about 60 inches and is dark gray, mottled clay throughout. In places, the surface layer is silt loam.

Included with this soil in mapping are a few small areas of the Commerce and Tunica soils. The Commerce soils are somewhat poorly drained. They are in higher positions than the Sharkey soil and are loamy throughout. The Tunica soils are poorly drained. They are in positions similar to those of the Sharkey soil, and they have loamy underlying material. Also included are a few small areas of Sharkey clay and Sharkey loamy fine sand. Included soils make up about 15 percent of the map unit.

This Sharkey soil has high fertility. Water and air move through this soil at a very slow rate. Adequate water is available to plants in most years. Water runs off the surface slowly. A seasonal high water table fluctuates between the surface and a depth of about 2 feet during December through April. This soil is subject to rare flooding during intense storms. Flooding can occur once in 10 years during the cropping season and other times of the year. The subsoil has very high shrink-swell potential. The surface layer of this soil is friable. Good tilth is difficult to maintain where some of the clayey subsoil is mixed into the plow layer. The surface layer is medium acid. The subsoil is slightly acid in the upper part and mildly alkaline in the lower part.

This soil is mainly used for cultivated crops. Small acreages are used as pasture or homesites.

This soil is moderately well suited to cultivated crops. The main limitations are wetness and very slow permeability. Suitable crops are cotton, soybeans, rice, wheat, and grain sorghum. Proper row arrangement, field ditches, and grassed outlets are needed to remove excess surface water. Flood irrigation is needed if rice is grown. Land grading and smoothing improve surface drainage, allow more uniform application of irrigation water, and permit more efficient use of farm equipment. Pipe or other drop structures installed in drainage ditches control the water level in rice fields and prevent excessive erosion of ditches. Most crops and pasture plants respond well to lime and fertilizer.

This soil is well suited to use as pasture. Wetness limits the choice of plants and the period of grazing. Field ditches can remove excess surface water. Suitable pasture plants are coastal bermudagrass, common bermudagrass, white clover, red clover, and vetch. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and soil in good condition.

This soil is well suited to use as woodland. Suitable trees are eastern cottonwood, American sycamore, and sweetgum. Trees should be water-tolerant and need to be planted or harvested during dry periods. Wetness limits the use of equipment, especially during the winter and spring.

This soil has good potential for use as habitat for woodland and wetland wildlife and fair potential for openland wildlife. Few or no soil limitations affect habitat for wildlife. Planting appropriate vegetation or propagating the natural growth of desirable plants can improve habitat for openland and woodland wildlife. Constructing shallow ponds can create waterfowl habitat.

This soil is poorly suited to use as homesites, local roads and streets, and most sanitary facilities. The main limitations are flooding, wetness, and very high shrink-swell potential. Low strength is a limitation for local roads and streets. Drainage is needed if roads and building foundations are constructed. Excess water can be removed by using shallow ditches and providing the proper grade for drainage. Plans for homesite development need to include preserving as many trees as possible. The very slow permeability of this soil and the high water table increase the possibility for failure of septic tank absorption fields. Increasing the size of the absorption field can overcome problems caused by the very slow permeability. Road design and construction can offset the limited ability of the soil to support a load.

This soil is poorly suited to recreation uses mainly because of wetness, flooding, and very slow permeability. Drainage is needed for most intensive recreation uses.

This Sharkey soil is in capability subclass IIIw and in woodland group 7W.

Se—Sharkey clay. This level, poorly drained soil is in the backswamps on flood plains along the Mississippi River, Joes Bayou, Bayou Macon, and the Tensas River. Areas are irregular in shape and range from 10 to several thousand acres. Slopes are dominantly less than 1 percent.

Typically, this Sharkey soil has a surface layer about 7 inches thick. It is dark grayish brown, mottled clay in the upper part and dark gray, mottled clay in the lower part. The subsoil extends to a depth of about 40 inches and is dark gray, mottled clay throughout. The underlying material to a depth of about 68 inches is dark gray clay.

Included with this soil in mapping are a few small areas of Commerce, Dundee, Newellton, Tensas, and Tunica soils. The Commerce and Dundee soils are somewhat poorly drained. These soils are in higher positions than the Sharkey soil and are loamy throughout. The Newellton and Tensas soils are somewhat poorly drained. They are in higher positions and have loamy subsoil or underlying material. The Tunica soils are poorly drained. These soils are in slightly higher positions than the Sharkey soil and have loamy underlying material. Also included are small areas of Sharkey soils that are occasionally flooded and Sharkey soil that has slopes that are more than 1 percent. Included soils make up about 10 percent of the map unit.

This Sharkey soil has high fertility. Water and air move through this soil at a very slow rate. Water runs off the surface very slowly and stands in low places for long periods after heavy rains. The surface layer of this soil is very sticky when wet and very hard when dry. Adequate water is available to plants in most years. A seasonal high water table fluctuates between the soil surface and a depth of about 2 feet during December through April. This soil is subject to rare flooding. Flooding occurs less often than once in 10 years during the cropping season and other times of the year. This soil has very high shrink-swell potential. The upper part of the surface layer is medium acid. The lower part of the surface layer and the upper and middle parts of the subsoil are slightly acid. The lower part of the subsoil and the underlying material are neutral. In places, the subsoil is strongly acid and or very strongly acid.

This soil is used mainly for cultivated crops. Small acreages are used as woodland, pasture, wildlife habitat, or homesites.

The Sharkey soil is moderately well suited to cultivated crops. The main limitations are wetness and poor tilth. Soybeans, rice, wheat, and grain sorghum are the main crops. Proper row arrangement, field ditches, and grassed outlets are needed to remove excess surface water. This soil is difficult to keep in good tilth. It can be worked only within a narrow range of moisture content. This soil is very sticky when it is wet and very hard when dry, and it becomes cloddy if tilled when it is too wet or too dry. Drainage is needed for most cultivated crops and pasture plants (fig. 4). Land grading and smoothing also improve surface drainage and permit more efficient use of farm equipment. Proper irrigation systems are needed for the production of rice. Pipe or other drop structures installed in drainage ditches control the water level in rice fields and prevent excessive erosion of ditches. Conservation tillage and crop residue left on the soil or regular additions of other organic matter improve fertility and tilth and help to maintain content of organic matter.

This soil is well suited to use as pasture. The main limitation is wetness. Suitable pasture plants are tall fescue, dallisgrass, and common bermudagrass. White clover, red clover, vetch, and winterpeas are adapted cool-season legumes. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth.

This soil is well suited to use as woodland, but because it is also suited to cropland, most areas have been cleared for crops. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Trees should be water-tolerant and need to be planted or harvested during dry periods. Wetness and the clayey surface layer limit the use of equipment, especially in winter and spring. Suitable trees are American sycamore, eastern cottonwood, and sweetgum.

This soil has good potential for use as habitat for woodland and wetland wildlife and fair potential for openland wildlife. Management that enhances the growth of oaks and other mast-producing trees can improve habitat for white-tailed deer and squirrels. Constructing shallow ponds can improve habitat for waterfowl and furbearers. Creating small, undisturbed areas of appropriate vegetation near cropland can improve habitat for openland wildlife, such as rabbits, quail, and doves.

The Sharkey soil is poorly suited to intensive recreation uses. The main limitations are wetness, very slow permeability, and the clayey surface layer. Flooding is a hazard. Good drainage is necessary for intensive recreation uses. A loamy fill material on the surface can improve areas of this soil for use as playgrounds.

This soil is poorly suited to use as building sites and local roads and streets. The main limitations are wetness, very high shrink-swell potential, and very slow permeability. Low strength is a limitation for local roads and streets, and flooding is a hazard. Drainage is needed if roads and building foundations are constructed. Dwellings need to be placed on mounds that are above flood elevations. Excess water can be removed by using shallow ditches and providing the proper grade for drainage. Septic tank absorption fields do not function properly during rainy periods because of wetness and very slow permeability. Sandy backfill for the trench and long absorption lines help to compensate for the very slow permeability. If buildings are constructed on this soil, proper design and diversion of runoff help to prevent structural damage caused by shrinking and swelling. Road design and construction can offset the limited ability of the soil to support a load.

This Sharkey soil is in capability subclass IIIw and in woodland group 7W.

Sh—Sharkey clay, frequently flooded. This level, poorly drained soil is in backswamps on the flood plains along the Mississippi River. It is subject to frequent flooding. This soil is also on the unprotected side of the Mississippi River levee system and in abandoned stream channels in other parts of the parish. The areas range from about 10 to 1,250 acres. Slopes are less than 1 percent.

Typically, this Sharkey soil has a dark gray clay surface layer about 10 inches thick. The subsoil extends to a depth of about 36 inches and is dark gray, mottled clay in the upper part and gray, mottled clay in the lower part. The underlying material to a depth of about 60 inches is light gray and gray, mottled clay.

Included with this soil in mapping are a few small areas of Commerce, Newellton, and Tunica soils. The

Figure 4.—Runoff is very slow in this area of Sharkey clay, and water stands for long periods after heavy rains unless drainage is improved.

Commerce soils are somewhat poorly drained. They are in higher positions than the Sharkey soil and are loamy throughout. The Newellton soils are somewhat poorly drained. The Tunica soils are poorly drained. These soils are in slightly higher positions and have loamy underlying material. Also included are small areas of Sharkey loamy fine sand and Sharkey silty clay loam. The included areas make up about 15 percent of the map unit.

This Sharkey soil has high fertility. Water and air move through this soil at a very slow rate. Water runs off the surface very slowly. A seasonal high water table fluctuates between the soil surface and a depth of about 2 feet during December through April. Adequate water is available to plants in most years. The soil on the protected side of the levee is subject to flooding during intense storms. The soil on the unprotected side of the levee is flooded by overflow from the Mississippi River for brief to very long periods. Flooding can occur more often than twice in 5 years during the cropping season and other times of the year. Floodwaters typically are 5 to 15 feet deep and can exceed 20 feet in places. The floodwaters are deeper on the unprotected side of the levee along the Mississippi River than they are on the protected side. This soil dries slowly after heavy rains. It has very high shrink-swell potential. The soil is neutral throughout.

This soil is used mainly as woodland. A small acreage is used as pasture.

This soil is poorly suited to cultivated crops. The main limitation is wetness, and frequent flooding is a hazard. It is generally not feasible to protect the soil from flooding. Crops that mature in a short period of time can be grown in some years.

This soil is poorly suited to use as pasture. The main limitation is wetness, and frequent flooding is a hazard. Suitable pasture plants are common bermudagrass and locally adapted native plants. Generally, it is not practical to apply high rates of fertilizer or lime to pastures because of the frequent overflow hazard.

This soil is moderately well suited to use as woodland. Common native trees are water hickory, black willow, baldcypress, and overcup oak. Trees should be water-tolerant and need to be planted or harvested during dry periods. Baldcypress is suitable to plant. Wetness and flooding severely limit the use of equipment during the winter and spring.

This soil has fair potential for use as habitat for woodland and wetland wildlife. This soil produces habitat for deer, rabbits, ducks, squirrels, and turkeys. Planting appropriate vegetation or propagating the natural growth of desirable plants can improve habitat for woodland wildlife. Constructing shallow ponds to provide open water areas for waterfowl and furbearers, such as muskrats, nutria, and otters, can improve habitat for wetland wildlife.

This soil is not suited to intensive recreation uses or to homesites and sanitary facilities. The hazard of flooding is generally too severe for these uses. It is not feasible to protect the soil from flooding.

This Sharkey soil is in capability subclass Vw and in woodland group 6W.

Sk—Sharkey loamy fine sand, overwash, gently undulating. This poorly drained soil is in areas on flood plains where floodwaters of the Mississippi River breached the natural levee and deposited a splay of sandy sediment on the surface. The areas range from about 10 to 500 acres. Slopes range from 0 to 3 percent.

Typically, the Sharkey soil has a surface layer about 10 inches thick. It is dark brown loamy fine sand in the upper part and brown loamy fine sand in the lower part. The subsoil extends to a depth of about 36 inches and is grayish brown, mottled silty clay. The underlying material to a depth of about 60 inches is gray and dark gray, mottled clay.

Included with this soil in mapping are a few small areas of Bruin, Commerce, and Crevasse soils. The Bruin soils are moderately well drained. The Commerce soils are somewhat poorly drained. These soils are in higher positions than the Sharkey soil and are loamy throughout. The Crevasse soils are excessively drained. They are in higher positions and are sandy throughout. Also included are small areas of Sharkey soil in swales that are subject to rare flooding. Included soils make up about 15 percent of the map unit.

This Sharkey soil has medium fertility. Water and air move through the surface layer of this soil at a rapid rate and through the subsoil at a very slow rate. Root development is restricted in many plants because the upper part of this soil is droughty. Water runs off the surface very slowly. A seasonal high water table fluctuates between the soil surface and a depth of about 2 feet during December through April. The subsoil has very high shrink-swell potential. This soil is neutral throughout.

This soil is used mainly as pasture and cropland. In a few areas, it is used as woodland or homesites.

This Sharkey soil is moderately well suited to cultivated crops. The main limitations are wetness in spring and droughtiness late in summer. Suitable crops are cotton, small grains, and vegetables. Crop residue left on the surface helps to conserve moisture and maintain or increase the organic matter content. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment.

This soil is moderately well suited to use as pasture. If this soil is used for pasture, the main limitations are wetness in winter and soil droughtiness in summer. Suitable pasture plants are coastal bermudagrass, common bermudagrass, and Pensacola bahiagrass. Rotation grazing helps to maintain forage quality. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Fertilizer promotes good growth of forage.

This soil is moderately well suited to use as woodland. Suitable trees are eastern cottonwood, American sycamore, and sweetgum. The main limitations to producing and harvesting timber are soil droughtiness in summer and fall and the sandy surface layer. The low available water capacity in the surface layer generally reduces seedling survival in areas that have numerous understory plants. Trafficability is poor when this sandy soil is dry.

This soil has fair potential for use as habitat for openland wildlife and good potential for woodland and wetland wildlife. Management that enhances the growth of oaks and other mast-producing trees and desirable understory vegetation can improve habitat for squirrels, doves, quail, and rabbits.

This Sharkey soil is poorly suited to use as homesites, local roads and streets, and most sanitary facilities. A seasonal perched water table is above the clayey subsoil between the surface and a depth of 2 feet. Flooding is a hazard in some low-lying areas. Drainage is needed if buildings are constructed. Plant selection is critical in establishing lawns, shrubs, trees, and vegetable gardens. Septic tank absorption fields do not function properly because of very slow permeability and the high water table. Road design and construction can offset the limited ability of the soil to support a load.

This soil is poorly suited to intensive recreation uses. The main limitations are wetness, very slow permeability, and the sandy surface layer. Drainage is necessary for most intensive recreation uses. Grasses and ornamental plants can be difficult to establish because of droughtiness in summer unless the soil is irrigated.

This Sharkey soil is in capability subclass IIIw and in woodland group 7W.

Ta—Tensas silty clay. This level, somewhat poorly drained soil is in low positions on the natural levees along Joes Bayou, Bayou Macon, and other former channels and distributaries of the Mississippi River. The areas range from about 10 to 1,250 acres. Slopes are less than 1 percent.

Typically, the Tensas soil has a very dark grayish brown silty clay surface layer about 3 inches thick. The subsoil extends to a depth of about 30 inches and is dark grayish brown, mottled silty clay in the upper part and grayish brown, mottled silty clay in the lower part. The underlying material to a depth of about 60 inches is brown, mottled silty clay loam.

Included in mapping are a few small areas of Dundee, Sharkey, and Tunica soils. The Dundee soils are somewhat poorly drained. These soils are in higher positions than the Tensas soil and are loamy throughout. The Sharkey soils are poorly drained. They are in lower positions and are clayey throughout. The Tunica soils are poorly drained. These soils are in positions similar to those of the Tensas soil, and they have subsoil and underlying material that is typically more alkaline than that of the Tensas soil. Also included are a few areas of Tensas soil that is subject to flooding after unusually heavy rains; and small areas of soils similar to the Tensas soil except that the upper part of the subsoil is very dark grayish brown. Included soils make up about 15 percent of the map unit.

This Tensas soil has medium fertility. Water and air move through this soil at a very slow rate. Water runs off the surface at a medium rate. The surface layer of this soil is sticky when wet and hard when dry. A seasonal high water table fluctuates between depths of about 1 foot and 3 feet during December through April. Adequate water is available to plants in most years. The subsoil has high shrink-swell potential. The surface layer is medium acid. The upper part of the subsoil is very strongly acid. The lower part of the subsoil and the underlying material are strongly acid.

This soil is used mainly for cultivated crops. Small acreages are used as pasture or homesites.

This soil is moderately well suited to cultivated crops. The main limitations are wetness and poor tilth. Suitable crops are soybeans, rice, grain sorghum, and wheat. Proper row arrangement, field ditches, and grassed outlets are needed to remove excess surface water. This soil is difficult to keep in good tilth and can be worked only within a narrow range of moisture content. It becomes cloddy if tilled when it is too wet or too dry. Land grading and smoothing also improve surface drainage and permit more efficient use of farm equipment. Deep cuts during land grading and smoothing can expose loamy material in places. Conservation tillage and crop residue left on the soil or regular addition of other organic matter improve fertility and tilth and help maintain content of organic matter. Most crops respond well to lime and fertilizer.

This Tensas soil is well suited to use as pasture. The main limitations are wetness and the clayey surface layer. Field ditches can remove excess surface water. Suitable pasture plants are tall fescue, dallisgrass, common bermudagrass, white clover, and red clover. Grazing when the soil is wet causes puddling on the surface. Fertilizer and lime are needed for optimum forage production. Rotation grazing helps to maintain forage quality.

This soil is well suited to use as woodland, but because it is also suited to cropland, most areas have been cleared for crops or pasture. Suitable trees are American sycamore and eastern cottonwood. Wetness and the clayey surface layer limit the use of equipment and cause moderate seedling mortality.

This soil has good potential for use as habitat for woodland and wetland wildlife and fair potential as habitat for openland wildlife. Planting appropriate vegetation or propagating the natural growth of desirable plants can improve habitat for woodland wildlife. Constructing shallow ponds to provide open water areas for waterfowl and furbearers, such as muskrats, nutria, and otters, can improve habitat for wetland wildlife.

This soil is poorly suited to recreation uses. The main limitations are wetness, the clayey surface layer, and very slow permeability. Good drainage is necessary for intensive recreation uses, such as playgrounds and camp areas.

This soil is poorly suited to use as homesites, local roads and streets, and most sanitary facilities. The main limitations are wetness, high shrink-swell potential, and very slow permeability. Low strength is a limitation for local roads and streets. Drainage is needed if roads and building foundations are constructed. Increasing the size of the absorption field can overcome the very slow permeability. Proper design and backfilling with material that has low shrink-swell potential can minimize the effects of shrinking and swelling.

This Tensas soil is in capability subclass IIIw and in woodland group 6W.

Td—Tensas-Dundee complex, gently undulating. These somewhat poorly drained soils are on the natural levees along Joes Bayou, a former channel of the Mississippi River. The landscape consists of parallel, low, narrow ridges and shallow swales. The Dundee soil is on the ridges, and Tensas soil is in the swales. Tensas soil makes up 50 percent of the complex, and Dundee soil makes up about 35 percent. These soils are so intermingled that they cannot be mapped separately at the scale used. The areas of this complex range from about 20 to more than 2,500 acres. Slopes range from 0 to 3 percent.

Typically, the Tensas soil has a dark grayish brown silty clay surface layer about 3 inches thick. The subsoil extends to a depth of 21 inches and is dark gray, mottled silty clay. The underlying material to a depth of about 60 inches is grayish brown, mottled silty clay loam and silt loam in the upper part and dark grayish brown, mottled silty clay loam in the lower part.

This Tensas soil has medium fertility. Water and air move through this soil at a very slow rate. Water runs off the surface at a medium rate. A seasonal high water table is at a depth of about 1 foot to 3 feet during December through April. Adequate water is available to plants in most years. This soil is subject to rare flooding. Flooding occurs less often than once in 10 years during the cropping season and other times of the year. The surface layer of this soil is sticky when wet and hard when dry. This soil has high shrink-swell potential. The surface layer and the subsoil are strongly acid. The underlying material is medium acid.

Typically, the Dundee soil has a dark grayish brown silty clay loam surface layer about 8 inches thick. The subsoil extends to a depth of about 29 inches and is grayish brown, mottled silty clay loam. The underlying material to a depth of about 60 inches is grayish brown, mottled silty clay loam in the upper part and light brownish gray, mottled silt loam in the lower part.

This Dundee soil has medium fertility. Water and air move through this soil at a moderately slow rate. Water runs off the surface at a medium rate. A seasonal high water table fluctuates between depths of about 1.5 and 3.5 feet during January through April. Adequate water is not available to plants during dry periods in summer and in fall of some years. This soil has moderate shrink-swell potential. The surface layer is strongly acid. The underlying material is strongly acid in the upper part and medium acid in the lower part.

Included in mapping are a few small areas of Sharkey and Tunica soils. The Sharkey soils are poorly drained. These soils are in lower positions than the Tensas and Dundee soils and are clayey throughout. The Tunica soils are poorly drained. They are in positions similar to those of the Tensas soil, and they have a subsoil that is generally more alkaline than that of the Tensas soil. Included soils make up about 15 percent of the map unit.

The soils in this complex are used mainly for cultivated crops. Small acreages are used as pasture or homesites.

These soils are moderately well suited to cultivated crops. Wetness, medium fertility, and poor tilth are the main limitations. Suitable crops are cotton, soybeans, grain sorghum, and wheat. Proper row arrangement, field ditches, and grassed outlets are needed to remove excess surface water. Dundee soil is friable and easy to keep in good tilth. Tensas soil is difficult to keep in good tilth. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. In places, however, large volumes of soil need to be moved. Crop residue left on the surface helps to conserve moisture, maintain tilth, and control erosion. Generally, lime and fertilizer are needed.

These soils are well suited to use as pasture. The main limitations are wetness, the clayey surface layer, and only medium natural fertility. Suitable pasture plants are common bermudagrass, coastal bermudagrass, Pensacola bahiagrass, tall fescue, and white clover. Wetness limits the choice of plants and the period of grazing. Field ditches can remove excess surface water. Uneven topography and wetness limit the use of equipment. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Lime and nitrogen fertilizer promote good growth of forage.

These soils are well suited to use as woodland; however, few areas remain in native hardwoods. Most areas have been cleared for crops or pasture. Suitable trees are eastern cottonwood, sweetgum, and American sycamore. The main concern in producing and harvesting timber is moderate equipment use limitation because of wetness.

These soils are poorly suited to recreation uses. The main limitations are wetness, moderately slow and very slow permeability, and the clayey surface layer. Flooding is a hazard in areas of the Tensas soil. Drainage and protection from flooding are needed for most intensive recreation uses.

These soils have good potential as habitat for woodland wildlife, fair to poor potential for wetland wildlife, and fair to good potential for openland wildlife. Planting appropriate vegetation or propagating the natural growth of desirable plants can improve habitat for woodland and openland wildlife. Constructing shallow ponds to provide open water areas for waterfowl and furbearers, such as muskrats, nutria, and otters, can improve habitat for wetland wildlife.

These soils are poorly suited to use as building sites, roads, and most sanitary facilities. The main limitations are wetness, moderate and high shrink-swell potential, and moderately slow and very slow permeability. If buildings are constructed, Dundee soil should be selected, if possible. Drainage is needed if roads and building foundations are constructed. Increasing the size of the absorption field can overcome the very slow and moderately slow permeability.

The soils in this complex are in capability subclass IIIw. The Tensas soil is in woodland group 6W, and the Dundee soil is in 12W.

Te—Tensas-Sharkey complex, gently undulating. This complex consists of somewhat poorly drained Tensas soil and poorly drained Sharkey soil. These soils are in low positions on natural levees and in backswamps along Joes Bayou, Bayou Macon, and their distributaries. The Tensas soil is on low ridges, and the Sharkey soil is in swales. Tensas soils make up 50 percent of the complex, and Sharkey soils make up about 40 percent. These soils are so intermingled that they cannot be mapped separately at the scale used. Areas of this complex range from about 20 to 750 acres. Slope ranges from 0 to 3 percent.

The Tensas soil has a surface layer about 6 inches thick. It is dark grayish brown silty clay in the upper part and grayish brown, mottled clay in the lower part. The subsoil to a depth of 27 inches is grayish brown, mottled clay and silty clay. The next layer to a depth of about 45 inches is brown, mottled silty clay loam and silt loam. The underlying material to a depth of 60 inches is brown, mottled silt loam and very fine sandy loam.

This Tensas soil has medium fertility. Water and air move through this soil at a very slow rate. Water runs off the surface at a medium rate. A seasonal high water table is at a depth of about 1 foot to 3 feet during December through April. Adequate water is available to plants in most years. The surface layer of this soil is sticky when wet and hard when dry. This soil has high shrink-swell potential. The surface layer is strongly acid in the upper part. The lower part of the surface layer and the subsoil are very strongly acid. The next layer ranges from strongly acid to slightly acid. The underlying material is neutral.

This Sharkey soil has a dark gray clay surface layer about 8 inches thick. The subsoil and underlying material to a depth of about 60 inches are gray and light gray, mottled clay.

This Sharkey soil has high fertility. Water and air move through this soil at a very slow rate. Water runs off the surface very slowly and stands in low places for long periods after heavy rains. A seasonal high water table fluctuates between the soil surface and a depth of about 2 feet during December through April. Adequate water is available to plants in most years. The surface layer of this soil is very sticky when wet and very hard when dry. This soil dries slowly after heavy rains. It has very high shrink-swell potential. The surface layer is medium acid or slightly acid. The subsoil and underlying material are medium acid or neutral.

Included in mapping are a few small areas of Dundee and Tunica soils. The Dundee soils are somewhat poorly drained. These soils are in higher positions than the Tensas soil and are loamy throughout. The Tunica soils are poorly drained. They are in positions similar to those of the Tensas soil and have a subsoil that is more alkaline. Included soils make up about 10 percent of the map unit.

The soils in this complex are used mainly for crops. Small acreages are used as pasture or woodland.

These soils are moderately well suited to cultivated crops. The main limitations are the clayey surface layer, wetness, and an undulating topography. Soybeans is the main crop (fig. 5). Proper row arrangement, field ditches, and grassed outlets are needed to remove excess surface water. This soil is difficult to keep in good tilth and can be worked only within a narrow range of moisture content. It becomes cloddy if farmed when it is too wet or too dry. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. Conservation tillage and crop residue left on the soil or regular addition of other organic matter improve fertility and tilth and help to maintain content of organic matter. Most crops respond well to fertilizer.

These soils are well suited to use as pasture. The main limitations are wetness and the clayey surface layer. Field ditches can remove excess surface water. Suitable pasture plants are common bermudagrass, tall fescue, dallisgrass, and ryegrass. Grazing when the soil is wet causes puddling on the surface. Fertilizer and lime are needed for optimum forage production. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and the soil in good condition.

These soils are well suited to use as woodland, but because they are also suited to cropland, most areas have been cleared for crops or pasture. Suitable trees are eastern cottonwood, American sycamore, and sweetgum. Careful reforestation after harvesting can reduce competition from undesirable understory plants. Because the clayey soil is sticky when wet, most planting and harvesting equipment can be used only during dry periods.

These soils have good potential for use as habitat for woodland wildlife, fair to good potential for wetland wildlife, and fair potential for openland wildlife. Management that enhances the growth of oak trees and desirable understory vegetation can improve habitat for white-tailed deer, squirrels, and turkeys. Constructing shallow ponds can improve the habitat for waterfowl and furbearers. Creating undisturbed, vegetated areas around the edges of cropland can improve the habitat for quail, doves, and rabbits.

These soils are poorly suited to recreation uses. The main limitations are the clayey surface texture, very slow permeability, and wetness. Good drainage is necessary for intensive recreation uses, such as playgrounds and camp areas. Fertilizer and traffic control can help maintain plant cover.

These soils are poorly suited to use for homesites, local roads and streets, and most sanitary facilities. The main limitations are wetness, very slow permeability, and

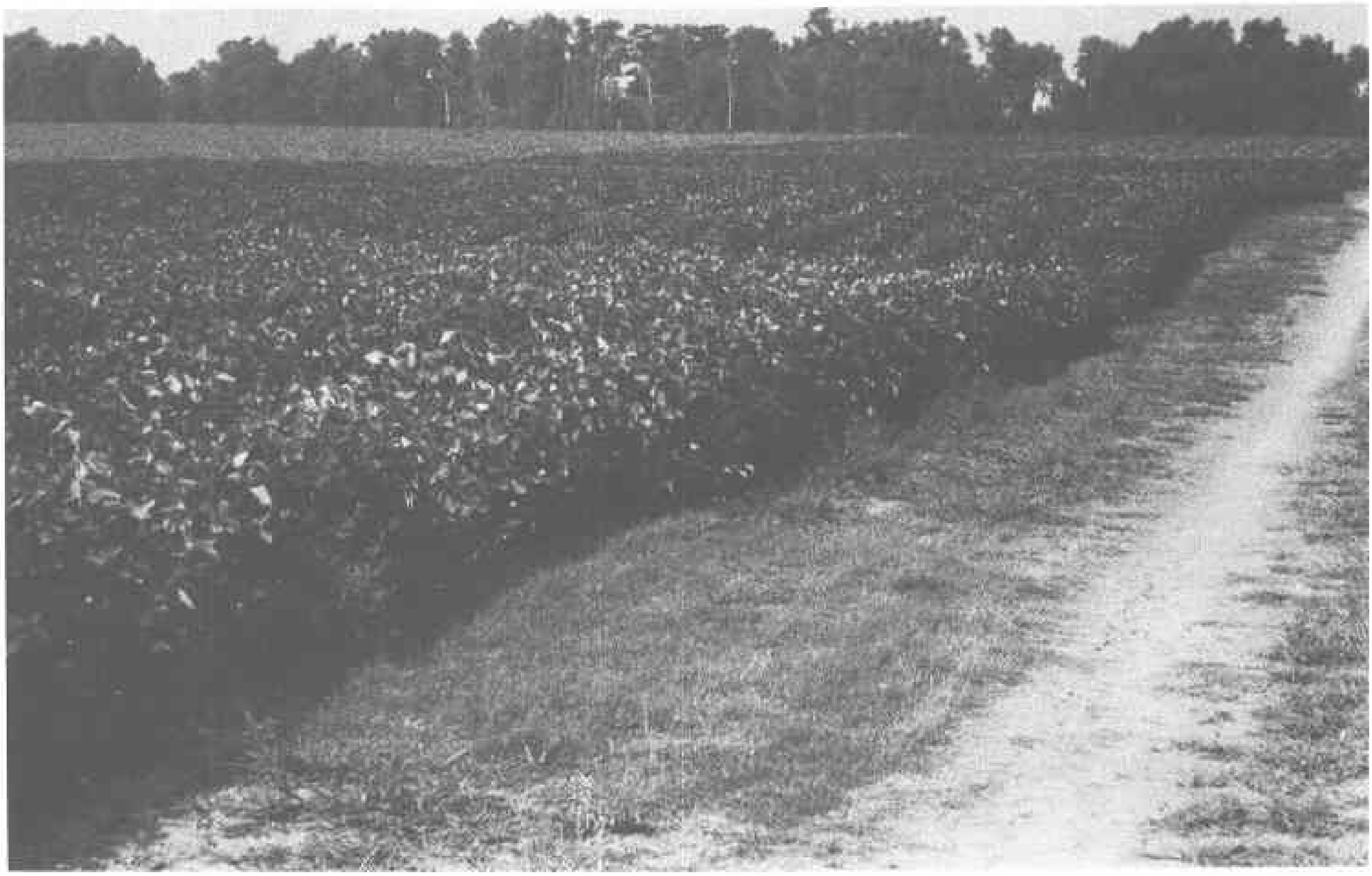


Figure 5.—Soybeans is the main crop on these clayey soils in an area of Tensas-Sharkey complex, gently undulating.

high and very high shrink-swell potential. Drainage is needed around homesites. Septic tank absorption fields do not function properly in these soils during wet periods. Roads and building foundations need to be constructed to withstand the stresses of shrinking and swelling. Roads can also be constructed to offset the limited ability of the soils to support a load.

The soils in this complex are in capability subclass IIIw. The Tensas soil is in woodland group 6W, and the Sharkey soil is in 7W.

Tn—Tunica clay. This level, poorly drained soil is in slightly elevated areas within the backswamps along the Mississippi River and its distributaries. The areas range from about 10 to 800 acres. Slopes are dominantly less than 1 percent.

Typically, this Tunica soil has a dark grayish brown clay surface layer about 6 inches thick. The subsoil extends to a depth of about 32 inches and is dark gray, mottled clay in the upper part and gray, mottled clay in the lower part. The underlying material to a depth of about 60 inches is grayish brown, mottled silt loam in the upper part and grayish brown, mottled very fine sandy loam in the lower part.

Included with this soil in mapping are a few small areas of Commerce, Newellton, Sharkey, and Tensas soils. The Commerce and Newellton soils are somewhat poorly drained. These soils are in higher positions than the Tunica soil. The Commerce soils are loamy throughout, and the Newellton soils are underlain by loamy material within 20 inches of the surface. The Sharkey soils are poorly drained. They are in lower positions and are clayey throughout. The Tensas soils are somewhat poorly drained. They are in positions similar to those of the Tunica soil, and they are more acid in the subsoil. Also included in places are Tunica soil that is subject to rare flooding. Included soils make up about 15 percent of the map unit.

This Tunica soil has high fertility. Water and air move through the upper part of this soil at a very slow rate and through the lower part at a moderate rate. Water runs off the surface slowly. A seasonal high water table is at a depth of about 1.5 to 3 feet during January through April. This soil has high shrink-swell potential in the clayey subsoil and low shrink-swell potential in the underlying loamy material. The surface layer of this soil is sticky when wet and very hard when dry. It is medium acid throughout. The subsoil is slightly acid in the upper part and neutral in the lower part. The underlying material is neutral in the upper part and mildly alkaline in the lower part.

This soil is mainly used for cultivated crops. Small acreages are used as pasture or homesites, buildings, or roads.

This soil is moderately well suited to cultivated crops. The main limitations are wetness and poor tilth. Suitable crops are soybeans, rice, and small grain. Proper row arrangement, field ditches, and grassed outlets are needed to remove excess surface water. This soil is difficult to keep in good tilth. It can be worked only within a narrow range of moisture content. It becomes cloddy if tilled when it is too wet or too dry. Land grading and smoothing improve surface drainage and permit more efficient use of farm equipment. Deep cuts during land grading and smoothing can expose loamy material. Pipe or other drop structures installed in drainage ditches control the water level in rice fields and prevent excessive erosion of ditches. Conservation tillage and crop residue left on the soil or regular addition of other organic matter improve fertility and tilth and help to maintain content of organic matter. Most crops and pasture plants respond well to lime and fertilizer.

This Tunica soil is well suited to use as pasture. The main limitations are wetness and the clayey surface layer. Suitable pasture plants are common bermudagrass, tall fescue, white clover, red clover, and vetch. Good management promotes optimum vigor and quality of forage plants. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Field ditches can remove excess surface water. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Grasses and legumes grow well if adequate fertilizer is used.

The soil is well suited to use as woodland, but because it is also suited to cropland most areas have been cleared for crops or pasture. Cherrybark oak, eastern cottonwood, green ash, American sycamore, and Nuttall oak are suitable for planting. Only trees that can tolerate seasonal wetness should be planted. Because the clayey surface layer is sticky when wet, the use of equipment during wet periods is limited.

This soil has good potential for use as habitat for woodland and wetland wildlife and fair potential for openland wildlife. Management that encourages growth of oaks and desirable understory vegetation can improve habitat for white-tailed deer, squirrels, and turkeys. Constructing shallow ponds can improve habitat for waterfowl and furbearers. Creating undisturbed, vegetated areas around the edges of cropland can improve habitat for quail, doves, and rabbits.

This soil is poorly suited to use for homesites, local roads and streets, and most sanitary facilities. The main limitations are wetness, very slow permeability, and high shrink-swell potential. Drainage is needed if roads and building foundations are constructed. Excess water can be removed by using shallow ditches and providing the proper grade for drainage. Septic tank absorption fields do not perform properly during wet periods because of very slow permeability and the high water table. Sandy backfill for the trench and long absorption lines help to compensate for the very slow permeability. Building and road design and construction can offset the effects of shrinking and swelling.

This soil is poorly suited to recreation uses, such as campsites, picnic areas, and playgrounds. The main limitations are wetness, very slow permeability, and the clayey surface layer. A good drainage system is needed. A loamy fill material on the surface can improve this soil for recreational uses.

This Tunica soil is in capability subclass IIIw and in woodland group 8W.

Ts—Tunica-Sharkey clays, gently undulating. This map unit consists of poorly drained Tunica and Sharkey soils. These soils are in low positions on the natural levees along the Mississippi River and its distributaries. The Tunica soil is on narrow ridges, and the Sharkey soil is in swales. Tunica soil makes up about 45 percent of this complex, and Sharkey soil makes up about 35 percent. These soils are so intermingled that they cannot be mapped separately at the scale used. Areas of this complex range from about 20 to 2,200 acres. Slopes range from 0 to 3 percent.

Typically, the Tunica soil has a surface layer of dark grayish brown clay about 6 inches thick. The subsoil extends to a depth of about 30 inches and is dark gray, mottled clay. The underlying material to a depth of about 60 inches is grayish brown, mottled silty clay loam.

This Tunica soil has high fertility. Water and air move through this soil at a very slow rate. Water runs off the surface slowly. A seasonal high water table fluctuates between depths of about 1.5 and 3 feet during January through April. Adequate water is available to plants in most years. The surface layer of this soil is very sticky when wet and very hard when dry. The shrink-swell potential is high. The soil is slightly acid throughout.

Typically, this Sharkey soil has a surface layer of very dark grayish brown clay about 7 inches thick. The subsoil extends to a depth of about 38 inches and is dark gray, mottled clay in the upper part and dark gray and gray, mottled clay in the lower part. The underlying material to a depth of about 60 inches is gray, mottled silty clay and clay.

This Sharkey soil has high fertility. Water and air move through this soil at a very slow rate. Water runs off the surface very slowly and stands for long periods after heavy rains. A seasonal high water table fluctuates between the soil surface and a depth of about 2 feet during December through April. The surface layer of this soil is very sticky when wet and dries slowly. The shrink-swell potential is very high. The soil is neutral throughout.

Included with these soils in mapping are a few small areas of Commerce and Newellton soils. Commerce and Newellton soils are somewhat poorly drained. Commerce soils are loamy throughout and are in higher positions than Tunica and Sharkey soils. Newellton soils are in slightly higher positions than the Tunica soil and are underlain by loamy material within 20 inches of the surface. Included soils make up about 20 percent of the map unit.

These soils are used mainly for crops. In a few areas, they are used as pasture or homesites.

These soils are moderately well suited to cultivated crops. Wetness, poor tilth, and undulating topography are the main limitations. Suitable crops are soybeans, wheat, and grain sorghum. Proper row arrangement, field ditches, and grassed outlets are needed to remove excess surface water. These soils are difficult to keep in good tilth and can be worked only within a narrow range of moisture content. They become cloddy if tilled when they are too wet or too dry. Land grading and smoothing remove excess water, but large volumes of soil need to be moved in places. Conservation tillage and crop residue left on the soil or regular additions of other organic matter improve fertility and tilth and help maintain content of organic matter. Drop structures, installed in grassed waterways where needed, prevent gullying.

These soils are moderately well suited to use as pasture. If they are used for pasture, the main limitations are wetness and the clayey surface layer. Suitable pasture plants are tall fescue, dallisgrass, white clover, red clover, and vetch. Grazing when the soil is wet results in puddling on the surface layer. Proper stocking, pasture rotation, and restricted grazing during wet periods help keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Nitrogen fertilizer promotes good forage growth.

These soils are moderately well suited to use as woodland; however, only a few areas remain in native hardwoods. Suitable trees are green ash, Nuttall oak, cherrybark oak, sugarberry, eastern cottonwood, American sycamore, and sweetgum. The main concerns in producing and harvesting timber are wetness and the clayey surface layer. Careful reforestation after harvesting can reduce competition from undesirable understory plants. Trees should be water-tolerant and need to be planted or harvested during dry periods. Because the clayey soils are sticky when wet, most planting and harvesting equipment can be used only during dry periods.

These soils have good potential for use as habitat for woodland and wetland wildlife. It has fair potential as habitat for openland wildlife. Planting appropriate vegetation, maintaining existing plant cover, or propagating the natural growth of desirable plants can improve habitat for wildlife.

These soils are poorly suited to recreation uses. The main limitations are wetness and the clayey surface layer. Good drainage is necessary for intensive recreation uses, such as playgrounds and camp areas. A loamy fill material can improve these soils for recreation uses.

These soils are poorly suited to use for building sites, local roads and streets, and most sanitary facilities. The main limitations are the clayey texture, wetness, and very high shrink-swell potential. Drainage is needed if roads and building foundations are constructed. Wetness and very slow permeability are limitations for septic tank absorption fields. Sandy backfill for the trench and long absorption lines help to compensate for the very slow permeability. Proper engineering design and backfilling with material that has low shrink-swell potential can minimize the effects of shrinking and swelling.

The soils in this complex are in capability subclass IIIw. The Tunica soil is in woodland group 8W, and the Sharkey soil is in 7W.

TT—Tunica and Sharkey soils, frequently flooded. This map unit consists of poorly drained Tunica and Sharkey soils. These level to gently undulating soils are in low positions on natural levees and in backswamps. They are on the unprotected side of the levee system along the Mississippi River. These soils are subject to frequent flooding. The soils are also subject to scouring and deposition by fast-flowing floodwaters. The landscape consists mainly of low ridges and broad flats. In places, it consists of parallel, low ridges and shallow swales. The Tunica soil is on ridges, and the Sharkey soil is in the swales and on broad flats. The areas range from about 100 to 700 acres. Slopes are dominantly less than 1 percent but can range to 3 percent.

The Tunica soil makes up about 45 percent of the soils of the map unit, and Sharkey soil makes up about 35 percent. Most mapped areas are made up of both soils, but the proportion of each soil varies from place to place.

Typically, this Tunica soil has a dark grayish brown, mottled clay surface layer about 6 inches thick. The subsoil extends to a depth of about 24 inches and is grayish brown, mottled clay. The underlying material to a depth of about 60 inches is grayish brown, mottled silty clay loam in the upper part; grayish brown, mottled silt loam in the middle part; and light brownish gray, mottled silt loam in the lower part.

This Sharkey soil has high fertility. Water and air move through the upper part of this soil at a very slow rate and through the lower part at a moderate rate. Water runs off the surface slowly. Adequate water is available to plants in most years. A seasonal high water table is at a depth of about 1.5 to 3 feet during January through April. This soil is subject to brief to very long periods of flooding. Flooding can occur more often than twice in 5 years during the cropping season and other times of the year. Floodwaters typically are 3 to 12 feet deep but exceed 16 feet in places. The clayey subsoil has high shrink-swell potential, and the loamy underlying material has low shrink-swell potential. The surface layer, the subsoil, and the upper part of the underlying material are slightly acid. The middle and lower parts of the underlying material are neutral.

Typically, this Sharkey soil has a dark grayish brown clay surface layer about 7 inches thick. The subsoil extends to a depth of about 60 inches and is dark gray, mottled clay in the upper part and gray, mottled clay in the lower part.

This Sharkey soil has high fertility. Water and air move through this soil at a very slow rate. Water runs off the surface very slowly and stands in low places for long periods after heavy rains. Adequate water is available to plants in most years. A seasonal high water table fluctuates between the soil surface and a depth of about 2 feet during December through April. This soil is subject to brief to very long periods of flooding. Flooding can occur more often than twice in 5 years during the cropping season and other times of the year. Floodwaters typically are between 4 and 15 feet deep but exceed 20 feet in places. The soil is neutral throughout.

Included with these soils in mapping are a few small areas of Bruin, Commerce, and Newellton soils. The Bruin soils are moderately well drained. The Commerce soils are somewhat poorly drained. These soils are on some of the highest ridges, and they are loamy throughout. The Newellton soils are somewhat poorly drained. These soils are in slightly higher positions than the Tunica soil and have a clayey subsoil that is underlain by loamy material within 20 inches of the surface. Also included are a few small areas of soils similar to Sharkey and Tunica soils except they have loamy or sandy surface layers. Included soils make up about 20 percent of the map unit.

These Tunica and Sharkey soils are mainly used as woodland. Small acreages are used as pasture or for crops.

These soils are poorly suited to cultivated crops. Generally, the hazard of flooding is too severe to allow most crops to grow. Crops that can be planted late, such as soybeans, can be grown in some years. It is not feasible to protect these soils from flooding.

These soils are poorly suited to use as pasture. The main hazard is frequent flooding. Suitable pasture plants are common bermudagrass and locally adapted native plants. Applying high rates of fertilizer or lime to pastures is generally not practical because of the frequent overflow hazard.

These soils are moderately well suited to use as woodland. Suitable trees are eastern cottonwood and baldcypress. Trees should be water-tolerant and need to be planted or harvested during dry periods. Wetness and flooding severely limit the use of equipment during the winter and spring.

These soils have fair potential for use as habitat for woodland wildlife and fair to good potential as habitat for wetland wildlife. These soils produce habitat for deer, rabbits, turkeys, and squirrels. Planting appropriate vegetation or propagating the natural growth of desirable plants can improve habitat for woodland wildlife. Constructing shallow ponds to provide open water areas for waterfowl and furbearers, such as muskrats, nutria, and otters, can improve habitat for wetland wildlife.

These soils are generally not suited to recreation or urban uses. The hazard of flooding is generally too severe for these uses.

The soils in this map unit are in capability subclass Vw. The Tunica soil is in woodland group 7W, and the Sharkey soil is in 6W.

Prime Farmland

In this section, prime farmland is defined and discussed, and the prime farmland soils in East Carroll Parish are listed.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, feed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. The moisture supply, of course, must be adequate, and the growing season has to be sufficiently long. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses. They either are used for producing food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures. Public land is land not available for farming in national forests, national parks, military reservations, and state parks.

Prime farmland soils usually get an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not subject to frequent flooding during the growing season. The slope ranges mainly from 0 to 6 percent. For more detailed information on the criteria for prime farmland consult the local Soil Conservation Service office.

The following map units, or soils, make up prime farmland in East Carroll Parish. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 5. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

About 227,778 acres, or nearly 78 percent of the total area of East Carroll Parish, meets the soil requirements for prime farmland. The areas are scattered throughout the parish. About 210,000 acres of this prime farmland is used for crops.

The trend of land use to urban and related uses has resulted in the loss of some prime farmland. This loss puts pressure on marginal land, which generally is more erodible, droughty, and difficult to cultivate, and generally is less productive than prime farmland.

Soils that have limitations, such as a high water table or flooding, may qualify as prime farmland if these limitations are overcome by such measures as drainage or flood control. In the following list, the measures needed to overcome the limitations of a map unit, if any, are shown in parentheses after the map unit name. Onsite evaluation is necessary to determine if the limitations have been overcome by the corrective measures.

Br	Bruin silt loam
Bu	Bruin-Commerce silt loams, gently undulating
Cm	Commerce silt loam
Co	Commerce silty clay loam
Dd	Dundee silt loam
De	Dundee silty clay loam
Go	Goldman silt loam, 1 to 5 percent slopes
Ne	Newellton silty clay
Ng	Newellton-Goldman complex, 1 to 5 percent slopes
Nm	Newellton-Tunica complex, gently undulating
Sa	Sharkey silty clay loam
Se	Sharkey clay
Sk	Sharkey loamy fine sand, overwash, gently undulating
Ta	Tensas silty clay
Td	Tensas-Dundee complex, gently undulating

Te Tensas-Sharkey complex, gently undulating
Tn Tunica clay
Ts Tunica-Sharkey clays, gently undulating

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and suitabilities of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops, pasture, and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the suitabilities and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of sand, roadfill, and topsoil. They can use it to identify areas where wetness or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Richard Aycock, area staff agronomist, Soil Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

According to the 1978 Census of Agriculture, 209,979 acres in East Carroll Parish were devoted to agriculture. This acreage represents 77 percent of the land area in East Carroll Parish. From 1974 to 1978, the acreage in cropland has gradually increased as the acreages of pasture and woodland have decreased. Acreage in urban use also increased slightly during that same period.

In 1982, according to the Louisiana Summary of Agriculture and Natural Resources, there were 135,000 acres of soybeans, 50,062 acres of cotton, and 10,728 acres of rice. Nearly one-third of the soybean acreage is double-cropped with wheat, and in 1982 there were nearly 44,000 acres. The rest of the cropland is in small acreages of corn, grain sorghum, oats, and pecans. About 6,250 acres was in pasture in 1982.

The soils and the climate in the parish are well suited to the crops that are commonly grown in the area. Cotton production is generally restricted to the better drained, loamy soils, while soybeans and rice are grown on the clayey soils.

Perennial grasses or legumes, or a mixture of these are grown for pasture and hay. The mixtures are generally either a summer or winter perennial grass and a suitable legume. In addition, some farmers seed small grain or ryegrass in the fall for winter and spring forage. Excess grass is harvested for use as hay in the winter (fig. 6).

The only significant acreage of pasture in East Carroll Parish is along the Mississippi River levee. About 2,000 acres of pasture remain west of the levee.

Native grasses and domestic grasses, such as common bermudagrass and improved bermudagrass, are common summer perennials. Common bermudagrass and improved bermudagrass produce good forage. Tall fescue is the chief winter perennial produced in the parish. It grows well on soils that have favorable soil moisture content. Common bermudagrass, improved bermudagrass, and tall fescue respond well to fertilizers,

Figure 6.—Hayland on a large earthen levee along the Mississippi River. Quality forage on the levees can be produced with proper management.

especially nitrogen. White clover, crimson clover, ball clover, arrowleaf clover, vetch, and southern wild winterpeas are the common legumes. These legumes adapt to a wide range of soils except deep sandy soils or soils that are very poorly drained. They respond to lime, particularly if they are grown on acid soils.

Proper grazing height and pasture rotation are essential for high quality forage and erosion control. Brush and weed control, fertilization, addition of lime, and pasture renovation are also needed. By grazing livestock on crop residue and winter cover crops, some farmers obtain additional forage.

Woodland grazing is confined mainly to the seasonally flooded bottom land hardwoods between the levee and the Mississippi River. These areas produce substantial quantities of native forage during periods of normal river levels, usually from summer through autumn. When the river rises in the winter and spring, several feet of water covers much of this area and livestock need to be moved.

Fertilizer and lime. The kind and amount of fertilizer depends upon the crop to be grown, the cropping and fertility history, the desired level of yield, and the soil phase. The results of laboratory analysis of soil samples taken from each field is the basis for applications of plant nutrients.

A soil sample representing no more than 20 acres is taken from a single soil phase. Samples from cropland are taken from the upper 5 to 7 inches of the soil. Soils used as pasture are sampled to a depth of 2 to 4 inches. Samples need to be collected from several different places in the field and mixed thoroughly. About 1 pint of the mixed soil material is used for the laboratory analysis. Samples taken from a field where no-till planting will be practiced for several years need to be from the upper 2 inches of the topsoil.

Most of the arable soils in East Carroll Parish respond well to additions of a complete fertilizer. Some of the more fertile soils have high levels of phosphorus and potassium and need only the addition of nitrogen. On coarse textured soils, which have been recently limed, cotton responds to the addition of the micronutrient element, boron. Soils that are low in zinc or those that have enough lime added to raise the pH to 6.5 or higher benefit from the addition of zinc for rice production.

The soils in East Carroll Parish range from very strongly acid to moderately alkaline in the upper 20 inches. A comparison of the pH levels in the soils in East Carroll Parish is in figure 7. Acid soils generally require the addition of lime to sufficiently raise their pH for good growth of soybeans, cotton, and other crops that grow well only on slightly acid or neutral soils. Lime that is high in calcium carbonate is needed for these soils rather than dolomitic lime, unless the latter is specifically recommended by soil test analysis.

Organic matter content. Organic matter provides a source of nitrogen for crop growth. Nitrogen added to

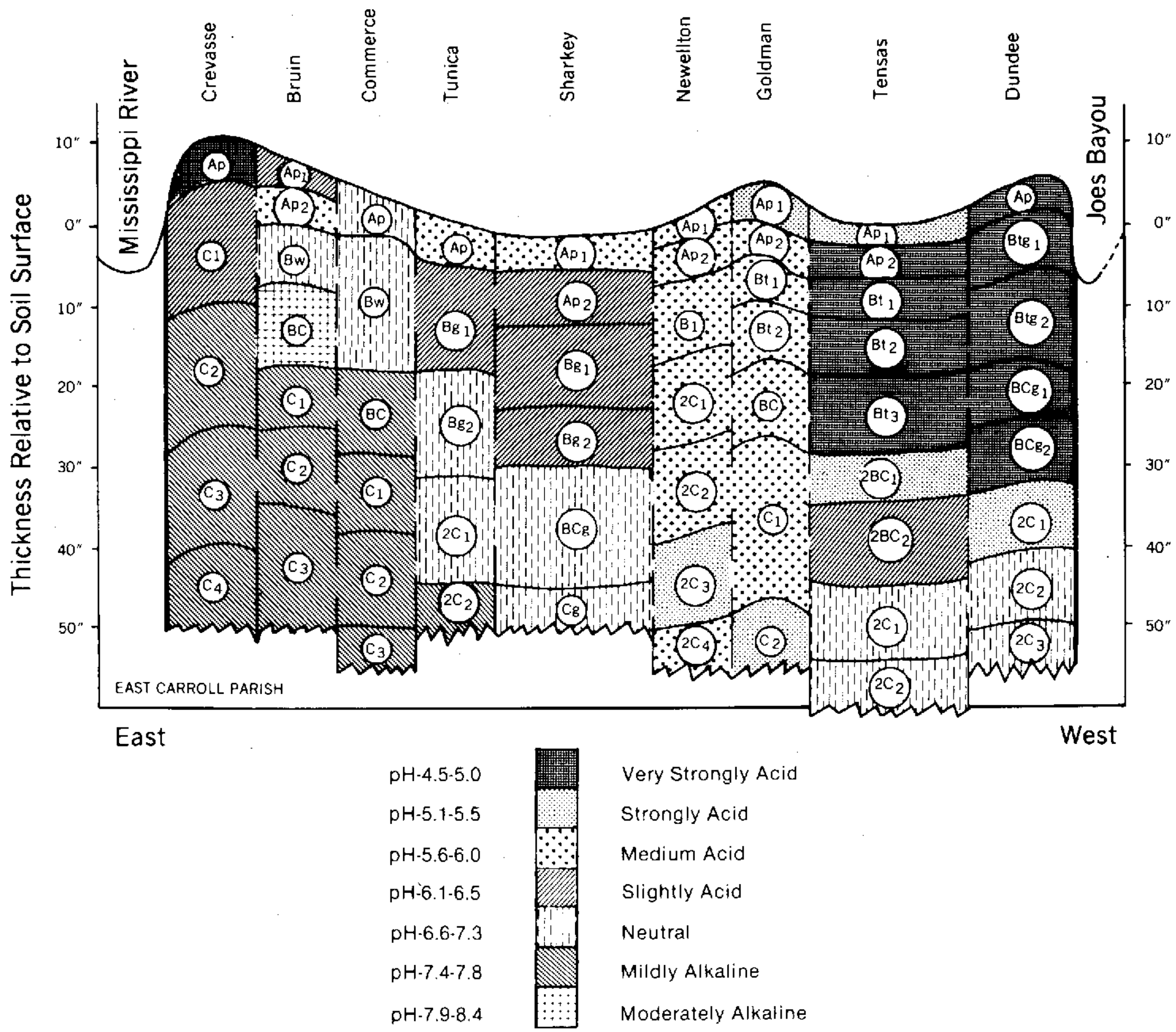


Figure 7.—Soil landscape sketch showing the reaction (pH) of the soils across East Carroll Parish.

the soil as commercial fertilizer makes up only a fraction of the total nitrogen that a crop uses. Soil organic matter provides the rest. Organic matter also increases the rate that water is taken into the soil and the amount of water that the soil can store. It reduces surface crusting and soil loss by erosion and fosters a good physical condition of the surface.

The soils in East Carroll Parish have moderately low organic matter content. The content ranges from 0.41 to 2.27 percent in the surface layer. Organic matter levels of representative soil profiles are shown in table 16. Plant residue left on the surface can build up organic matter to a limited extent and maintain it. High-residue crops, such as corn or grain sorghum, grown in rotation with cotton or soybeans increase the organic matter content. Planting cool-season cover crops and growing perennial grasses and legumes in rotation with other crops also increase organic matter levels.

Favorable organic matter levels in soil promote crop maturity and increase herbicide effectiveness while reducing herbicide damage to the crop.

Soil tillage. The major purposes of soil tillage are seedbed preparation and weed control. Excessive tillage damages soil structure, accelerates the decomposition of organic matter, and encourages soil crusting.

A compacted layer develops in loamy soils when they are continuously plowed at the same depth or when they are plowed when wet. This compacted layer, known as a traffic pan or plowpan, develops just below the plow layer. The pan restricts the movement of air, water, and plant roots through the soil. Plowing at a different depth, using chisel plowing or subsoiling, and not plowing when the soil is wet can keep this compacted layer from developing. Chisel plowing and subsoiling breaks up plowpans, while leaving about 75 percent of the surface plant residue in place. In East Carroll Parish, most crops that grow in loamy soils respond well to deep tillage.

Generally, plowpans do not form in clayey soils. Alternate wetting and drying cause clayey soils to shrink and swell. This movement cracks and churns the soils to a depth of several inches. Some of the clayey soils in the parish become cloddy and lose their moisture when they are cultivated. The result is poor stands, and planting is often delayed until rains fall. Avoiding tillage on these soils before planting is helpful if good surface drainage and few perennial weeds are present. Clayey soils can be cultivated after planting and establishment of stands if the soils are moist but not wet.

Drainage. The removal of excess surface water is essential to successful crop production in most soils of East Carroll Parish. Wetness is the main limitation for crops and pasture plants. Early drainage methods involved a complex system of main ditches, laterals, and field drains. A more recent approach to drainage in this parish combines land leveling or grading with a minimum number of surface ditches. This method creates larger and more uniformly shaped fields, which are more suited to the use of modern, multirow farm machinery.

Water for plant growth. In East Carroll Parish, a large amount of rain falls during the winter and spring. However, in many years, sufficient water is not available at critical periods for optimum plant growth. Crops often do not receive moisture in summer and early in autumn. This rainfall pattern favors the growth of early maturing crops.

The available water capacity of the soils in the parish ranges from very low in Crevasse soils to very high in Sharkey soils. The irrigated acreage has increased from about 3,800 acres in 1974 to over 20,000 acres in 1983. The acreage of rice also increased during this period. Cotton and soybean farmers also grade the land and install in-furrow irrigation systems, or they use traveling-sprinkler and center-pivot systems where the land is too undulating for grading.

The Soil Conservation Service, the Louisiana Cooperative Extension Service, or the Louisiana Agricultural Experiment Station can provide additional information on irrigation.

Cropping system. A good cropping system includes a legume for nitrogen, a cultivated crop for weed control, a deep-rooted crop that uses subsoil fertility and maintains subsoil permeability, and a close-growing crop that maintains organic matter content. The sequence of crops needs to provide cover for the soil for as much of the year as possible.

A suitable cropping system varies according to the needs of the farmer and the characteristics of the soil. Producers of livestock, for example, generally use cropping systems that have higher percentages of permanent pasture and annual grasses than the cropping systems of cash-crop farms. Continual growth of cotton is the predominant cropping system on the loamy soils of East Carroll Parish. Rice and soybean monoculture occupy the clayey soils. About a third of the soybean acreage is double-cropped with small grains.

Specific recommendations on various cropping systems is available from the Soil Conservation Service, the Louisiana Cooperative Extension Service, or the Louisiana Agricultural Experiment Station.

Control of erosion. Sheet and rill erosion is a concern on many of the soils in the parish. According to the 1982 National Resource Inventory, erosion rates are excessive on about 17 percent of the acreage in the parish *(26)*. Some gully erosion occurs mainly on the more gently undulating soils, on high-bank streams, and where water flows into drainage ditches. Vegetation or plant residue left on the surface for as much of the year as possible can reduce sheet and rill erosion. Across-slope farming can reduce erosion on undulating soils that are not suited to terracing and contour farming. On most soils, conservation tillage can reduce the amount of soil lost to erosion by 50 to 90 percent. A no-till system is the most efficient erosion control system, and other systems that combine no-till planting and conventional cultivation are nearly as effective in controlling erosion.

Grassed waterways that have gentle side slopes can remove excess surface water as effectively as open ditches that have steep side slopes. Grassed waterways also erode less than ditches, and they filter sediment from water that runs off adjacent fields.

Grade stabilization or other water control structures to control gully erosion need to be placed where water flows into drainage ditches.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby parishes and counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that insures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major, and generally expensive, landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

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

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

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

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

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

There are no subclasses in class I because the soils of this class have few limitations. The soils in class V are subject to little or no erosion, but they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation. Class V contains only the subclasses indicated by *w, s,* or *c.*

The acreage of soils in each capability class and subclass is shown in table 7. The capability classification of each map unit is given in the section "Detailed Soil Map Units."

Woodland Management and Productivity

Carl V. Thompson Jr., state staff forester, Soil Conservation Service, helped prepare this section.

This section has information on trees and their environment, particularly the soils in which they grow; the kinds, amounts, and conditions of woodland resources in East Carroll Parish; and interpretations of the soils that woodland owners, foresters, forest managers, and agricultural workers can use in their planning for wood crops.

Soils directly influence the growth, management, harvesting, and multiple uses of forests.

Soil is the medium which anchors a tree and from which the tree draws nutrients and moisture. Soil characteristics such as chemical composition, texture, structure, depth, and slope position affect tree growth, seedling survival, adaptability, and equipment limitations.

The ability of a soil to supply moisture and nutrients to trees is strongly related to its texture, structure, and depth. Generally, sandy soils, such as the Crevasse soils, are less fertile and lower in water-holding capacity than clayey soils, such as the Sharkey soils.

However, aeration is often impeded in clayey soils, particularly under wet conditions. Slope position strongly influences tree composition as well as growth within individual trees.

These combined soil characteristics largely determine the forest stand composition and influence management and utilization decisions. Sweetgum, for example, is tolerant of many soils and sites, but grows best on the rich, moist, alluvial loamy soils of bottom lands. Heavy logging and site preparation equipment use is more restricted on clayey soils than on better drained sandy or loamy soils.

Woodland Resources

East Carroll Parish was once entirely forested. Dense hardwood forests covered the fertile Mississippi River bottom land soils of the parish. The dominant species were eastern cottonwood, green ash, American elm, slippery elm, American sycamore, sweetgum, overcup oak, Nuttall oak, Shumard oak, water oak, willow oak, swamp chestnut oak, cherrybark oak, pecan, baldcypress, and red maple. Few acres of this vast forest still stand. The forest has been cleared for cropland and pasture. The few forested areas are on low-lying tracts; in swamps; along bayous, streams, and lakes; and on the batture along the Mississippi River.

Early settlers in the parish began to clear trees for cropland soon after they arrived. The loamy soils on the high natural levees, which are best suited to cropland, were cleared first. The clayey soils at lower elevations, which are less suitable for cropland, retained their forest cover until recent years. Clearing the hardwood forests accelerated when soybeans, which grow well on a wide variety of soils, became a common crop in the parish. At present, there is only about 22,000 acres of woodland in East Carroll Parish, representing about 7.5 percent of the total land area. The woodland area decreased by about 57,500 acres between 1964 and 1974. Another 29,700 acres of bottom land hardwood was cleared between 1974 and 1980 *(22)*.

Most of the cleared areas were planted in soybeans. The trend is expected to decline in the future as woodland that is suitable and available for crops decreases.

East Carroll Parish has about 22,000 acres of commercial forest land (fig. 8). Commercial forest land produces or is capable of producing industrial wood crops and has not been withdrawn from timber use. Commercial forest land ownership is 11 percent public, 82 percent forest industry, and 7 percent miscellaneous private *(22)*.

The parish is entirely within the Southern Mississippi Valley Alluvium Major Land Resource Area.

Commercial forest land can be divided into forest types. These forest types can be based on tree species, site quality, or age. In this survey, forest types are stands of trees that have similar characteristics, are of the same species, and that grow under the same ecological and biological conditions. Forest types are named for the trees that predominate.

The *oak-gum-cypress* forest type covers 36 percent of the forest land in East Carroll Parish *(22)*. This type is composed of bottom land forests of tupelo, blackgum, sweetgum, oak, and baldcypress, exclusively or in combination. Associated trees include eastern cottonwood, black willow, ash, hackberry, maple, and elm.

The *elm-ash-cottonwood* forest type occupies 64 percent of the forest land in the parish. American elm, green ash, and eastern cottonwood compose most of the stocking. Associated trees include water hickory, Nuttall oak, willow oak, water oak, overcup oak, sweetgum, boxelder, black willow, and sandbar willow.

Hardwoods compose all of the marketable timber volume. Most of the forest acreage is 45 percent saplings and seedlings, 36 percent sawtimber, and 9 percent pole timber. The other 10 percent is classified as "non-stocked areas." Most of the productive sites are in pasture or cropland. However, 46 percent of the forest land produces 120 cubic feet or more of wood per acre, 18 percent produces 85 to 120 cubic feet, and 36 percent produces less than 85 cubic feet *(22)*.

Timber production is important to the economy of the parish, but it has decreased significantly in recent years because of land clearing and lack of intensive management. Harvesting mature trees and thinning out

Figure 8.—American sycamore is the main commercially grown tree in East Carroll Parish because of its tolerance of wetness and its fast growing characteristics. These trees are in an area of Commerce and Bruin soils, frequently flooded.

undesirable species can improve timber stands. Controlled grazing, fire protection, and tree planting should also be considered.

The Soil Conservation Service, Louisiana Office of Forestry, or the Louisiana Cooperative Extension Service can help determine specific woodland management needs.

Environmental Impact

Other values associated with woodlands include wildlife habitat, recreation, natural beauty, and conservation of soil and water.

The commercial forest land of East Carroll Parish provides food and shelter for wildlife. It also provides recreational opportunities. A number of hunting and fishing clubs in the parish use the forest land. The forest land provides watershed protection, helps to arrest soil erosion and sedimentation, and enhances the quality of water resources.

Trees can be planted to screen distracting views of dumps and other unsightly areas, muffle the sound of traffic, reduce wind velocity, and beautify the landscape. They also produce fruits and nuts. Trees and forests filter out airborne dust and other impurities, convert carbon dioxide into oxygen, and provide shade.

Soils vary in their ability to produce trees. Depth, fertility, texture, and the available water capacity influence tree growth. Elevation, aspect, and climate determine the kinds of trees that can grow on a site. Available water capacity and depth of the root zone are major influences of tree growth. Elevation and aspect are of particular importance in mountainous areas.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to fertilization than others, some are more susceptible to landslides and erosion after building roads and harvesting timber, and some require special efforts to reforest. In the section "Detailed soil map units," each map unit in the survey area suitable for producing timber presents information about productivity, limitations for harvesting timber, and management concerns for producing timber. Table 8 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate*, and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

The first tree listed for each soil under the column "Important trees" is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

Table 8 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation for use and management. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *S* indicates a dry, sandy soil. The letter *A* indicates a soil that has no significant restrictions or limitations for forest use and management. If a soil has more than one limitation, the priority is as follows: W and S.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, or susceptibility of the surface layer to compaction. As slope gradient and length increase, it becomes more difficult to use wheeled equipment. On the steeper slopes, tracked equipment must be used. On the steepest slopes, even tracked equipment cannot operate; more sophisticated systems are needed. The rating is *slight* if equipment use is restricted by soil wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are steep enough that wheeled equipment cannot be operated safely across the slope, if soil wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts ground-based equipment, or if special equipment is needed to avoid or reduce soil compaction. The rating is *severe* if slopes are steep enough that tracked equipment cannot be operated safely across the slope, if soil wetness restricts equipment use for more than 6 months per year, if stoniness restricts ground-based equipment, or if special equipment is needed to avoid or reduce soil compaction. Ratings of *moderate* or *severe* indicate a need to choose the most suitable equipment and to carefully plan the timing of harvesting and other management operations.

Ratings of *seedling mortality* refer to the probability of death of naturally occurring or properly planted seedlings of good stock in periods of normal rainfall as influenced by kinds of soil or topographic features. *Seedling mortality* is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments in the surface layer, rooting depth, and the aspect of the slope. Mortality generally is greatest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of *moderate* or *severe* indicate that it may be necessary to use containerized or larger than usual planting stock or to make special site preparations, such as bedding, furrowing, installing surface drainage, or providing artificial shade for seedings. Reinforcement planting is often needed if the risk is *moderate* or *severe*.

The potential productivity of *common trees* on a soil is expressed as a *site index*. Common trees are listed in the order of their observed general occurrence. Generally, only two or three tree species dominate.

The soils that are commonly used to produce timber have the yield predicted in cubic meters. The yield is predicted at the point where mean annual increment culminates. The productivity of the soils in this survey is mainly based on the site index that was determined at age 30 years for eastern cottonwood, 35 years for American sycamore, and 50 years for all other species.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands. The procedure and technique for determining site index are given in the site index tables for the soil survey of East Carroll Parish *(4, 5, 6, 7, 8, 16)*.

The *productivity class* represents an expected volume produced by the most important trees, expressed in cubic meters per hectare per year. Cubic meters per hectare can be converted to cubic feet per acre by multiplying by 14.3. It can be converted to board feet by multiplying by a factor of about 71. For example, a productivity class of 8 means the soil can be expected to produce 114 cubic feet per acre per year at the point where mean annual increment culminates, or about 568 board feet per acre per year.

Trees to plant are those that are used for reforestation or, if suitable conditions exist, natural regeneration. They are suited to the soils and will produce a commercial wood crop. Desired product, topographic position (such as a low, wet area), and personal preference are three factors of many that can influence the choice of trees to use for reforestation.

Recreation

In table 9, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 13.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface absorbs rainfall readily but remains firm. Strong slopes can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is firm after rains.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Billy Craft, state staff biologist, Soil Conservation Service, prepared this section.

East Carroll Parish is largely a rural parish that has a variety of habitat types supporting varying wildlife populations. About 77 percent, or 210,000 acres, are open agricultural lands that provide poor to moderate habitat for mourning dove, woodcock, cottontail, swamp rabbits, bobwhite, snipe, killdeer, and many other nongame animals. During the winter, migratory waterfowl also use some of the temporarily flooded agricultural fields. Intensive farming limits the available winter cover in open agricultural areas.

Only 7.5 percent, or about 22,000 acres, of the parish is forest land. Most of the original bottom land hardwoods of East Carroll Parish have been converted to openland. The other forested tracts are the forest industry lands along Louisiana State Highway 2, which comprise about 5,000 acres, and the batture area lying between the Mississippi River and the protection levee. The forested areas support moderate to high populations of white-tailed deer, fox squirrel, wild turkey, swamp rabbits, cottontail, wood duck, mink, raccoon, opossum, nutria, coyote, woodcock, wading birds (ibis, herons, and egrets), reptiles, amphibians, nongame birds, and wintering waterfowl. All of the forest land is posted and leased by hunting clubs. The forested wetlands support a variety of furbearers.

The many private ponds, lakes, rivers, and bayous in the parish support low to high populations of largemouth bass, white bass, yellow bass, bream (sunfish), white crappie, black crappie, gar, carp, buffalo, bowfin, and shad (fig. 9). Striped bass have also been stocked in Lake Providence. Some of the larger streams and lakes in the parish are the Mississippi River, Bayou Macon, Joes Bayou, Tensas River, Lake Providence, Old River

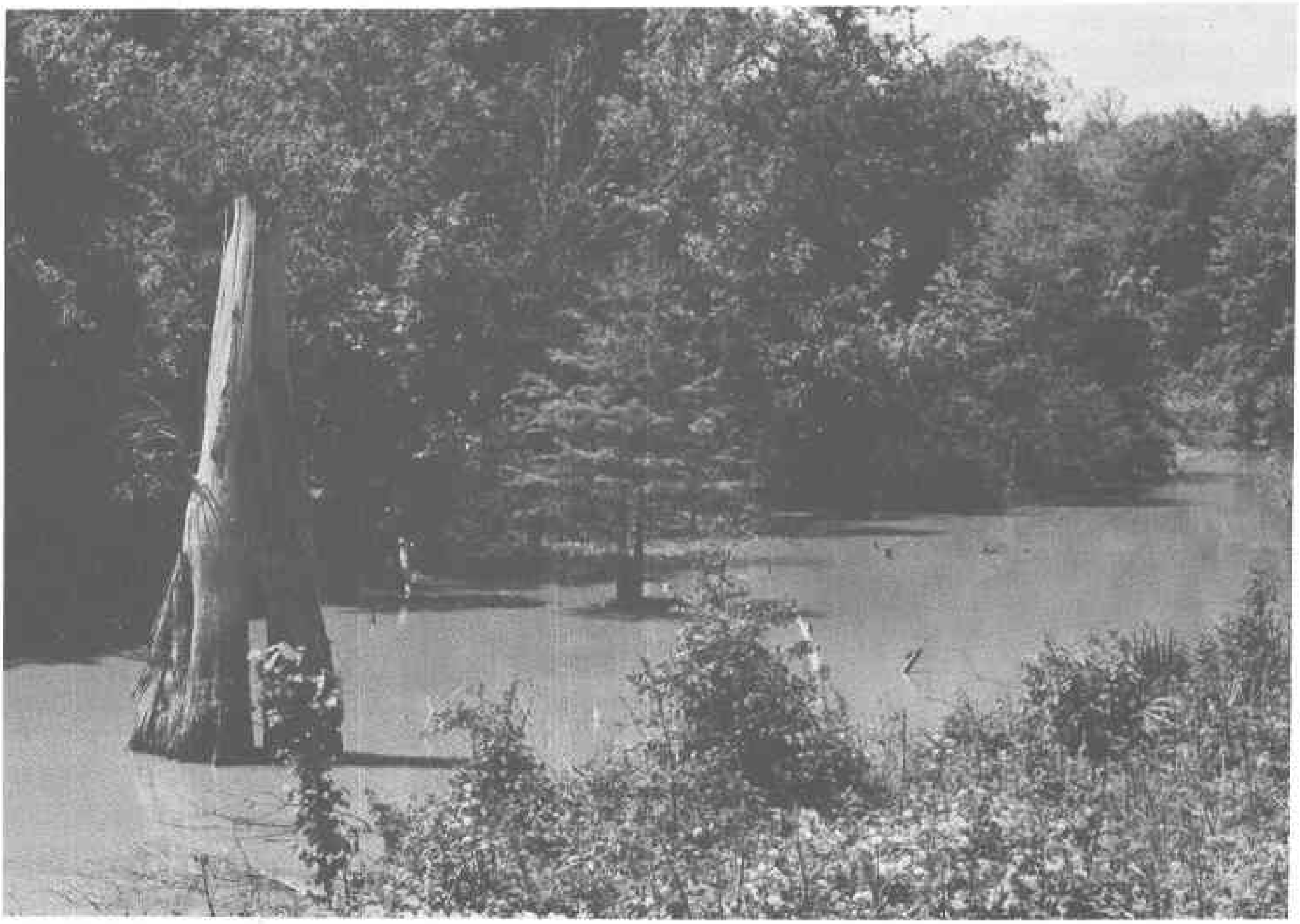


Figure 9.—Long Lake is one of many channel scars in the parish that support a variety of fish and provide habitat for wetland wildlife.

Lake, and Gassoway Lake. High turbidity, suspended solids, other related water quality parameters, and channel work are the primary limiting factors in game fish production in the streams.

Interest in crawfish farming is growing, and East Carroll Parish has good potential for its expansion. The double cropping of rice and crawfish is also gaining popularity. Rice acreage is increasing.

East Carroll Parish also provides habitat for endangered or unique species, such as the bald eagle and osprey.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and rice.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, bermudagrass, clover, and bahiagrass.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goatweed (woolly croton), beggarweed, switchgrass, and lespedeza.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, sweetgum, sugarberry, hawthorn, dogwood, hickory, blackberry, and sycamore. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are persimmon, sumac, and mayhaw.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are privet, yaupon, American beautyberry, and American elder.

Wetland plants are annual and perennial, wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, and slope. Examples of wetland plants are smartweed, wild millet, wildrice, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, mourning dove, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, nutria, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet, and because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations must be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to: evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by a very firm dense layer, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to a high water table, flooding, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, and flooding affect absorption of the effluent.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand is less than 4 feet below the base of the absorption field or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, flooding, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope can cause construction problems.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 13 are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, slope, and flooding affect both types of landfill. Texture, highly organic layers, and soil reaction affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over a water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by a high water table and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand. They have at least 5 feet of suitable material, low shrink-swell potential, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10 or a high shrink-swell potential. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand is a natural aggregate suitable for commercial use with a minimum of processing. Sand is used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or a layer of sand that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope and a water table.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They have little or no gravel and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, or soils that have only 20 to 40 inches of suitable material. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and releases a variety of plant-available nutrients as it decomposes.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. An unfavorable feature is less than 5 feet of suitable material. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and the salinity of the soil.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to layers that affect the rate of water movement, permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, susceptibility to flooding, and subsidence of organic layers. Excavating and grading and the stability of ditchbanks are affected by slope and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The performance of a system is affected by the depth of the root zone and soil reaction.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Wetness and slope affect the construction of grassed waterways. Low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(3)* and the system adopted by the American Association of State Highway and Transportation Officials *(2)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area, or from nearby areas, and on field examination.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They influence the soil's absorption of cations, moisture retention, shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year *(27)*. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams or by runoff from adjacent slopes. Shallow water standing or flowing for short periods after rainfall is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (no more than twice in 5 years). *Frequent* means that flooding occurs often under normal weather conditions (more than twice in 5 years). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. December-June, for example, means that flooding can occur during the period December through June. The definitions of the frequency of flooding differ slightly from the National Soil Conservation Service definition.

The definitions of the frequency of flooding for the occasional and frequently flooded phases differ from the Soil Conservation Service definition of flooding that occurs elsewhere because the frequency of flooding for each of these phases is slightly different, and the period of flooding is between June 1 and November 30, rather than during any time of the year. Descriptions of the "Detailed Soil Map Units" indicate if the soils flood at other times of the year. Except for the capability subclasses shown in table 6, the interpretations in the tables are based on flooding as indicated in the "Detailed Soil Map Units," which is equal to the Soil Conservation Service definition.

The information on flooding is based on evidence in the soil profile, namely, thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table, that is, *perched* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

The two numbers in the "High water table-Depth" column indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that the water table exists for less than a month.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severely corrosive environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Soil Fertility Levels

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This section gives information concerning the environmental factors and the physical and chemical properties of the soils that affect their potential for crop production, and also lists the methods to obtain the chemical analyses of the soils that are sampled.

Factors Affecting Crop Production

Crop composition and yield are a function of many environmental, soil, and plant factors. A list and brief description of the most important factors follows:

Environment factors
- Light—intensity and duration
- Temperature—air and soil
- Precipitation—distribution and amount
- Atmospheric carbon dioxide concentration

Plant factors (species and hybrid specific)
- Rate of nutrient and water uptake
- Rate of growth and related plant functions

Soil factors—physical properties
- Particle size distribution—texture
- Structure
- Surface area
- Bulk density
- Water retention and flow
- Aeration

Soil factors—chemical properties and soil fertility factors
- Quantity factor—Amount of an element in the soil that is readily available for uptake by plants. The quantity factor is often referred to as the available supply of an element. To determine the quantity factor, the available supply is removed from the soil using a suitable extractant and analyzed.
- Intensity factor—The intensity factor is related to the concentration of an element species in the soil water. It is a measure of the availability of an element for uptake by plant roots. Two soils that have identical quantities of an element's available supply but have different element intensity factors will differ in element availability to the plant.
- Relative intensity factor—Effect that the availability of one element has on the availability of another.
- Quantity/intensity relationship factor—These relationships include the reactions between the soil surface and soil water that control the distribution of element species between the available supply in the soil and the soil water. A special type of quantity/intensity relationship is the buffer capacity of the soil for a given element. The buffer capacity is the amount of a given element that must be added to or removed from the available supply to produce a given change in the intensity factor for that element.
- Replenishment factor—Rate of replenishment of the available supply and intensity factors by weathering reactions, fertilizer additions, and transport by mass flow and diffusion.

These factors are interdependent. The magnitude of the factors and the interactions among them controls crop response. The relative importance of each factor changes from soil to soil, crop to crop, and environment to environment. This list demonstrates that the soil factors are only part of the overall system.

The goal of soil testing is to provide information for a soil and crop management program that establishes and maintains optimum levels and balance of the essential elements in the soil for crop and animal nutrition. Soil testing also protects the environment against the build-up of potentially toxic levels of essential and nonessential elements. Current soil tests measure one soil factor, the available supply of one or more nutrients in the plow layer. Existing soil tests can generally diagnose the problem, and reliable recommendations can be made to correct the problem. Soil management systems are generally based on physical and chemical alteration of the plow layer. Characteristics of this layer can vary from one location to another depending upon management practices and soil use.

Subsurface horizons are less subject to change as a result of alteration of the plow layer, or else they change very slowly. Subsurface horizons reflect the soil's inherent ability to supply nutrients to plant roots and to provide a favorable environment for root growth. If followed, soil fertility recommendations based on current soil tests normally correct major fertility problems in the plow layer.

Crop and environmental factors, physical properties of the plow layer, and physical and chemical properties of the subsoil can limit crop production.

Information on the available nutrient supply in the subsoil allows evaluation of the native fertility levels of the soil. A number of soil profiles were sampled and analyzed for soil reaction; organic matter content; extractable phosphorus; exchangeable cations of calcium, magnesium, potassium, sodium, aluminum, and hydrogen; total acidity; and cation-exchange capacity. These results are summarized in table 18 and are discussed in the following sections with the emphasis on subsoil properties. More detailed information on these topics is also available *(1, 12, 13, 14, 20, 21, 25)*.

Chemical analyses methods

The methods used in obtaining the data are listed below. The codes in parentheses refer to published methods *(25)*.

pH—1:1 soil/water solution (8C1a)

Organic carbon—acid—dichromate oxidation (6A1a)

Extractable phosphorus—Bray 2 extractant (0.03 molar ammonium fluoride-0.1 molar hydrochloric acid)

Exchangeable bases—pH 7, 1 molar ammonium acetate-calcium (6N2), magnesium (602), potassium (6Q2), sodium (6P2)

Exchangeable aluminum and hydrogen—1 molar potassium chloride (6G2)

Total acidity—pH 8.2, barium chloride-triethanolamine (6H1a)

Effective cation-exchange capacity—sum of bases plus exchangeable aluminum and hydrogen (5A3b)

Sum cation-exchange capacity—sum of bases plus total acidity (5A3a)

Base saturation—sum of bases/sum cation-exchange capacity (5C3)

Exchangeable sodium percentage—Exchangeable sodium/sum cation-exchange capacity (5D2)

Aluminum saturation—exchangeable aluminum/effective cation-exchange capacity (5G1)

Nitrogen is generally the most limiting nutrient element in crop production because plants have a high demand for it. Nitrogen fertilizer recommendations are nearly always based on the nitrogen requirement of the crop rather than on nitrogen soil test levels, since no reliable nitrogen soil tests are available.

Generally, over 90 percent of the nitrogen in the surface layer is organic. Frequently, most of the nitrogen in the subsoil is fixed ammonium nitrogen. These forms of nitrogen are unavailable for plant uptake, but they can be converted to readily available ammonium and nitrate species.

The amount of readily available ammonium and nitrate nitrogen in soils, the amount of organic nitrogen, the rate of mineralization of organic nitrogen to available forms of nitrogen, and the rate of conversion of fixed ammonium nitrogen to available forms of nitrogen provide information on the fertility status of a soil with respect to nitrogen despite the lack of an adequate nitrogen soil test. Unfortunately, since the amounts and rates of transformation of the various forms of nitrogen in the soils of East Carroll Parish are unknown, no assessment of the nitrogen fertility status for these soils can be given.

Phosphorus exists in soils as discrete solid phase minerals, such as hydroxyapatite, variscite, and strengite; as occluded or coprecipitated phosphorus in other minerals; as retained phosphorus, such as carbonates, metal oxides, and layer silicates, on mineral surfaces; and in organic compounds. Most of the phosphorus is unavailable for plant uptake; thus, the availability of phosphorus in soils is a factor in controlling phosphorus uptake by plants.

The Bray 2 extractant tends to remove more phosphorus than the more commonly used Bray 1, Mehlich I, and Olsen extractants. These extractants provide an estimate of the plant-available phosphorus supply in soils. The Bray 2 extractable phosphorus content of most of the soils in East Carroll Parish is in the medium to high range, according to soil test interpretation guidelines. Only Dundee and Tensas soils have low extractable phosphorus levels in the surface layer and the subsoil. Most of the soils in East Carroll Parish have high levels of extractable phosphorus in the subsoil. A crop response to fertilizer phosphorus should not be expected where extractable phosphorus has a high level throughout the soil. A response to added phosphorus can be obtained where the level of extractable phosphorus is low in the surface layer and the crop is unable to obtain phosphorus from the lower layers. High levels of extractable phosphorus throughout the soil should not be interpreted as an indication that the soil never needs phosphorus fertilizer because continuous cropping can reduce the available supply of phosphorus in the soil. If the available supply of phosphorus is in the medium to high range, it should be maintained by replenishing phosphorus as needed. If the available supply is low, it should be gradually built up and then maintained.

Potassium exists in three major forms: exchangeable potassium associated with negatively-charged sites on clay mineral surfaces, non-exchangeable potassium trapped between clay mineral interlayers, and structural potassium within the crystal lattice of minerals. Exchangeable potassium in soils can be replaced by other cations and is generally readily available for plant uptake. To become available for plant uptake nonexchangeable potassium and structural potassium need to be converted to exchangeable potassium through weathering reactions.

The exchangeable potassium content of the soils is an estimate of the supply available to plants. The available supply of potassium in the soils of East Carroll Parish is very low, low, or medium, depending upon the soil texture according to soil test interpretation guidelines. Generally, the higher levels of exchangeable potassium are in clay loam and clay soils. Crops respond to fertilizer potassium if exchangeable potassium levels are very low to low. Very low to low levels should be gradually built up by adding fertilizer potassium where possible. Exchangeable potassium levels can be maintained by adding enough fertilizer potassium to make up for that removed by crops, the fixation of exchangeable potassium to non-exchangeable potassium, and leaching. Most soils in East Carroll Parish contain a sufficient amount of clay, and therefore, a sufficiently high cation-exchange capacity to maintain adequate quantities of available potassium for crop production.

Magnesium exists in soils as exchangeable magnesium associated with negatively-charged sites on clay mineral surfaces and as structural magnesium in mineral crystal lattices. Exchangeable magnesium is generally readily available for plant uptake while structural magnesium needs to be converted to exchangeable magnesium during mineral weathering reactions.

The exchangeable magnesium content of the soils of East Carroll Parish is in the medium to high range, depending upon soil test interpretation guidelines. Higher levels of exchangeable magnesium in clay soils are more than adequate for crop production. Magnesium deficiencies in plants are normally rare. Generally, fertilizer sources of magnesium are not needed for crop production on the soils of the parish.

Calcium exists in soils as exchangeable calcium associated with negatively-charged sites on clay mineral surfaces and as structural calcium in mineral crystal lattices. Generally, exchangeable calcium is available for plant uptake while structural calcium is not.

The exchangeable calcium levels in the soils of East Carroll Parish are more than adequate for crop production. Calcium deficiencies in plants are extremely rare.

Calcium is the most abundant exchangeable cation in the soils of East Carroll Parish. Generally, the exchangeable calcium content increases or remains about the same throughout the soil. However, the exchangeable calcium content of the underlying material in Goldman, Newellton, Tensas, and Tunica soils is significantly less than that in the surface layer and the subsoil. Higher levels of exchangeable calcium are generally in clay soils and in those horizons that have free carbonates.

The *organic matter content* of a soil greatly influences other soil properties. High organic matter content in mineral soils is highly desirable, while low organic matter content can lead to many problems. Increasing the organic matter content can greatly improve the soil structure, drainage, and other physical properties; and can increase the moisture-holding capacity, cation-exchange capacity, and nitrogen content of a soil.

Increasing the organic matter content of a soil is very difficult, since organic matter is continually subject to microbial degradation. In Louisiana, higher temperatures increase microbial activity, hence increasing the degradation rate. Native plant communities are in a dynamic state if the rate of organic matter breakdown is balanced by the input of fresh material. Disruption of this natural process can lead to a dramatic decline in the organic matter content of the soil. Unsound soil management practices lead to a further decrease in organic matter content.

Even if no degradation of organic matter occurs, 10 tons of organic matter input are needed to raise the organic matter content in the upper 6 inches of soil by just 1 percent. Since breakdown of organic matter occurs in the soil, producing a small increase in the organic matter content takes several decades of adding large amounts of organic matter to the soil. Conservation tillage and planting cover crops slowly increase the soil's organic matter content, or at least prevent further declines.

The organic matter content of the soils of East Carroll Parish is low and decreases sharply with depth as fresh inputs of organic matter are confined to the surface layer. These low levels reflect the high organic matter degradation, erosion, and cultural practices that cause difficulty in maintaining organic matter at higher levels.

Sodium exists in soils as exchangeable sodium associated with negatively-charged sites on clay mineral surfaces and as structural sodium in mineral crystal lattices. Sodium is readily soluble and generally not strongly retained by soils. Thus, well drained soils subject to a moderate or more intense degree of weathering from rainfall normally will not have significant amounts of sodium. Soils that are in low rainfall environments, soils that have restricted drainage in the subsoils, and Coastal Marsh soils have significant to substantial amounts of sodium. High levels of exchangeable sodium in soils are associated with undesirable physical properties, such as poor structure, slow permeability, and restricted drainage.

Although many of the soils in East Carroll Parish have more exchangeable sodium than exchangeable potassium, none of the soils have excessive levels of exchangeable sodium. Higher than normal levels of exchangeable sodium in the soils are probably associated with restricted drainage in the subsoil.

The *pH* of the soil solution in contact with the soil is a fundamental soil property that greatly affects other soil properties. The pH is an intensity factor rather than a quantity factor. A lower pH means that the soil is more acidic. The pH controls the availability of essential and non-essential elements for plant uptake by controlling mineral solubility, ion exchange, and adsorption-desorption reaction with the soil surface. The pH also affects microbial activity.

Aluminum exists in soils as exchangeable monomeric hydrolysis species, nonexchangeable polymeric hydrolysis species, aluminum oxides, and aluminosilicate minerals. *Exchangeable aluminum* in soils is determined by extraction with neutral salts, such as potassium chloride or barium chloride. The presence of exchangeable aluminum in soils is directly related to pH. If the pH is less than 5.5, soils have significant amounts of exchangeable aluminum that has a charge of plus 3, which is toxic to plants. Thus, significant reductions in plant growth of aluminum-sensitive crops can be expected in soils with a pH of less than 5.5 and appreciable amounts of exchangeable aluminum. The toxic effects of aluminum on plant growth can be alleviated by adding lime to the soil to convert exchangeable aluminum to nonexchangeable polymeric hydrolysis species. High levels of organic matter can also alleviate aluminum toxicity by complexing the aluminum.

Sources of *exchangeable hydrogen* in soils include hydrolysis of exchangeable and nonexchangeable aluminum and pH-dependent exchange sites on metal oxides, certain layer silicates, and organic matter. Exchangeable hydrogen, as determined by extraction with neutral salts such as potassium chloride, is normally not a major component of soil acidity because exchangeable hydrogen is not readily replaced by other cations unless accompanied by a neutralization reaction. Most of the neutral salt exchangeable hydrogen in soils apparently comes from aluminum hydrolysis.

Acidity from hydrolysis of neutral salt exchangeable aluminum plus neutral salt exchangeable hydrogen from pH-dependent exchange sites makes up the exchangeable acidity in soils. Exchangeable acidity is determined at the pH of the soil. Titratable acidity is the amount of acidity neutralized to a selected pH, usually pH 7.0 or 8.2. The titratable acidity constitutes the total "potential" acidity of a soil determined up to a given pH. All sources of soil acidity, including hydrolysis of monomeric and polymeric aluminum species and hydrogen from pH-dependent exchange sites on metal oxides, layer silicates, and organic matter, contribute to the total potential acidity. Total potential acidity in soils is determined by titration with base or incubation with lime; extraction with a buffered extractant followed by titration of the buffered extractant (pH 8.2, barium chloride-triethanolamine method); or equilibration with buffers followed by estimation of acidity from changes in buffer pH.

Only the B horizons of the Dundee and Tensas soils have a sufficiently low pH and organic matter content to have significant quantities of exchangeable aluminum. In some cases, if the pH in the surface layer is sufficiently low enough for exchangeable aluminum to be present, high levels of organic matter will effectively complex the aluminum and prevent its extraction by a neutral salt, such as potassium chloride. The levels of exchangeable aluminum in the subsoil of the Dundee and Tensas soils are not high enough nor do they comprise a sufficient enough fraction of the cation-exchange capacity to pose any problem for crop production.

The *cation-exchange capacity* represents the available supply of nutrient and non-nutrient cations in the soil. It is the amount of cations on permanent and pH-dependent negatively-charged sites on the soil surface. Permanent charge cation-exchange sites occur because a net negative charge develops on a mineral surface from substitution of ions within the crystal lattice. A negative charge developed from ionization of surface hydroxyl groups on minerals and organic matter produces pH-dependent cation-exchange sites.

The cation-exchange capacity is operationally defined by the method used to determine it. Several methods for determining cation-exchange capacity are available. They can be classified as one of two types: methods that use unbuffered salts to measure the cation-exchange capacity at the pH of the soil and methods that use buffered salts to measure the cation-exchange capacity at a specified pH. These methods produce different results since unbuffered salt methods include only a portion of the pH-dependent cation-exchange capacity in the overall cation-exchange capacity. Buffered salt methods include all of the pH-dependent cation-exchange capacity up to the pH of the buffer (usually pH 7.0 or 8.2) in the overall cation-exchange capacity. Errors in the saturation, washing, replacement steps of the methods also cause different results in determining cation-exchange capacity.

The effective cation-exchange capacity is the sum of exchangeable bases (calcium, magnesium, potassium, sodium) determined by extraction with pH 7.0, 1 molar ammonium acetate plus the sum of neutral salt exchangeable aluminum and hydrogen (exchangeable acidity). The sum cation-exchange capacity is the sum of exchangeable bases plus the total acidity determined by extraction with pH 8.2, barium chloride-triethanolamine. The effective cation-exchange capacity is generally less than the sum cation-exchange capacity. The effective cation-exchange capacity includes only that portion of the pH-dependent cation-exchange capacity that is determined by exchange of hydrogen with a neutral salt, whereas the sum cation-exchange capacity includes all of the pH-dependent cation-exchange capacity up to pH 8.2. If a soil has no pH-dependent exchange sites or the pH of the soil is about 8.2, the effective and sum cation-exchange capacity are approximately the same. If the cation-exchange capacity is larger, by whatever method used to determine it, the capacity to store nutrient cations is also larger.

Most of the cation-exchange capacity of the soils of East Carroll Parish is permanent charge cation-exchange capacity from the clays in the soils. The effective cation-exchange capacity of these soils is generally about 60 to 100 percent of the total cation-exchange capacity.

Physical and Chemical Analyses of Selected Soils

The results of physical analysis of three typical pedons in the survey area are given in table 19 and the results of chemical analysis in table 20. Table 21 gives data obtained by clay, silt, and very fine sand mineral analysis. The data are for soils sampled at carefully selected sites. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." Soil samples were analyzed by the Soil Characterization Laboratory, Agronomy Department, Louisiana Agricultural Experiment Station, Louisiana State University Agricultural Center.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods *(25)*.

Sand—(0.05-2.0 mm fraction) weight percentages of materials less than 2 mm (3A1).
Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all materials less than 2 mm (3A1).
Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of materials less than 2 mm (3A1).
Water retained—pressure extraction, percentage of oven-dry weight of less than 2 mm material; 1/3 or 1/10 (3/10) bar (4B1), 15 bars (4B2).
Water-retention difference—between 1/3 bar and 15 bars for less than 2 mm material (4C1).
Moist bulk density—of less than 2 mm material, saran-coated clods at field moist (4A3A), air-dry (4A1b), and ovendry (4A1h) conditions.
Organic matter—potassium dichromate-sulfuric acid wet digestion (6A1a).
Total nitrogen—Kjeldahl (6B1b).
Extractable cations—ammonium acetate pH 7.0, uncorrected; calcium (6N2e), magnesium (602d), sodium (6P2b), potassium (6Q2b).
Extractable acidity—barium chloride-triethanolamine (BaCl2-TEA) solution (6G2b).
Cation-exchange capacity—ammonium acetate, pH 7.0 (5A1b).
Base saturation—ammonium acetate, pH 7.0 (5C1).
Reaction (pH)—1:1 water dilution (8C1a).
Reaction (pH)—potassium chloride (8C1c).
Reaction (pH)—calcium chloride (8C1e).
Aluminum and hydrogen—potassium chloride extraction (6G2).
Iron oxides as Fe—sodium dithionite extract; iron (6C2b), aluminum (6G7a).
Available phosphorus—Bray 1 and 2 extraction reagents.
Mineral composition of clay-sized fraction—x-ray diffraction (7A2b) and differential thermal techniques (7A3).
Mineral composition of the silt and very fine sand fraction—optical microscopy techniques (7B1A).

Interpretation of Laboratory Data

Dr. B.J. Miller, Agronomy Department, Louisiana Agricultural Experiment Station, Louisiana State University Agricultural Center, prepared this section.

Tables 19, 20, and 21 summarize the results of physical, chemical, and mineralogical analyses on each horizon of representative pedons of Commerce, Dundee, and Sharkey soils in East Carroll Parish. The soils that were analyzed did not have particles of more than 2.0 millimeters effective diameter.

The data about these soils illustrate each soil's features and the differences among them. The differences can be mostly attributed to differences in the sand, silt, and clay content and differences in the time of soil development. The Commerce and Sharkey soils developed in alluvium that is associated with the present Mississippi River meander belt. They are considered less than 3,000 years old *(18)*. The Dundee soils developed in alluvium that is associated with an older meander belt and is believed to be between 3,000 and 5,000 years old. Data on the Commerce and Sharkey soils, which show pH values of 6.0 or more and percent base saturation by summation of cations of more than 75 throughout, illustrate the higher pH and higher percentage of base saturation of the soils developed in the youngest sediment. By comparison, percent base saturations that are determined by the same method are less than 75 and pH values are less than 5.8 throughout the upper 37 inches of the Dundee soils. The percent base saturation and pH increase with depth and have values comparable to those of the Sharkey and Commerce soils in deep parts of the Dundee soils. Calculations of the percent saturation with exchangeable calcium, magnesium, and potassium show higher saturations in the Commerce and Sharkey soils than in the Dundee soils. The presence of significant amounts of exchangeable aluminum and hydrogen also demonstrate the more highly weathered and acid nature of the Dundee soils. Measurable quantities of exchangeable aluminum and hydrogen were not present in the Commerce and Sharkey soils. Some subhorizons within the Dundee soils have exchangeable aluminum levels that are high enough to be potentially toxic to plants that are susceptible to aluminum toxicity.

The cation-exchange capacities of the soils depend almost entirely upon the amount and kind of clay present and also upon the organic matter content. Cation-exchange capacities and clay content of the surface layer decrease as follows: Sharkey, Commerce, and Dundee soils. Cation-exchange capacities in the subsurface follow the same order, except that Commerce and Dundee soils have similar cation-exchange capacities that vary somewhat with clay content.

Table 21 shows the results of mineralogical analyses of the soils. The clay-size fraction of all the soils are approximately 70 percent smectite. Micaceous clays and kaolinite comprise about 15 and 10 percent of the clay-size fraction respectively. The rest is small amounts of quartz, feldspars, and interlayered and interstratified phyllosilicates. Quartz and small amounts of other minerals resistant to weathering comprise most of sand- and silt-size fractions from all the soils. Feldspars are the predominant weatherable minerals present, and both plagioclase and alkali group feldspars were identified. The other weatherable minerals are mostly pyroxines, amphiboles, and small amounts of mica.

Table 19 shows moisture retention data for the Commerce, Dundee, and Sharkey soils. Moisture retention is typically related to soil texture, structure, and organic matter content. Total water storage capacity measured at 1/3 bar in the upper 60 inches of soil decreases as follows: Sharkey, Commerce, and Dundee soils. Available water storage capacity in this same zone taken as 1/3 bar water content minus 15 bar water content decreases as follows: Sharkey, Commerce, and Dundee soils. The available water capacity on Sharkey clay is somewhat higher than normal for Sharkey soils. Some Sharkey soils may have available water storage capacities of about half that of the soil shown on table 19.

The bulk densities of all the soils are appreciably higher immediately below the plow layer than they are in the plow layer itself. At even greater depths, the bulk density values are again generally lower. These general relationships are consistent for field moist, air-dry, and ovendry bulk densities. The higher bulk densities below the plow layer are attributed to compaction caused by machinery and equipment use during tillage operations. Shrinking and swelling of the large quantities of expanding-lattice clays in soils, such as Sharkey soils, help offset the effects of compaction caused by farming operations. The high shrinkage capacity of these clays also can explain the high air-dry and ovendry density values on individual clods or aggregates of soils, such as Sharkey soils, compared to Commerce and Dundee soils that have much lower total clay contents.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(24)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 22 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Fluvaquents (*Fluv*, meaning flood plain, plus *aquent*, the suborder of the Entisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Aeric* identifies the subgroup that has high chroma mottles. An example is Aeric Fluvaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, nonacid, thermic Aeric Fluvaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum within a series can have some variation. An example is the Commerce series, which is a member of the fine-silty, mixed, nonacid, thermic Aeric Fluvaquents.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (23)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (24)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Bruin Series

The Bruin series consists of moderately well drained, moderately permeable soils on natural levees of the Mississippi River and its distributaries. These soils formed in loamy alluvium recently deposited by the Mississippi River. Slopes range from 0 to 3 percent.

Soils of the Bruin series are coarse-silty, mixed, thermic Fluvaquentic Eutrochrepts.

Bruin soils commonly are near the Commerce, Crevasse, Newellton, Sharkey, and Tunica soils. The

Commerce soils are in slightly lower positions than the Bruin soils. They have a fine-silty control section. The Crevasse soils are in lower positions and are sandier throughout. The Newellton, Sharkey, and Tunica soils are in lower positions and have a clayey subsoil.

Typical pedon of Bruin silt loam in an area of Bruin-Commerce silt loams, gently undulating; 3 miles northwest of Lake Providence, 3,700 feet south of Highway 598, 575 feet east of the paved highway, and 95 feet south of turnrow in Spanish Land Grant 47, T. 22 N., R. 12 E.

Ap1—0 to 4 inches; brown (10YR 5/3) silt loam; weak medium subangular blocky structure; very friable; common medium and fine roots; slightly acid; abrupt smooth boundary.

Ap2—4 to 8 inches; dark brown (10YR 4/3) silt loam; moderate medium subangular blocky structure parting to platy; friable; few medium and fine roots; medium acid; abrupt smooth boundary.

Bw1—8 to 14 inches; dark brown (10YR 4/3) silt loam; few medium faint dark yellowish brown (10YR 4/4) mottles and few fine faint grayish brown mottles; moderate medium subangular blocky structure; friable; few black stains, few very fine pores; neutral; clear smooth boundary.

Bw2—14 to 24 inches; dark brown (10YR 4/3) silt loam; common medium faint grayish brown (10YR 5/2) mottles and few medium faint dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; very friable; few black stains; mildly alkaline; gradual smooth boundary.

C1—24 to 31 inches; stratified brown (10YR 5/3) very fine sandy loam and pale brown (10YR 6/3) loamy fine sand; few fine distinct dark brown (10YR 4/3) mottles and few fine faint grayish brown mottles; massive; very friable; mildly alkaline; clear smooth boundary.

C2—31 to 42 inches; dark brown (10YR 4/3) very fine sandy loam; few fine faint grayish brown mottles; massive; common bedding planes; very friable; mildly alkaline; clear smooth boundary.

C3—42 to 65 inches; brown (10YR 5/3) and pale brown (10YR 6/3) loamy fine sand; massive; very friable; mildly alkaline.

The solum is 20 to 40 inches thick.

The Ap horizon is 4 to 10 inches thick and has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Reaction ranges from medium acid to neutral.

The Bw horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. Mottles in shades of gray and brown are few or common. Texture is silt loam, very fine sandy loam, or loam. Reaction ranges from slightly acid to mildly alkaline.

Some pedons have a BC horizon. It has colors and textures similar to those of the Bw horizon. Reaction ranges from slightly acid to moderately alkaline.

The C horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. Mottles in shades of gray and brown are few or common. Texture is loamy fine sand, fine sandy loam, very fine sandy loam, loam, silt loam, or silty clay loam. Reaction ranges from slightly acid to moderately alkaline.

Commerce Series

The Commerce series consists of somewhat poorly drained, moderately slowly permeable soils on natural levees of the Mississippi River and its distributaries. These soils formed in loamy alluvium recently deposited by the Mississippi River. Slopes range from 0 to 3 percent.

Soils of the Commerce series are fine-silty, mixed, nonacid, thermic Aeric Fluvaquents.

Commerce soils commonly are near Bruin, Crevasse, Newellton, Sharkey, and Tunica soils. The Bruin soils are in slightly higher positions than the Commerce soils. They have a coarse-silty control section. The Crevasse soils are in lower positions and are sandier throughout. The Newellton, Sharkey, and Tunica soils are in lower positions and have a clayey subsoil.

Typical pedon of Commerce silt loam; 7 miles northwest of Lake Providence, 1,585 feet east of U.S. Highway 65, 25 feet south of a field road, NE1/4NE1/4, Spanish Land Grant 2, T. 22 N., R. 12 E.

Ap—0 to 6 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

Bw—6 to 24 inches; dark grayish brown (10YR 4/2) silty clay loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; neutral; clear smooth boundary.

BC—24 to 33 inches; grayish brown (10YR 5/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine roots; mildly alkaline; clear smooth boundary.

C1—33 to 43 inches; grayish brown (10YR 5/2) silt loam; common medium distinct light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable; few fine roots; mildly alkaline; clear smooth boundary.

C2—43 to 56 inches; grayish brown (10YR 5/2) silt loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; mildly alkaline; clear smooth boundary.

C3—56 to 65 inches; grayish brown (10YR 5/2) silt loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; very friable; mildly alkaline.

The solum is 20 to 40 inches thick.

The Ap horizon is 4 to 10 inches thick and has hue of 10YR, value of 4 or 5, and chroma of 1 to 3. Texture is silt loam or silty clay loam. Reaction ranges from medium acid to mildly alkaline.

The Bw and BC horizons have hue of 10YR, value of 4 or 5, and chroma of 1 or 2. Mottles in shades of brown and gray range from few to many. Texture is silt loam, loam, or silty clay loam. Reaction ranges from slightly acid to moderately alkaline.

The C horizon has colors similar to those of the Bw horizon. Mottles in shades of brown are common or many. Texture is very fine sandy loam, loam, silt loam, or silty clay loam. Reaction ranges from neutral to moderately alkaline. Thin layers of silty clay are in the C horizon in some pedons.

Crevasse Series

The Crevasse series consists of excessively drained, rapidly permeable soils on the splays of flood plains and on sandbars. These soils formed in sandy alluvium recently deposited by the Mississippi River. Slopes range from 0 to 3 percent.

Soils of the Crevasse series are mixed, thermic Typic Udipsamments.

Crevasse soils commonly are near the Bruin, Commerce, Newellton, Sharkey, and Tunica soils. The Bruin soils are in high positions on natural levees. They have a coarse-silty control section. The Commerce soils are in slightly higher positions than the Crevasse soils and have a fine-silty control section. The Newellton, Sharkey, and Tunica soils are in lower positions and have a clayey subsoil.

Typical pedon of Crevasse loamy fine sand; 14 miles south of Lake Providence, 150 feet west of U.S. Highway 65, 225 feet north of a field entrance, NE1/4NE1/4 sec. 25, T. 9 N., R. 12 E.

Ap—0 to 5 inches; dark brown (10YR 4/3) loamy fine sand; single grained; loose; common fine and very fine roots; very strongly acid; abrupt smooth boundary.

C1—5 to 20 inches; brown (10YR 5/3) loamy fine sand; single grained; loose; few fine roots; slightly acid; clear smooth boundary.

C2—20 to 35 inches; dark brown (10YR 4/3) fine sand; single grained; loose; mildly alkaline; clear smooth boundary.

C3—35 to 48 inches; brown (10YR 5/3) fine sand; single grained; loose; mildly alkaline; clear smooth boundary.

C4—48 to 60 inches; dark brown (10YR 4/3) fine sand; single grained; loose; mildly alkaline.

The Ap horizon is 4 to 10 inches thick and has hue of 10YR, value of 4, and chroma of 2 or 3. Texture is fine sand or loamy fine sand. Reaction ranges from very strongly acid to neutral.

The C horizon has hue of 10YR, value of 4 to 6, and chroma of 2 or 3. Texture is loamy fine sand, loamy sand, fine sand, or sand. Reaction ranges from medium acid to mildly alkaline.

The Crevasse soils in map unit Cs in East Carroll Parish are taxadjuncts to the Crevasse series because they have a surface layer that is very strongly acid or strongly acid. The Crevasse series has a surface layer that typically is medium acid to moderately alkaline. This difference, however, does not affect the use and management of the soils.

Dundee Series

The Dundee series consists of somewhat poorly drained, moderately slowly permeable soils on natural levees along Joes Bayou and its former distributaries. These soils formed in old loamy alluvium deposited by former channels and distributaries of the Mississippi River. Slopes range from 0 to 3 percent.

Soils of the Dundee series are fine-silty, mixed, thermic Aeric Ochraqualfs.

Dundee soils commonly are near the Sharkey, Tensas, and Tunica soils. The Sharkey soils are in lower positions than the Dundee soils and are clayey throughout. The Tensas and Tunica soils are in lower positions. The upper part of the subsoil of these soils is clayey.

Typical pedon of Dundee silt loam; 3 miles southeast of Monticello, 650 feet east of a gravel road, 85 feet south of a paved road, NE1/4NE1/4 sec. 8, T. 18 N., R. 11 E.

Ap—0 to 5 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; few fine roots; very strongly acid; abrupt smooth boundary.

Btg1—5 to 12 inches; grayish brown (10YR 5/2) silt loam; common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable; few fine roots; few thin patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

Btg2—12 to 23 inches; dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; common thin continuous clay films on faces of peds; few very fine pores; very strongly acid; clear smooth boundary.

BCg1—23 to 29 inches; grayish brown (10YR 5/2) loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; few thin patchy clay films on faces of peds; many very fine pores; very strongly acid; clear smooth boundary.

BCg2—29 to 37 inches; grayish brown (10YR 5/2) silt loam; few fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; common fine pores; very strongly acid; clear smooth boundary.

2Cg1—37 to 47 inches; light brownish gray (10YR 6/2) silt loam; few fine distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; few fine roots; strongly acid; clear smooth boundary.

2Cg2—47 to 55 inches; gray (10YR 5/1) silty clay loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; massive; firm; few fine roots; common black stains on faces of peds; neutral; clear smooth boundary.

2Cg3—55 to 60 inches; grayish brown (10YR 5/2) silt loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; massive; firm; mildly alkaline.

The solum is 25 to 60 inches thick.

The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. This horizon is 4 to 8 inches thick. If the value is 3, the horizon is less than 6 inches thick. Texture is silt loam or silty clay loam. Reaction ranges from very strongly acid to medium acid except where lime has been added.

The Btg horizon has hue of 10YR, value of 4 or 5, and chroma of 2. Mottles in shades of gray and brown are few or common. Texture is silty clay loam, silt loam, or clay loam. Reaction ranges from very strongly acid to medium acid.

The BCg horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. Texture is silt loam, loam, clay loam, or silty clay loam. Reaction ranges from very strongly acid to medium acid.

The 2Cg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Mottles in shades of brown range from few to many. Texture is silt loam, silty clay loam, or very fine sandy loam. Reaction ranges from strongly acid to mildly alkaline.

Goldman Series

The Goldman series consists of moderately well drained, moderately permeable soils on natural levees along older abandoned channels and distributaries of the Mississippi River. These soils formed in intermediate aged alluvium deposited by the Mississippi River. Slopes range from 1 to 5 percent.

Soils of the Goldman series are coarse-silty, mixed, thermic Aquic Hapludalfs.

Goldman soils commonly are near the Commerce, Newellton, Sharkey, and Tunica soils. The Commerce soils are in positions similar to those of the Goldman soils and have a fine-silty control section. The Sharkey soils are in lower positions and are clayey throughout. The Newellton and Tunica soils are in lower positions and the upper part of the subsoil is clayey.

Typical pedon of Goldman silt loam, 1 to 5 percent slopes; 2.5 miles south-southwest of Lake Providence, 7,075 feet west of U.S. Highway 65, 50 feet south of a ditch, NE1/4SE1/4 sec. of Spanish Land Grant 63, T. 21 N., R. 12 E.

Ap1—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; strongly acid; abrupt smooth boundary.

Ap2—5 to 8 inches; dark brown (10YR 4/3) silt loam; common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable; common fine and medium roots; medium acid; abrupt smooth boundary.

Bt1—8 to 17 inches; dark yellowish brown (10YR 4/4) silt loam; common medium faint brown (10YR 5/3) mottles; moderate medium subangular blocky structure; friable; few fine and medium roots; few fine black stains; medium acid; clear wavy boundary.

Bt2—17 to 22 inches; dark yellowish brown (10YR 4/4) silt loam; common medium distinct grayish brown (10YR 5/2) mottles and few fine faint yellowish brown mottles; moderate medium subangular blocky structure; friable; few fine roots; medium acid; clear smooth boundary.

BC—22 to 32 inches; dark brown (10YR 4/3) very fine sandy loam; common medium distinct grayish brown (10YR 5/2) mottles and few medium faint brown (10YR 5/3) mottles; weak medium subangular blocky structure; very friable; few fine roots; medium acid; gradual wavy boundary.

C1—32 to 52 inches; dark brown (10YR 4/3) loamy fine sand; many medium distinct brown (10YR 5/3) and grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; very friable; few fine roots; medium acid; gradual wavy boundary.

C2—52 to 60 inches; grayish brown (10YR 5/2) very fine sandy loam; many medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very friable; few medium roots; slightly acid.

The solum is 20 to 60 inches thick.

The Ap horizon is 4 to 8 inches thick and has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Texture is silt loam or silty clay loam. Reaction is strongly acid or medium acid except where lime has been added.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. Mottles in shades of gray or brown range from few to many. Texture is loam, silt loam, and very fine sandy loam. Reaction ranges from strongly acid to slightly acid.

The BC and C horizons have hue of 10YR, value of 4 or 5, and chroma of 2 to 4. Mottles in shades of gray or brown range from few to many. Texture is loamy fine sand, loamy very fine sand, very fine sandy loam, silt loam, and fine sandy loam. Reaction ranges from strongly acid to slightly acid.

Newellton Series

The Newellton series consists of somewhat poorly drained, slowly permeable soils in low positions on natural levees of the present and former channels of the Mississippi River and its distributaries. The soils formed in recently deposited clayey alluvium underlain by alluvium of intermediate age (fig. 10). Slopes range from 0 to 5 percent.

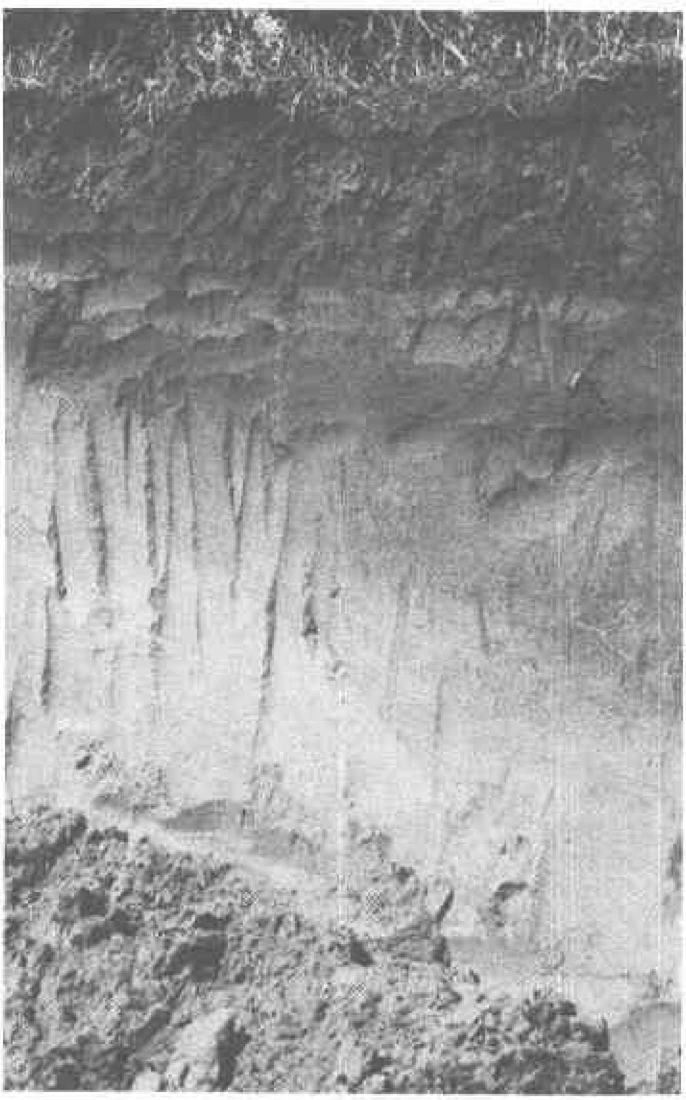

Figure 10.—Newellton silty clay has dark color silty clays typically 12 to 20 inches thick underlain by loamy material.

Soils of the Newellton series are clayey over loamy, montmorillonitic, nonacid, thermic Aeric Fluvaquents.

Newellton soils commonly are near the Bruin, Commerce, Sharkey, and Tunica soils. The Bruin and Commerce soils are in higher positions than those of the Newellton soils and are loamy throughout. The Sharkey and Tunica soils are in lower positions. These soils have a clayey subsoil that is thicker than that of Newellton soils.

Typical pedon of Newellton silty clay; 5 miles southwest of Lake Providence, 1 mile east of Highway 134, 76 feet south of a small drain, 160 feet east of a large drain, SW1/4SW1/4 sec. 61, T. 21 N., R. 12 E.

Ap1—0 to 3 inches; dark grayish brown (10YR 4/2) silty clay; moderate medium subangular blocky structure; firm; many fine roots; medium acid; abrupt smooth boundary.

Ap2—3 to 7 inches; dark grayish brown (10YR 4/2) silty clay; few fine distinct strong brown (7.5YR 4/6) mottles; moderate medium subangular blocky structure; firm; many fine roots; medium acid; abrupt smooth boundary.

Bw—7 to 17 inches; grayish brown (10YR 5/2) silty clay; many medium distinct yellowish brown (10YR 5/6) mottles and common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; dark stains on faces of some peds; few fine black concretions; medium acid; gradual wavy boundary.

2C1—17 to 27 inches; grayish brown (10YR 5/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6) mottles and few fine distinct dark yellowish brown (10YR 4/6) mottles; moderate medium subangular blocky structure; friable; few very fine roots; few fine black concretions; medium acid; clear smooth boundary.

2C2—27 to 37 inches; grayish brown (10YR 5/2) silt loam; thin bands of silty clay loam; common fine distinct yellowish brown (10YR5/4) and dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; few fine black concretions; medium acid; gradual wavy boundary.

2C3—37 to 49 inches; grayish brown (10YR 5/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few very fine roots; few fine pores; few fine black stains; strongly acid; clear smooth boundary.

2C4—49 to 60 inches; grayish brown (10YR 5/2) silt loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; few small black stains; friable; medium acid.

The solum is 12 to 20 inches thick.

The Ap horizon is 4 to 8 inches thick and has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. Texture is clay or silty clay. Reaction ranges from medium acid to neutral.

The Bw horizon has hue of 10YR, value of 4 to 5, and chroma of 1 or 2. Mottles in shades of gray and brown range from few to many. Texture is clay or silty clay, and reaction ranges from medium acid to mildly alkaline.

The 2C horizon has hue of 10YR, value of 4 to 6, and chroma of 1 to 3. Mottles in shades of yellow and brown range from few to many. Texture is very fine sandy loam, silt loam, loam, or silty clay loam. Reaction ranges from strongly acid to moderately alkaline.

Sharkey Series

The Sharkey series consists of poorly drained, very slowly permeable soils in the low positions on natural levees and in backswamp areas on the flood plain of the Mississippi River. These soils formed in clayey alluvium deposited by the Mississippi River. Slopes range from 0 to 3 percent.

Soils of the Sharkey series are very fine, montmorillonitic, nonacid, thermic Vertic Haplaquepts.

Sharkey soils commonly are near the Bruin, Commerce, Crevasse, Dundee, Newellton, Tensas, and Tunica soils. The Bruin, Commerce, and Dundee soils are in higher positions on natural levees than the Sharkey soils and are loamy throughout. The Crevasse, Newellton, Tensas, and Tunica soils are in slightly higher positions. Crevasse soils are sandy throughout. In the Newellton, Tensas, and Tunica soils, the lower part of the subsoil is loamy.

Typical pedon of Sharkey clay; 3.4 miles west of Alsatia, 2,100 feet west of a highway intersection, 120 feet south of Highway 580, NW1/4NE1/4 sec. 28, T. 19 N., R. 12 E.

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

Ap2—4 to 7 inches; dark gray (10YR 4/1) clay; common medium distinct dark yellowish brown (10YR 4/4) mottles; massive; very firm; few fine roots; slightly acid; abrupt smooth boundary.

Bg1—7 to 16 inches; dark gray (10YR 4/1) clay; common medium distinct dark yellowish brown (10YR 4/4) mottles and few fine distinct dark brown (10YR 4/3) mottles; weak coarse subangular blocky structure; firm; few fine roots; slightly acid; clear smooth boundary.

Bg2—16 to 25 inches; dark gray (10YR 4/1) clay; common medium distinct reddish brown (5YR 4/4) mottles and few fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; few slickensides at 45 degree angle in lower part; slightly acid; gradual smooth boundary.

BCg—25 to 40 inches; dark gray (10YR 4/1) clay; many medium distinct brown (7.5YR 4/4) mottles and few fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; firm; slickensides at about a 45 degree angle; few fine roots; neutral; clear smooth boundary.

Cg—40 to 68 inches; dark gray (10YR 4/1) clay; common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; common barite crystals; neutral.

The solum is 36 to 60 inches thick. Clay content of the Bg horizon averages 60 to 90 percent.

The Ap horizon is 4 to 10 inches thick and has hue of 10YR, value 3 or 4, and chroma of 1 or 2. Texture is clay, silty clay loam, or loamy fine sand. Reaction ranges from strongly acid to neutral. Some pedons have a sandy Ap horizon that has hue of 10YR, value of 4 or 5, and chroma of 3.

The Bg and BCg horizons have hue of 10YR or 5Y, value of 4 to 6, and chroma of 1, or they are neutral. Mottles in shades of yellow, brown, and red range from few to many. Texture is clay, silty clay, or silty clay loam. Reaction ranges from medium acid to mildly alkaline. Some pedons have thin strata of loamy textures in the lower part of the BCg horizon.

The Cg horizon has colors and textures similar to those of the Bg and BCg horizons. Mottles in shades of yellow and brown are few to common. Reaction ranges from neutral to moderately alkaline. Some pedons have strata of coarser textures in this horizon below a depth of about 40 inches.

Tensas Series

The Tensas series consists of somewhat poorly drained, very slowly permeable soils in low positions on natural levees of former channels and distributaries of the Mississippi River. These soils formed in old clayey alluvium underlain by loamy alluvium deposited by former channels and distributaries of the Mississippi River. Slopes range from 0 to 3 percent.

Soils of the Tensas series are fine, montmorillonitic, thermic Vertic Ochraqualfs.

Tensas soils commonly are near the Dundee, Sharkey, and Tunica soils. The Dundee soils are in higher positions than the Tensas soils and have a fine-silty control section. The Sharkey soils are in lower positions and are clayey throughout. The Tunica soils formed in younger sediment. They have a subsoil that is less well developed than that in the Tensas soils.

Typical pedon of Tensas silty clay, in an area of Tensas-Sharkey complex, gently undulating; 4 miles northeast of Monticello, 105 feet east of a field road, 468 feet north of a field road, SW1/4SW1/4 sec. 15, T. 19 N., R. 11 E.

Ap1—0 to 3 inches; dark grayish brown (10YR 4/2) silty clay; moderate medium subangular blocky structure; firm; common fine and very fine roots; strongly acid; abrupt smooth boundary.

Ap2—3 to 6 inches; grayish brown (10YR 5/2) clay; common medium prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; very strongly acid; abrupt smooth boundary.

Bt1—6 to 11 inches; grayish brown (10YR 5/2) clay; common medium prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; very strongly acid; clear smooth boundary.

Bt2—11 to 18 inches; grayish brown (10YR 5/2) silty clay; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few very fine and medium roots; very strongly acid; gradual smooth boundary.

Bt3—18 to 27 inches; grayish brown (10YR 5/2) silty clay; common medium distinct dark brown (10YR 4/3) mottles and few medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; few very fine and medium roots; few black stains; very strongly acid; clear smooth boundary.

2BC1—27 to 34 inches; brown (10YR 5/3) silty clay loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common very fine pores; few fine black concretions; common black stains on faces of peds; strongly acid; gradual smooth boundary.

2BC2—34 to 45 inches; brown (10YR 5/3) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few very fine roots; few very fine pores; black stains along root channels; slightly acid; gradual smooth boundary.

2C1—45 to 54 inches; brown (10YR 5/3) silt loam; common medium faint dark yellowish brown (10YR 4/4) and yellowish brown (10YR 4/3) mottles; weak medium subangular blocky structure; friable; few fine pores; neutral; clear smooth boundary.

2C2—54 to 65 inches; brown (10YR 5/3) very fine sandy loam; many medium faint dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; neutral.

The solum is 30 to 50 inches thick. Depth to the loamy 2BC horizon ranges from 20 to 36 inches.

The Ap horizon is 3 to 8 inches thick and has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. Reaction ranges from very strongly acid to medium acid except where lime has been added.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. Mottles in shades of brown and yellow are few or common. Texture is silty clay or clay. Reaction ranges from very strongly acid to medium acid.

The 2BC horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Mottles in shades of brown and yellow are few or common. Texture ranges from silty clay loam to very fine sandy loam. Reaction ranges from strongly acid to slightly acid.

The 2C horizon has colors and textures similar to those of the 2BC horizon. Reaction ranges from strongly acid to neutral.

Tunica Series

The Tunica series consists of poorly drained, very slowly permeable soils in low positions on high natural levees and on all parts of low natural levees along the Mississippi River and its distributaries. These soils formed in clayey alluvium underlain by loamy alluvium recently deposited by the Mississippi River. Slopes range from 0 to 3 percent.

Soils of the Tunica series are clayey over loamy, montmorillonitic, nonacid, thermic Vertic Haplaquepts.

Tunica soils commonly are near the Bruin, Commerce, Crevasse, Newellton, Sharkey, and Tensas soils. The Bruin and Commerce soils are in higher positions than those of Tunica soils. Bruin soils have a coarse-silty control section. Commerce soils have a fine-silty control section. The Crevasse soils are in positions similar to those of the Tunica soils and are sandy throughout. The Newellton soils are in slightly higher positions and are underlain by loamy material at a shallower depth. The Sharkey soils are in low positions on natural levees and in backswamp areas and are clayey throughout. The Tensas soils are in positions similar to those of the Tunica soils and have a subsoil that is better developed and typically more acid.

Typical pedon of Tunica clay; 3 miles north of Lake Providence, 2,800 feet east of Highway 596, 144 feet north of a ditch, SE1/4NW1/4 of Spanish Land Grant 72, T. 22 N., R. 13 E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) clay; weak medium subangular blocky structure; firm, plastic; few fine roots; medium acid; clear smooth boundary.

Bg1—6 to 18 inches; dark gray (10YR 4/1) clay; many medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm, plastic; few fine roots; slightly acid; gradual smooth boundary.

Bg2—18 to 32 inches; gray (10YR 5/1) clay; few coarse prominent reddish brown (5YR 4/3) mottles and many fine distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; firm; few fine roots; neutral; clear smooth boundary.

2Cg1—32 to 49 inches; grayish brown (10YR 5/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few small pockets of silty clay loam; neutral; clear smooth boundary.

2Cg2—49 to 60 inches; grayish brown (2.5Y 5/2) very fine sandy loam; few fine faint dark grayish brown mottles; massive; very friable; mildly alkaline; clear smooth boundary.

The solum is 20 to 36 inches thick.

The Ap horizon is 3 to 10 inches thick and it has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. Reaction ranges from medium acid to mildly alkaline.

The Bg horizon has hue of 10YR, value of 4 to 6, and chroma of 1. Mottles in shades of brown range from few to many. Texture is clay or silty clay. Reaction ranges from medium acid to mildly alkaline.

The 2C horizon has hue of 10YR and 2.5Y, value of 4 to 6, and chroma of 1 or 2. Mottles in shades of brown, yellow, and gray range from few to many. Texture is loamy fine sand, silty clay loam, silt loam, and very fine sandy loam. Reaction ranges from medium acid to mildly alkaline.

Formation of the Soils

Dr. Bobby J. Miller, Department of Agronomy, Agriculture Experiment Station, Louisiana State University, prepared this section.

In this section the processes and factors of soil formation are described as they relate to the soils in the parish.

Processes of soil formation

The processes of soil formation influence the kind and degree of development of soil horizons. The factors of soil formation—climate, living organisms, relief, parent material, and time—determine the rate and effectiveness of the different processes.

Soil-forming processes result in additions of organic, mineral, and gaseous material to the soil *(19)*; losses of the material from the soil; translocation of material from one point to another within the soil; and physical and chemical transformation of mineral and organic material within the soil.

Many processes occur simultaneously. Examples in the survey area include accumulating organic matter, developing soil structure, and leaching of bases from the surface horizon. The contribution of a particular process can change with time. For example, levee protection has reduced flooding and has resulted in a reduced rate of accumulation of sediment on many soils in the parish. Some processes that have contributed to the formation of soils in East Carroll Parish are discussed in the following paragraphs.

Organic matter has accumulated, has partly decomposed, and has been incorporated into all the soils. Organic matter production is greatest in and above the surface layer. The result is a soil that has a surface layer that is darker than the deeper layers. Exceptions are soils that have a dark surface layer of an older soil that was buried by more recent alluvium.

Living organisms decompose, incorporate, and mix organic residue into the soil. Many of the more stable products of decomposition remain as finely divided material that increase granulation and are a source of plant nutrients in the soil. In the Crevasse soils, for example, the A horizon has been darkened by the accumulation of organic matter.

Intermittent additions of alluvium on the surface helped to form some of the soils. Added sediment provides new parent material. This accumulation of new material has been faster than the processes of soil formation could appreciably alter the soils. Strata that are evident in such soils as the Commerce soils are the result of such accumulation. Sediment that has widely contrasting texture is evident in the Tunica and Newellton soils.

Processes that result in development of soil structure have occurred in most of the soils. Plant roots and other organisms result in rearrangement of soil material. Decomposition products of organic residue and secretions of organisms serve as cementing agents that help to stabilize structural aggregates. Alternate wetting and drying as well as shrinking and swelling contribute to the development of structural aggregates and are particularly effective in soils that have appreciable amounts of clay, such as the Sharkey soils.

The translocation of elements from upper to lower horizons is an important process in soil formation. Water moving through the soil leaches soluble bases and any free carbonates that were initially in the upper part of the soil. This process is indicated by soil reaction that is more alkaline in the lower part of the soil than in the surface layer and by the absence of free carbonates in the surface layer of soils that are calcareous in the lower part of the profile. The effects of leaching are most pronounced in the Dundee, Goldman, and Tensas soils. These soils, which formed in the oldest sediment in the parish, are acid throughout or at least in the upper horizons. The other soils in the parish are not so leached and typically are slightly acid to mildly alkaline in the upper part of the soil.

The poorly drained soils in the parish have horizons in which iron and, perhaps, manganese compounds have been reduced and segregated. Reducing conditions prevail in the poorly aerated parts of the soil. Consequently, the soluble reduced forms of iron and manganese are predominant over the much less soluble oxidized forms. Reduced forms of these elements result in the gray colors that are characteristic of the Bg and Cg horizons in such soils as the Sharkey and Tunica soils. In the more soluble reduced forms, appreciable amounts of iron and manganese can be removed from the soils or translocated by water from one part to another within the soil. Brown mottles in the predominantly gray horizons indicate segregation and concentration of oxidized iron compounds resulting from alternating oxidizing and reducing conditions in the soils.

The formation, translocation, and accumulation of clay have also been processes that have helped to develop such soils in the parish as the Dundee and Tensas soils. Silicon and aluminum, released as a result of weathering of such minerals as pyroxenes, amphiboles, and feldspars, can recombine with the components of water to form secondary clay minerals, such as kaolinite. Layer silicate minerals, such as biotite and montmorillonite, can also weather to form other clay minerals, such as vermiculite or kaolinite. The secondary accumulation of clay results largely from translocation of clays from upper to lower parts of the soil. As water moves downward, it carries small amounts of clay in suspension. This clay is redeposited, and it accumulates at the deepest position of water penetration or in horizons where the clay becomes flocculated or is filtered out by fine pores in the soil. Over long periods, such processes can result in distinct horizons of clay accumulation.

Secondary accumulations of calcium carbonate can be present in the lower part of the subsoil in some soils. Carbonates dissolved from overlying parts of the soil can also be translocated to these depths by water and redeposited. Other sources and processes can contribute in varying degrees to carbonate accumulation; for example, segregation of material within the horizons, upward translocation of material in solution from deeper parts of the soil during fluctuations of water table levels, and contributions of material from such readily weatherable minerals as plagioclase. Some lower horizons of the Commerce soils have some calcium carbonate.

Factors of Soil Formation

Soil is a natural, three-dimensional body that formed on the earth's surface. It has properties resulting from the integrated effect of climate and living matter acting on parent material, as conditioned by relief over time.

The interaction of five main factors influences the processes of soil formation and results in differences among the soils. These factors are the physical and chemical composition of the parent material; the climate during the formation of soil from the parent material; the kinds of plants and other organisms living in and on the soil; the relief of the land and its effect on runoff and soil moisture conditions; and the length of time for the soil to form *(10, 11)*.

The effect of any one factor can differ from place to place, but the interaction of all the factors determines the kind of soil that forms. Many of the differences in soils cannot be attributed to differences in only one factor. For example, organic matter content of soils in East Carroll Parish is influenced by several factors, including relief, parent material, and living organisms. Such interactions do not preclude recognition of how a factor can influence a specific soil property. In the following paragraphs the factors of soil formation are described as they relate to the soils in the parish.

Parent Material

The parent material for mineral soils is the unconsolidated mass in which the soils form. The soils in East Carroll Parish are mineral soils that formed mainly in unconsolidated Mississippi River sediment of the natural levees and associated backswamps. Arkansas River sediment has had a minor influence on the development of the soils.

Sediment carried by the Mississippi River is of varied origin and could have originated anywhere in a drainage area extending from western Montana to eastern Pennsylvania. Sorting of the sediment during deposition, together with a diverse mineralogy, results in marked differences in the parent material of soils that formed in alluvium. Mineralogical studies *(9)* of the alluvium indicate that smectite minerals predominate in the clay fraction, and that the aluminum also has secondary amounts of micaceous clays, and associated amounts of kaolinite, chlorite-vermiculite intergrade, and quartz minerals. A large amount of quartz with a sizable component of feldspars and smaller amounts of a variety of minerals, including such readily weatherable components as biotite and hornblende, make up the sand and silt fractions.

When deposited, Mississippi River sediment does not have detectable quantities of calcium carbonate. By comparison, Arkansas River sediment has less smectite and more micaceous clays in the clay-sized fraction and has calcium carbonate at the time of deposition. The Arkansas River alluvium gets its reddish color from iron oxides that are associates of the sand, silt, and, particularly, the clay fraction. Reddish Permian age formations are the major source of this red sediment. Recognizable Arkansas River sediment in the soils of East Carroll Parish generally is thin, reddish brown strata or reddish mottles and is more often in the young clayey soils, such as the Sharkey and Tunica soils.

Partial sorting of the alluvium takes place when the stream overflows and the initial decrease in velocity and transporting capability of the water results in rapid deposition of sediment. As the velocity of the water decreases, the initial deposits are high in sand content. Sediment that is high in silt content overlies the sand deposits, and more clayey material overlies both deposits.

Still or slow-moving water in low areas behind the natural levees deposits the clayey backswamp sediment. Consequently, the natural levees are highest and have the greatest sand content near a stream channel. Characteristically, their long, gentle slopes extend from the stream to the clayey backswamp deposits.

The Crevasse, Commerce, and Sharkey soils formed in coarse, intermediate, and fine textured parent material. Differences in these soils can wholly or partly be attributed to differences in the parent material. For example, cation-exchange capacity, organic matter content, and changes in volume upon wetting and drying increase as the amount of clay increases. Soil permeability, soil aeration, and content of minerals that are readily weatherable decrease as the amount of clay increases. Consequently, the silty soils are generally more productive for most agricultural crops and also provide the most desirable sites in the parish for most urban and industrial uses.

Climate

East Carroll Parish has a humid, subtropical climate. A detailed discussion of the climate in this parish appears in the section "General Nature of the Parish." Because most of the parent material is relatively young, the soils in the parish developed under climatic conditions that are similar to those of the present.

The climate is relatively uniform throughout the parish, and local differences in the soils are not a result of differences in climate. The warm average temperatures and large amount of precipitation favor a rapid rate of weathering of minerals in the soils. The soils are only slightly weathered because they have been exposed to weathering agents for only short periods of time. Weathering and leaching have occurred to some extent in most of the soils, resulting in soil reactions that become more alkaline with depth and the absence of free carbonates in the upper horizons of such soils as the Bruin soils. Weathering processes that involve the release and reduction of iron are evident in such soils as the Dundee and Sharkey soils that have a gray Btg, Bg, or Cg horizon. Oxidation and segregation of iron as a result of alternating oxidizing and reducing conditions are indicated by mottled horizons in many of the soils.

Another facet of climate involves clayey soils that have large amounts of expanding-lattice minerals that change volume upon wetting and drying. Wetting and drying cycles and associated volume changes are factors in the formation and stabilization of structural aggregates in clayey soils. When the wet soils dry, cracks of variable width and depth form as a result of the decrease in volume. If cracks form, the depth and extent of cracking are influenced by climate. Repeated volume changes frequently result in structural damage to buildings, roads, and other structures.

Formation of deep, wide cracks may shear plant roots. If cracks are present, much of the water from initial rainfall or irrigation infiltrates the cracks. Once the soil has become wet, infiltration rates become slow or very slow. Formation of cracks occurs extensively in the Sharkey and Tunica soils late in summer and early in fall when the soils are driest. Cracks that are 1 inch or more wide and that extend to depths of more than 20 inches can form during this time in most years. Cracks that are less extensive and not as deep sometimes form in the more silty Commerce and Dundee soils. Cracks do not form in the loamy Bruin or sandy Crevasse soils.

Time

Time influences the kinds of horizons and their degree of development. Long periods of time are generally required for prominent horizons to form. In many areas, the differences in the time of formation for different soils can amount to several thousand years. Significant differences can exist among the soils, mostly because of differences in time of soil formation *(10, 11)*.

The Bruin, Commerce, Crevasse, Newellton, Sharkey, and Tunica soils are thought to be the youngest soils in the parish. They developed in the most recent alluvium, which is probably less than 2,800 years old. The Dundee and Tensas soils formed in somewhat older alluvium, which could be more than 5,000 years old *(18)*. The Goldman soils formed in intermediate age sediment that is relative to the other two sediments in the parish.

The youngest soils have only faint profile development. For example, the Commerce soils retain many of the characteristics of their alkaline, loamy parent material. Evidence of the faint development is a darkening of the A horizon by organic matter and a weakly developed B horizon. About the only evidence of age of these soils is the darkening of the A horizon by organic matter and removal of some of the carbonates.

In contrast, the Dundee and Tensas soils, which both formed in older parent material, have distinct profile development. They have been leached of most carbonates and other soluble salts and are acid. Fine clay has moved downward from the A horizon to form a strongly developed, clay loam Bt horizon.

The Goldman soils, which formed in the intermediate age sediment, have distinct profile development, but not as distinct as that of soils that formed in the oldest sediment in the parish. They are less leached of carbonates and bases; therefore, they are somewhat less acid than some of the oldest soils. Enough clay has moved downward from the A horizon to form a distinct Bt horizon.

Relief

Relief and other physiographic features influence soil formation processes mainly by affecting internal soil drainage, runoff, erosion and deposition, and exposure to the sun and wind.

In East Carroll Parish, the sediment accumulated at a faster rate than the erosion took place. Under these conditions, accumulation of sediment occurred at a faster rate than many of the processes of soil formation. For example, the B horizon is absent in such soils as the Crevasse soils, and the lower horizons of some soils have distinct stratification. Levee construction and other water-control measures have reversed this trend for such soils as the Bruin and Commerce soils, as well as for some others. Soil slope and rate of runoff are low enough that erosion is not a major problem in the parish.

In East Carroll Parish, the land surface is level to gently undulating. With few exceptions, the soils have slopes of less than 3 percent. Slopes range to 5 percent in the gently undulating Goldman and Newellton soils. Relief and landscape position have influenced formation of the different soils. Characteristically, the slopes are long and extend from their highest elevations on the natural levees to elevations that are several feet lower in the backswamps.

From the highest to the lowest elevations, the dominant soils typically are the Bruin, Commerce, Newellton, Tunica, and Sharkey soils. Soils at lower elevations receive runoff from those at higher elevations, and the water table is nearer the surface for longer periods in the soils at lower elevations. For example, the Bruin soils are moderately well drained and the water table is more than 6 feet below the surface. The Sharkey soils are poorly drained and often submerged. They have a water table that fluctuates from several feet above the surface to a depth of 2 feet or less during December through April. Differences in the organic matter content of the soils are related to the internal drainage of the soils and, consequently, to relief. Generally, organic matter content increases as internal soil drainage becomes more restricted.

The Bruin, Commerce, and Crevasse soils are in the higher and better drained positions and have an environment that has more extensive oxidation of organic matter. The Sharkey soils are poorly drained and are often saturated for extended periods, resulting in an environment that promotes greater reducing conditions and in the accumulation of more organic matter in the surface layer.

Living Organisms

Living organisms exert a major influence on the kind and extent of soil horizons that develop. Plant growth and activity of other organisms disturb the soil by modifying the porosity, influencing the tilth, and affecting the incorporation of organic matter.

In photosynthesis, plants use energy from the sun to synthesize compounds needed for growth. In this way, they produce additional organic matter. Growth of plants and their eventual decomposition provide for recycling of nutrients from the soil and serve as a major source of organic residue.

Decomposition and incorporation of organic matter by micro-organisms enhance the tilth and generally increase the infiltration rate and water-holding capacity in soils. Relatively stable organic compounds in soils generally have high cation-exchange capacities and consequently increase the ability of the soils to absorb and store such nutrients as calcium, magnesium, and potassium. The extent of these and other processes and the kind of organic matter produced can vary widely, depending on the kinds of organisms living in and on the soil. Consequently, large differences in soils can result in areas that have widely contrasting populations of plants and other organisms.

The native vegetation in East Carroll Parish is mainly hardwood forests and associated understory and ground cover. Cottonwood, sycamore, and pecan are dominant on the higher and better drained Bruin and Commerce soils. Oak, sweetgum, and green ash are dominant on the clayey and poorly drained Sharkey and Tunica soils.

The kinds and populations of micro-organisms influence differences in the amount of organic matter that accumulates in and on the soils. Aerobic organisms use oxygen from the air and are chiefly responsible for organic matter decomposition through rapid oxidation of organic residue. These organisms are most abundant and prevail for longer periods in such better drained and aerated soils as the Bruin, Crevasse, and Goldman soils.

In the most poorly drained soils, anerobic organisms are dominant throughout most or the entire year. Anerobic organisms do not require oxygen from the air and decompose organic residue very slowly. Differences in decomposition by micro-organisms can result in large accumulations of organic matter in such poorly drained soils as the Sharkey soils. The accumulation is much less in soils that are drained better, such as the Bruin and Goldman soils.

Landforms and Surface Geology

Dr. Bobby J. Miller, Department of Agronomy, Agriculture Experiment Station, Louisiana State University, prepared this section.

East Carroll Parish lies entirely within the Mississippi River alluvial valley. The Mississippi River and its abandoned channels form the eastern boundary of the parish. Bayou Macon forms the western boundary.

Generally, the land slopes from east to west and from north to south. Elevations in the parish average about 100 feet above mean sea level along the northern boundary and about 80 feet above mean sea level along the southern boundary. Elevations can be 10 feet or more above these averages along the natural levees of the Mississippi River.

Quaternary and Tertiary sediments found in the parish extend to a depth of about 2,000 feet (fig. 11).

All surface sediment is recent Mississippi River alluvium of Holocene age. The sediment was deposited along loamy meander belts or natural levees, in clayey backswamps and in sandy levee break areas or in rapid overland waterflow areas.

The Tertiary sediment is of the Eocene Epoch. The Jackson and Claiborne Groups comprise the Eocene Epoch. The uppermost formations that are present in these two groups once comprised an erosional surface in the parish during glacial periods when sea level had receded and the Mississippi River Valley was subject to severe erosional forces. The Cockfield Formation of the Claiborne Group and the Jackson Group was left exposed on the surface. At greater depths, underlying

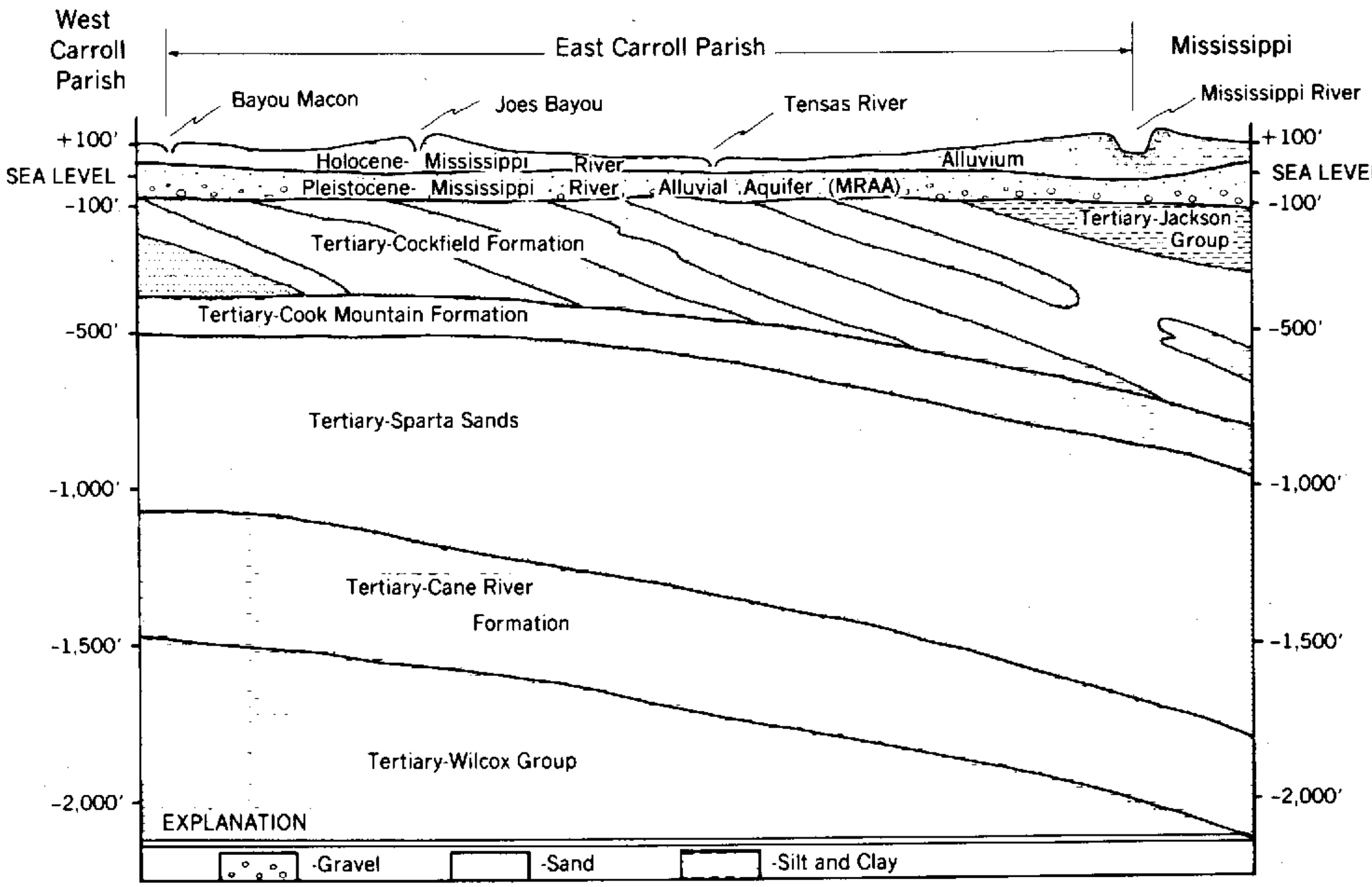

Figure 11.—Stratigraphy of East Carroll Parish, showing geologic formations, aquifers, and approximate depths to these layers.

formations in the Claiborne Group are the Cook Mountain, Sparta Sands, and the Cane River Formations.

As the glaciers receded and sea level rose, coarse-grained sediment from the Mississippi and Arkansas Rivers began filling the Mississippi River Valley. The sediment is referred to as "Old Mississippi River Alluvium of Pleistocene age." The Mississippi River Alluvial Aquifer is in this sediment.

As the gradient to sea level decreased, these rivers changed from a braided stream system to a meandering stream system. The Holocene or Recent Mississippi River Alluvial sediment, in which the present soils formed, are deposited from this type of system. All the natural levees and channels of the Mississippi River on the present surface could be less than 2,800 years old in East Carroll Parish *(18)*. The oldest channel in the parish, Joes Bayou, could be more than 5,000 years old, and it could be a former channel of the Arkansas River.

Some of the older recognizable meander channel scars of the Mississippi River are in the Sondheimer area of the parish. These old natural levees, parallel ridges and swales, and channel scars are now in backswamp areas and are covered by clayey sediment. The Tunica and Newellton soils are in such areas. The "Bear Wallow" meander scar south of Lake Providence is recent enough that the clayey sediment does not cover some of the loamy sediment. The loamy Goldman soil is mapped in this "medium-aged" loamy sediment. The youngest loamy sediment is along the present channel of the Mississippi River, Lake Providence, Old River Lake, and Gassoway Lake. The Bruin and Commerce soils are associated with the younger loamy sediment along these channels.

The sandy Crevasse soils are associated with old levee breaks and areas where there has been rapid overland waterflow in the unprotected areas behind the Mississippi River levee. Sharkey clay is in backswamp areas where thick, clayey deposits have accumulated.

The loamy Dundee soils have formed in old loamy sediment along Joes Bayou. The clayey Tensas soils are on low-lying natural levees that have thick, clayey sediment capping the old loamy sediment along Joes Bayou and Bayou Macon. The soils-landscape-parent material relationship of the soils across East Carroll Parish is shown in figure 12.

The sediments of different age that comprise the surface deposits can be identified on the detailed soil maps in this survey since specific sites of soils have formed on each of the different age deposits. The general soil map can also identify major areas of sediment for a particular age. Soils that developed in the oldest sediment are mostly in the area included in the Tensas-Sharkey and Tensas-Dundee-Sharkey general soil map units. All of the other general soil map units are mostly or entirely soils that were developed in the most recent deposits.

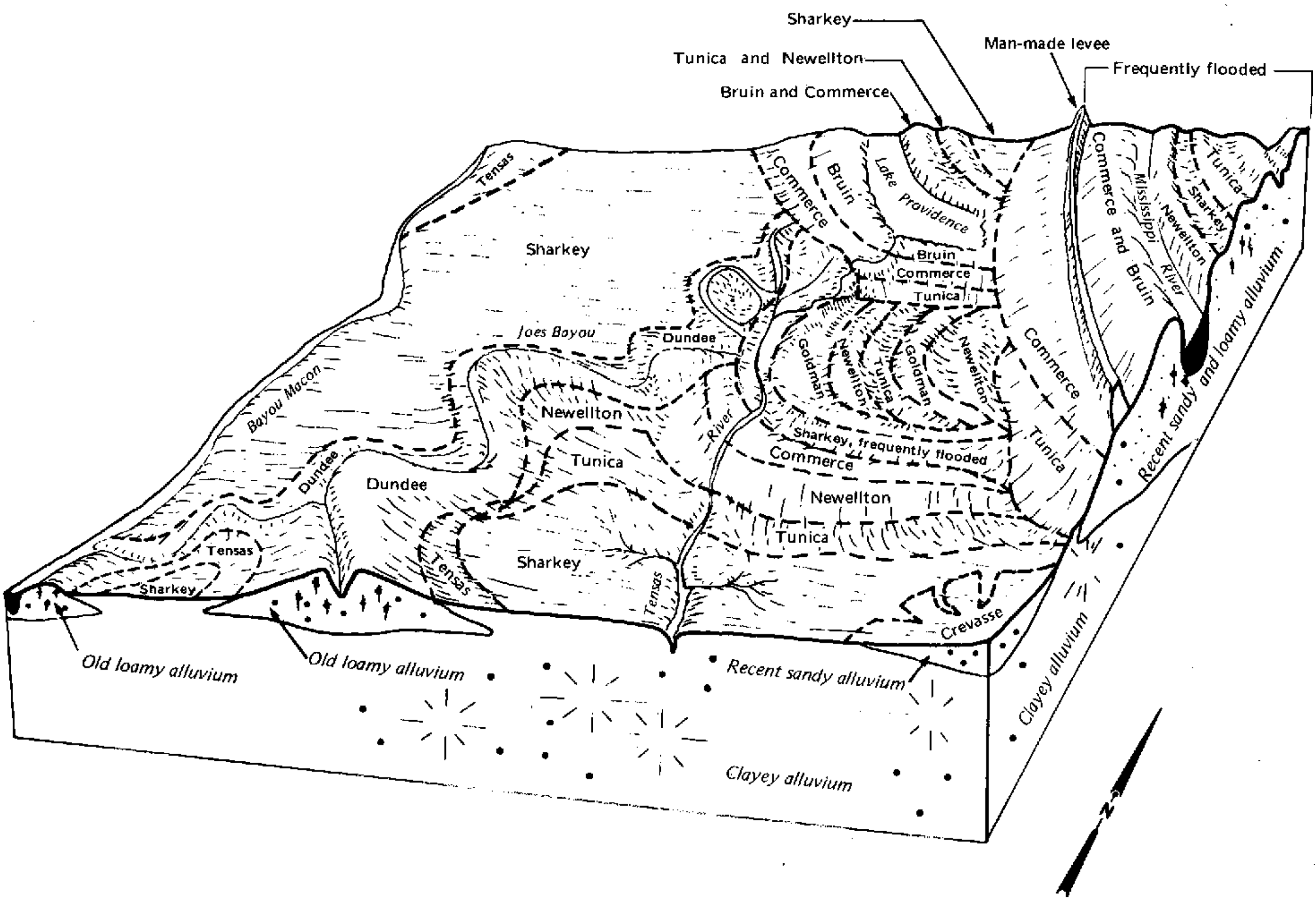

Figure 12.—Soils-landscape-parent material relationship across East Carroll Parish.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

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

Argillic horizon. Mineral soil horizon that is characterized by the accumulation of clay. The argillic horizon is in the position of the subsoil.

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	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bottom land. The normal flood plain of a stream, subject to flooding.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.

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, i.e., clay coatings, clay skins.

Coarse textured soil. Sand or loamy sand.

Coefficient of linear extensibility (COLE). The ratio of the difference between the moist and dry lengths of a soil clod to its dry length. The measurement correlates with the volume change upon wetting and drying.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds 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.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

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.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

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 they are wet 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.

Drainage, surface. Runoff, or surface flow of water, from an area.

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

Ephemeral erosion. Soil loss caused by seasonal, concentrated flow channels or ephemeral cropland gully erosion.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a

catastrophe in nature, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay are in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The movement of water into the soil is rapid.

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.*

Fine textured soil. Sandy clay, silty clay, and clay.

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. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual.* The major horizons of mineral soil are as follows:

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

A horizon.—The mineral horizon 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.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have 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 in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

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

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

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).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

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

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move through the profile. Permeability is measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

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 semisolid to plastic.

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

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

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

Reaction, soil. A measure of the 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
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

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

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

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.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

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.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

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.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Soil. A natural, three-dimensional body at the earth's surface. It 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.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

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

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or 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).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

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

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Surface layer. 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."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed on the contour or at a slight angle to the contour across sloping soils. The terrace intercepts surface runoff, so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

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

Thin layer (in tables). Otherwise suitable soil material is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, such as zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Water table. The saturated zone in the soil. The seasonal high water table refers to the highest level of a saturated zone in the soil in most years.

Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Data recorded in the period 1951-79 at Lake Providence, Louisiana]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	54.4	35.1	44.8	78	14	90	5.45	2.60	7.90	8	.9
February---	59.0	38.2	48.6	80	18	122	5.16	2.90	7.15	7	.7
March------	67.0	45.4	56.2	85	26	247	5.83	3.33	8.04	7	.2
April------	76.3	54.5	65.4	89	35	462	5.16	2.78	7.25	7	.0
May--------	84.1	62.3	73.2	95	46	719	5.14	2.11	7.69	7	.0
June-------	90.5	69.3	79.9	100	56	897	3.64	1.46	5.51	6	.0
July-------	92.9	71.9	82.4	101	64	1,004	4.54	2.43	6.39	7	.0
August-----	92.6	70.8	81.7	100	60	983	3.15	1.25	4.75	4	.0
September--	87.6	65.5	76.6	98	49	798	3.22	.90	5.09	5	.0
October----	78.7	53.4	66.1	94	34	499	2.55	.51	4.16	3	.0
November---	66.6	44.1	55.4	85	23	190	4.37	2.20	6.25	6	.0
December---	57.9	37.5	47.7	80	18	85	5.74	3.19	7.99	7	.1
Yearly:											
Average--	75.6	54.0	64.8	---	---	---	---	---	---	---	---
Extreme--	---	---	---	102	11	---	---	---	---	---	---
Total----	---	---	---	---	---	6,096	53.95	43.59	63.78	74	1.9

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 °F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data recorded in the period 1951-79 at Lake Providence, Louisiana]

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 2	March 2	April 1
2 years in 10 later than--	February 20	March 13	March 24
5 years in 10 later than--	February 1	February 19	March 8
First freezing temperature in fall:			
1 year in 10 earlier than--	November 11	November 2	October 25
2 years in 10 earlier than--	November 21	November 9	October 31
5 years in 10 earlier than--	December 9	November 24	November 10

TABLE 3.--GROWING SEASON

[Data recorded in the period 1951-79 at Lake Providence, Louisiana]

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	276	237	216
8 years in 10	288	251	226
5 years in 10	311	278	246
2 years in 10	337	305	265
1 year in 10	358	319	275

TABLE 4.--SUITABILITY AND LIMITATIONS OF GENERAL SOIL MAP UNITS

General soil map unit	Percent of area	Cultivated crops	Pasture	Woodland	Urban uses	Intensive recreation areas
1. Commerce-Bruin	15	Well suited-----	Well suited----	Well suited------	Moderately well suited: wetness, moderately slow permeability, moderate shrink-swell potential, low strength for roads.	Moderately well suited: wetness, moderately slow permeability.
2. Crevasse-Sharkey	2	Poorly suited: wetness, low fertility, droughtiness.	Moderately well suited: wetness, low fertility, droughtiness.	Moderately well suited: moderate seedling mortality and equipment use limitations.	Moderately well suited: wetness, very slow permeability, very high shrink-swell potential, low strength for roads.	Moderately well suited: sandy surface layer, droughty, wetness, very slow permeability.
3. Tensas-Dundee-Sharkey	13	Moderately well suited: wetness, poor tilth.	Well suited----	Well suited------	Poorly suited: wetness, very slow and moderately slow permeability, moderate, high, and very high shrink-swell potential, low strength for roads, flooding.	Poorly suited: wetness, moderately slow and very slow permeability, clayey surface layer, flooding.
4. Tensas-Sharkey	2.5	Moderately well suited: wetness, poor tilth.	Well suited----	Well suited------	Poorly suited: wetness, high and very high shrink-swell potential, very slow permea-bility, low strength for roads, flooding.	Poor suited: wetness, very slow permeability, clayey surface layer, flooding.

TABLE 4.--SUITABILITY AND LIMITATIONS OF GENERAL SOIL MAP UNITS--Continued

General soil map unit	Percent of area	Cultivated crops	Pasture	Woodland	Urban uses	Intensive recreation areas
5. Sharkey	32	Moderately well suited: wetness, poor tilth.	Well suited----	Well suited------	Poorly suited: wetness, flooding, very high shrink-swell potential, very slow permeability, low strength for roads.	Poorly suited: wetness, very slow permeability, clayey surface layer, flooding.
6. Tunica-Sharkey-Newellton	15	Moderately well suited: wetness, poor tilth, uneven slopes.	Well suited----	Well suited------	Poorly suited: wetness, slow and very slow permeability, high and very high shrink-swell potential, low strength for roads, flooding.	Poorly suited: wetness, flooding, slow and very slow permeability, flooding.
7. Newellton-Goldman-Tunica	4.5	Well suited-----	Well suited----	Well suited------	Poorly suited: wetness, moderate to very slow permeability, moderate and high shrink-swell potential, low strength for roads.	Poorly suited: wetness, moderate to very slow permeability, clayey surface layer.
8. Commerce-Crevasse-Bruin	12	Poorly suited: flooding.	Poorly suited: flooding.	Moderately well suited: severe seedling mortality and equipment use limitations.	Not suited: flooding.	Not suited: flooding.
9. Sharkey-Tunica-Newellton	4	Poorly suited: flooding.	Poorly suited: flooding.	Moderately well suited: severe seedling mortality and equipment use limitations.	Not suited: flooding.	Not suited: flooding.

TABLE 5.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
Ar	Arents, loamy and clayey	440	0.2
Br	Bruin silt loam	2,257	0.8
Bu	Bruin-Commerce silt loams, gently undulating	4,400	1.5
Cm	Commerce silt loam	15,722	5.4
Co	Commerce silty clay loam	15,622	5.4
CR	Commerce and Bruin soils, frequently flooded	19,547	6.7
Cs	Crevasse loamy fine sand	3,143	1.1
Cv	Crevasse fine sand, frequently flooded	8,541	2.9
Dd	Dundee silt loam	1,174	0.4
De	Dundee silty clay loam	10,105	3.5
Go	Goldman silt loam, 1 to 5 percent slopes	1,939	0.7
Ne	Newellton silty clay	10,480	3.6
Ng	Newellton-Goldman complex, 1 to 5 percent slopes	3,891	1.3
Nm	Newellton-Tunica complex, gently undulating	5,918	2.0
NT	Newellton and Tunica soils, frequently flooded	4,656	1.6
Sa	Sharkey silty clay loam	9,626	3.3
Se	Sharkey clay	92,031	31.5
Sh	Sharkey clay, frequently flooded	3,493	1.2
Sk	Sharkey loamy fine sand, overwash, gently undulating	1,494	0.5
Ta	Tensas silty clay	13,641	4.7
Td	Tensas-Dundee complex, gently undulating	9,602	3.3
Te	Tensas-Sharkey complex, gently undulating	3,423	1.2
Tn	Tunica clay	15,997	5.5
Ts	Tunica-Sharkey clays, gently undulating	9,466	3.2
TT	Tunica and Sharkey soils, frequently flooded	5,226	1.8
	Small water	4,006	1.4
	Large water	15,537	5.3
	Total	291,377	100.0

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Land capability	Cotton	Soybeans	Rice	Wheat	Corn	Common bermudagrass
		Lbs	Bu	Bu	Bu	Bu	AUM*
Ar. Arents							
Br. Bruin	I	900	40	---	60	100	8.5
Bu. Bruin-Commerce	IIw	890	40	---	56	95	7.9
Cm. Commerce	IIw	900	40	---	55	100	8.0
Co. Commerce	IIw	850	40	---	53	85	7.5
CR. Commerce and Bruin	Vw	---	---	---	---	---	---
Cs. Crevasse	IIIs	---	---	---	---	---	---
Cv. Crevasse	Vw	---	---	---	---	---	---
Dd, De. Dundee	IIw	800	38	---	50	85	---
Go. Goldman	IIe	650	30	---	49	75	7.0
Ne. Newellton	IIw	675	36	120	47	---	6.0
Ng. Newellton-Goldman	IIe	641	30	---	47	---	6.5
Nm. Newellton-Tunica	IIIw	---	25	---	45	---	---
NT. Newellton and Tunica	Vw	---	---	---	---	---	---
Sa, Se. Sharkey	IIIw	650	36	130	45	---	6.5
Sh. Sharkey	Vw	---	---	---	---	---	4.2
Sk. Sharkey	IIIw	500	27	---	---	55	---

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Cotton	Soybeans	Rice	Wheat	Corn	Common bermudagrass
		Lbs	Bu	Bu	Bu	Bu	AUM*
Ta--------------- Tensas	IIIw	600	36	130	50	---	6.5
Td--------------- Tensas-Dundee	IIIw	700	32	120	44	---	---
Te--------------- Tensas-Sharkey	IIIw	550	30	120	46	---	6.5
Tn--------------- Tunica	IIIw	625	35	120	40	---	---
Ts--------------- Tunica-Sharkey	IIIw	592	33	120	42	---	---
TT--------------- Tunica and Sharkey	Vw	---	---	---	---	---	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Absence of an entry indicates no acreage]

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I	2,257	---	---	---	---
II	63,333	5,830	57,503	---	---
III	164,341	---	161,198	3,143	---
IV	---	---	---	---	---
V	41,463	---	41,463	---	---
VI	---	---	---	---	---
VII	---	---	---	---	---
VIII	---	---	---	---	---

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordination symbol	Management concerns		Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class*	
Br-------------- Bruin	10A	Slight	Slight	Eastern cottonwood--	105	10	Eastern cottonwood, sweetgum, American sycamore.
				Green ash-----------	---	---	
				Pecan---------------	---	---	
				Sweetgum------------	105	11	
				American sycamore---	---	---	
				Sugarberry----------	---	---	
				Water oak-----------	---	---	
				American elm--------	---	---	
Bu:							
Bruin----------	10A	Slight	Moderate	Eastern cottonwood--	105	10	Eastern cottonwood, sweetgum, American sycamore.
				Green ash-----------	---	---	
				Pecan---------------	---	---	
				Sweetgum------------	105	11	
				American sycamore---	---	---	
				Sugarberry----------	---	---	
				Water oak-----------	---	---	
				American elm--------	---	---	
Commerce-------	13W	Moderate	Slight	Eastern cottonwood--	120	13	Eastern cottonwood, American sycamore.
				Green ash-----------	80	---	
				Nuttall oak---------	90	---	
				Water oak-----------	110	8	
				Pecan---------------	---	---	
				American sycamore---	---	---	
				Willow oak----------	---	---	
Cm, Co---------- Commerce	13W	Moderate	Slight	Eastern cottonwood--	120	13	Eastern cottonwood, American sycamore, sweetgum.
				Green ash-----------	80	---	
				Nuttall oak---------	90	---	
				Water oak-----------	110	8	
				Pecan---------------	---	---	
				American sycamore---	---	---	
				Willow oak----------	---	---	
CR:							
Commerce-------	12W	Moderate	Moderate	Eastern cottonwood--	113	12	Eastern cottonwood, American sycamore.
				Nuttall oak---------	---	---	
				Overcup oak---------	---	---	
				Water hickory-------	---	---	
				Sugarberry----------	---	---	
Bruin----------	9W	Moderate	Moderate	Eastern cottonwood--	98	9	Eastern cottonwood.
				American sycamore---	---	---	
				Water oak-----------	---	---	
				Sugarberry----------	---	---	
Cs, Cv---------- Crevasse	9S	Moderate	Moderate	Loblolly pine-------	90	9	Loblolly pine, eastern cottonwood.
				Sweetgum------------	90	7	
				White oak-----------	90	4	
				Eastern cottonwood--	100	9	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns		Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class*	
Dd, De: Dundee	12W	Moderate	Slight	Cherrybark oak	105	12	Cherrybark oak, eastern cottonwood, sweetgum, water oak, yellow-poplar.
				Eastern cottonwood	100	9	
				Sweetgum	100	10	
				Water oak	95	6	
Go: Goldman	9A	Slight	Slight	Eastern cottonwood	100	9	Eastern cottonwood, American sycamore.
				Green ash	70	---	
				Cherrybark oak	95	9	
				Water oak	90	6	
				Sweetgum	100	10	
				Nuttall oak	---	---	
				Willow oak	97	6	
				Pecan	---	---	
Ne: Newellton	9W	Moderate	Moderate	Eastern cottonwood	100	9	Eastern cottonwood, American sycamore.
				Green ash	75	---	
				Nuttall oak	---	---	
				Water oak	90	6	
				Sweetgum	95	8	
				Pecan	---	---	
				Sugarberry	---	---	
				Willow oak	---	---	
Ng: Newellton	9W	Moderate	Moderate	Eastern cottonwood	100	9	Eastern cottonwood, American sycamore.
				Green ash	75	---	
				Nuttall oak	85	---	
				Water oak	90	6	
				Sweetgum	95	8	
				Pecan	---	---	
				Sugarberry	---	---	
				Willow oak	---	---	
Goldman	9A	Slight	Slight	Eastern cottonwood	100	9	Eastern cottonwood, American sycamore.
				Green ash	70	---	
				Cherrybark oak	95	9	
				Water oak	90	6	
				Sweetgum	100	10	
				Nuttall oak	---	---	
				Willow oak	97	6	
				Pecan	---	---	
Nm: Newellton	9W	Moderate	Moderate	Eastern cottonwood	100	9	Eastern cottonwood, American sycamore.
				Nuttall oak	---	---	
				Water oak	---	---	
				Sweetgum	95	8	
				Pecan	---	---	
				Sugarberry	---	---	
Tunica	8W	Severe	Moderate	Cherrybark oak	90	8	Cherrybark oak, eastern cottonwood, green ash, Nuttall oak, sweetgum, American sycamore.
				Eastern cottonwood	105	10	
				Green ash	---	---	
				Nuttall oak	---	---	
				Sweetgum	90	7	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordi-nation symbol	Management concerns		Potential productivity			Trees to plant
		Equipment limita-tion	Seedling mortality	Common trees	Site index	Produc-tivity class*	
NT:							
Newellton	7W	Severe	Severe	Eastern cottonwood	93	7	Eastern cottonwood, baldcypress.
				Nuttall oak	---	---	
				Water hickory	---	---	
				Overcup oak	---	---	
Tunica	7W	Severe	Severe	Eastern cottonwood	90	7	Eastern cottonwood, baldcypress.
				Nuttall oak	---	---	
				Water hickory	---	---	
				Overcup oak	---	---	
Sa, Se Sharkey	7W	Severe	Moderate	Sweetgum	90	7	Eastern cottonwood, American sycamore, sweetgum.
				Willow oak	100	7	
				Water oak	90	6	
				Nuttall oak	---	---	
				Sugarberry	---	---	
Sh Sharkey	6W	Severe	Severe	Baldcypress	96	6	Baldcypress.
				Water hickory	---	---	
				Overcup oak	---	---	
				Black willow	---	---	
Sk Sharkey	7W	Severe	Moderate	Sweetgum	90	7	Eastern cottonwood, American sycamore, sweetgum.
				Green ash	---	---	
				Pecan	---	---	
				Cherrybark oak	95	9	
				American sycamore	---	---	
Ta Tensas	6W	Moderate	Moderate	Water oak	95	6	Eastern cottonwood, American sycamore.
				Green ash	---	---	
				Willow oak	---	---	
				Sweetgum	100	10	
				Nuttall oak	---	---	
Td:							
Tensas	6W	Moderate	Moderate	Water oak	95	6	Eastern cottonwood, American sycamore.
				Green ash	---	---	
				Willow oak	---	---	
				Sweetgum	100	10	
				Nuttall oak	---	---	
Dundee	12W	Moderate	Slight	Cherrybark oak	105	12	Cherrybark oak, eastern cottonwood, sweetgum, water oak, yellow-poplar.
				Eastern cottonwood	100	9	
				Sweetgum	100	10	
				Water oak	95	6	
Te:							
Tensas	6W	Moderate	Moderate	Water oak	95	6	Eastern cottonwood, American sycamore.
				Green ash	---	---	
				Willow oak	---	---	
				Sweetgum	100	10	
				Nuttall oak	---	---	
Sharkey	7W	Severe	Moderate	Sweetgum	90	7	Eastern cottonwood, American sycamore, sweetgum.
				Willow oak	100	7	
				Water oak	90	6	
				Nuttall oak	---	---	
				Sugarberry	---	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns		Potential productivity			Trees to plant
		Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class*	
Tn------------- Tunica	8W	Severe	Moderate	Cherrybark oak------ Eastern cottonwood-- Green ash----------- Nuttall oak--------- Sweetgum------------	90 105 --- --- 90	8 10 --- --- 7	Cherrybark oak, eastern cottonwood, green ash, Nuttall oak, sweetgum, American sycamore.
Ts:							
Tunica---------	8W	Severe	Moderate	Cherrybark oak------ Eastern cottonwood-- Green ash----------- Nuttall oak--------- Sweetgum------------	90 105 --- --- 90	8 10 --- --- 7	Cherrybark oak, eastern cottonwood, green ash, Nuttall oak, sweetgum, American sycamore.
Sharkey--------	7W	Severe	Moderate	Sweetgum------------ Willow oak---------- Water oak----------- Nuttall oak--------- Sugarberry----------	90 100 90 --- ---	8 10 6 --- ---	Eastern cottonwood, American sycamore, sweetgum.
TT:							
Tunica---------	7W	Severe	Severe	Eastern cottonwood-- Nuttall oak--------- Water hickory------- Overcup oak---------	90 --- --- ---	7 --- --- ---	Eastern cottonwood, baldcypress.
Sharkey--------	6W	Severe	Severe	Baldcypress--------- Water hickory------- Overcup oak--------- Black willow--------	96 --- --- ---	6 --- --- ---	Baldcypress.

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

TABLE 9.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ar. Arents					
Br Bruin	Slight	Slight	Slight	Slight	Slight.
Bu: Bruin	Slight	Slight	Slight	Slight	Slight.
Commerce	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Cm, Co Commerce	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
CR: Commerce	Severe: flooding.	Moderate: flooding, wetness, percs slowly.	Severe: flooding.	Moderate: wetness, flooding.	Severe: flooding.
Bruin	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Cs Crevasse	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Severe: droughty.
Cv Crevasse	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy, flooding.	Severe: too sandy.	Severe: droughty.
Dd, De Dundee	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Go Goldman	Slight	Slight	Moderate: slope.	Slight	Slight.
Ne Newellton	Severe: too clayey, wetness.	Severe: too clayey.	Severe: too clayey, wetness.	Severe: too clayey.	Severe: too clayey.
Ng: Newellton	Severe: too clayey, wetness.	Severe: too clayey.	Severe: too clayey, wetness.	Severe: too clayey.	Severe: too clayey.
Goldman	Slight	Slight	Moderate: slope.	Slight	Slight.
Nm: Newellton	Severe: too clayey, wetness.	Severe: too clayey.	Severe: too clayey, wetness.	Severe: too clayey.	Severe: too clayey.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Nm:					
Tunica	Severe: percs slowly, too clayey.	Severe: too clayey, percs slowly.	Severe: percs slowly, too clayey.	Severe: too clayey.	Severe: too clayey.
NT:					
Newellton	Severe: flooding, wetness, too clayey.	Severe: too clayey.	Severe: too clayey, flooding, wetness.	Severe: too clayey.	Severe: flooding, too clayey.
Tunica	Severe: flooding, percs slowly, too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey, flooding, percs slowly.	Severe: too clayey.	Severe: flooding, too clayey.
Sa Sharkey	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
Se Sharkey	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, percs slowly.	Severe: wetness, too clayey.	Severe: wetness, too clayey.
Sh Sharkey	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, flooding.	Severe: wetness, too clayey.	Severe: wetness, flooding, too clayey.
Sk Sharkey	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
Ta Tensas	Severe: wetness, percs slowly.	Severe: too clayey, percs slowly.	Severe: too clayey, wetness.	Severe: too clayey.	Severe: too clayey.
Td:					
Tensas	Severe: wetness, percs slowly, flooding.	Severe: too clayey, percs slowly.	Severe: too clayey, wetness.	Severe: too clayey.	Severe: too clayey.
Dundee	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.
Te:					
Tensas	Severe: wetness, percs slowly.	Severe: too clayey, percs slowly.	Severe: too clayey, wetness.	Severe: too clayey.	Severe: too clayey.
Sharkey	Severe: wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, percs slowly.	Severe: wetness, too clayey.	Severe: wetness, too clayey.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Tn: Tunica	Severe: percs slowly, too clayey.	Severe: too clayey, percs slowly.	Severe: percs slowly, too clayey.	Severe: too clayey.	Severe: too clayey.
Ts:					
Tunica	Severe: percs slowly, too clayey.	Severe: too clayey, percs slowly.	Severe: percs slowly, too clayey.	Severe: too clayey.	Severe: too clayey.
Sharkey	Severe: wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, percs slowly.	Severe: wetness, too clayey.	Severe: wetness, too clayey.
TT:					
Tunica	Severe: flooding, percs slowly, too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey, flooding, percs slowly.	Severe: too clayey.	Severe: flooding, too clayey.
Sharkey	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, flooding.	Severe: wetness, too clayey.	Severe: wetness, flooding, too clayey.

TABLE 10.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Ar. Arents										
Br: Bruin	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Bu:										
Bruin	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Commerce	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
Cm, Co: Commerce	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
CR:										
Commerce	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
Bruin	Poor	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
Cs, Cv: Crevasse	Poor	Fair	Fair	Poor	Fair	Poor	Very poor.	Fair	Poor	Very poor.
Dd, De: Dundee	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Go: Goldman	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ne: Newellton	Fair	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
Ng:										
Newellton	Fair	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
Goldman	Good	Good	Good	Good	Good	Poor	Very	Good	Good	Very poor.
Nm:										
Newellton	Fair	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
Tunica	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good.
NT:										
Newellton	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Poor	Fair	Fair.
Tunica	Poor	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Good.
Sa, Se: Sharkey	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good.
Sh: Sharkey	Poor	Poor	Fair	Fair	Poor	Fair	Fair	Poor	Fair	Fair.
Sk: Sharkey	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Good	Good.

TABLE 10.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hard-wood trees	Shrubs	Wetland plants	Shallow water areas	Open-land wild-life	Woodland wildlife	Wetland wild-life
Ta----------------- Tensas	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good.
Td:										
Tensas------------	Fair	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Fair.
Dundee------------	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Te:										
Tensas------------	Fair	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Fair.
Sharkey-----------	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good.
Tn----------------- Tunica	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good.
Ts:										
Tunica------------	Fair	Fair	Fair	Good	Fair	Good	Good	Fair	Good	Good.
Sharkey-----------	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good.
TT:										
Tunica------------	Poor	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Good.
Sharkey-----------	Poor	Poor	Fair	Fair	Poor	Fair	Fair	Poor	Fair	Fair.

TABLE 11.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ar. Arents					
Br. Bruin	Slight	Slight	Slight	Slight	Slight.
Bu:					
Bruin	Slight	Slight	Slight	Slight	Slight.
Commerce	Severe: wetness.	Moderate: wetness, shrink-swell.	Moderate: wetness, shrink-swell.	Severe: low strength.	Moderate: wetness.
Cm, Co. Commerce	Severe: wetness.	Moderate: wetness, shrink-swell.	Moderate: wetness, shrink-swell.	Severe: low strength.	Moderate: wetness.
CR:					
Commerce	Severe: wetness.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Severe: flooding.
Bruin	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Cs. Crevasse	Severe: cutbanks cave.	Slight	Slight	Slight	Severe: droughty.
Cv. Crevasse	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: droughty.
Dd, De. Dundee	Severe: wetness.	Moderate: wetness, shrink-swell.	Moderate: wetness, shrink-swell.	Severe: low strength.	Moderate: wetness.
Go. Goldman	Moderate: wetness.	Slight	Slight	Slight	Slight.
Ne. Newellton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Severe: too clayey.
Ng:					
Newellton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Severe: too clayey.
Goldman	Moderate: wetness.	Slight	Slight	Slight	Slight.
Nm:					
Newellton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Severe: too clayey.
Tunica	Severe: wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
NT:					
Newellton	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, low strength.	Severe: flooding, too clayey.
Tunica	Severe: wetness.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, flooding, shrink-swell.	Severe: flooding, too clayey.
Sa: Sharkey	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: wetness.
Se: Sharkey	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: wetness, too clayey.
Sh: Sharkey	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding, too clayey.
Sk: Sharkey	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: wetness.
Ta: Tensas	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Severe: too clayey.
Td:					
Tensas	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: low strength.	Severe: too clayey.
Dundee	Severe: wetness.	Moderate: wetness, shrink-swell.	Moderate: wetness, shrink-swell.	Severe: low strength.	Moderate: wetness.
Te:					
Tensas	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Severe: too clayey.
Sharkey	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: wetness, too clayey.
Tn: Tunica	Severe: wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
Ts:					
Tunica	Severe: wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ts:					
Sharkey----------	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: wetness, too clayey.
TT:					
Tunica-----------	Severe: wetness.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, flooding, shrink-swell.	Severe: flooding, too clayey.
Sharkey----------	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding, too clayey.

TABLE 12.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ar. Arents					
Br------------------ Bruin	Slight-----------	Moderate: seepage.	Slight-----------	Slight-----------	Fair: thin layer.
Bu: Bruin--------------	Slight-----------	Moderate: seepage.	Slight-----------	Slight-----------	Fair: thin layer.
Commerce-----------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: thin layer.
Cm, Co-------------- Commerce	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: thin layer.
CR: Commerce-----------	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: thin layer.
Bruin--------------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: thin layer.
Cs------------------ Crevasse	Severe: wetness, poor filter.	Severe: seepage, flooding.	Severe: seepage, wetness.	Severe: seepage.	Poor: seepage, too sandy.
Cv------------------ Crevasse	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: seepage, too sandy.
Dd, De-------------- Dundee	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
Go------------------ Goldman	Severe: wetness.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Good.
Ne------------------ Newellton	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Ng: Newellton----------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ng:					
Goldman	Severe: wetness.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Good.
Nm:					
Newellton	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Tunica	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
NT:					
Newellton	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Tunica	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
Sa, Se Sharkey	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Sh Sharkey	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Sk Sharkey	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Ta Tensas	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Td:					
Tensas	Severe: wetness, percs slowly.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Dundee	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
Te:					
Tensas	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Sharkey	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Tn------------------ Tunica	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
Ts:					
Tunica--------------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
Sharkey-------------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
TT:					
Tunica--------------	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
Sharkey-------------	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.

TABLE 13.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Topsoil
Ar. Arents			
Br. Bruin	Fair: thin layer.	Improbable: excess fines.	Good.
Bu:			
Bruin	Fair: thin layer.	Improbable: excess fines.	Good.
Commerce	Poor: low strength.	Improbable: excess fines.	Fair: thin layer.
Cm. Commerce	Poor: low strength.	Improbable: excess fines.	Fair: thin layer.
Co. Commerce	Poor: low strength.	Improbable: excess fines.	Fair: too clayey, thin layer.
CR:			
Commerce	Poor: low strength.	Improbable: excess fines.	Fair: too clayey, thin layer.
Bruin	Fair: thin layer.	Improbable: excess fines.	Good.
Cs. Crevasse	Good	Probable	Fair: too sandy.
Cv. Crevasse	Good	Probable	Poor: too sandy.
Dd. Dundee	Fair: wetness.	Improbable: excess fines.	Good.
De. Dundee	Fair: wetness.	Improbable: excess fines.	Fair: too clayey.
Go. Goldman	Good	Improbable: excess fines.	Good.
Ne. Newellton	Poor: low strength.	Improbable: excess fines.	Poor: too clayey.
Ng:			
Newellton	Poor: low strength.	Improbable: excess fines.	Poor: too clayey.
Goldman	Good	Improbable: excess fines.	Good.
Nm:			
Newellton	Poor: low strength.	Improbable: excess fines.	Poor: too clayey.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Topsoil
Nm:			
Tunica	Fair: wetness.	Improbable: excess fines.	Poor: too clayey.
NT:			
Newellton	Poor: low strength.	Improbable: excess fines.	Poor: too clayey.
Tunica	Fair: wetness.	Improbable: excess fines.	Poor: too clayey.
Sa Sharkey	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Poor: wetness.
Se, Sh Sharkey	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Poor: too clayey, wetness.
Sk Sharkey	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Poor: wetness.
Ta Tensas	Poor: low strength.	Improbable: excess fines.	Poor: too clayey.
Td:			
Tensas	Poor: low strength.	Improbable: excess fines.	Poor: too clayey.
Dundee	Fair: wetness.	Improbable: excess fines.	Fair: too clayey.
Te:			
Tensas	Poor: low strength.	Improbable: excess fines.	Poor: too clayey.
Sharkey	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Poor: too clayey, wetness.
Tn Tunica	Fair: wetness.	Improbable: excess fines.	Poor: too clayey.
Ts, TT:			
Tunica	Fair: wetness.	Improbable: excess fines.	Poor: too clayey.
Sharkey	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Poor: too clayey, wetness.

TABLE 14.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
Ar. Arents						
Br------------ Bruin	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
Bu:						
Bruin------------	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
Commerce---------	Moderate: seepage.	Severe: thin layer, wetness.	Severe: slow refill.	Favorable------	Wetness, erodes easily.	Erodes easily.
Cm, Co------------ Commerce	Moderate: seepage.	Severe: thin layer, wetness.	Severe: slow refill.	Favorable------	Wetness, erodes easily.	Erodes easily.
CR:						
Commerce---------	Moderate: seepage.	Severe: thin layer, wetness.	Severe: slow refill.	Flooding-------	Wetness, erodes easily.	Erodes easily.
Bruin------------	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Flooding, erodes easily.	Erodes easily.
Cs, Cv----------- Crevasse	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake.	Droughty.
Dd--------------- Dundee	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Favorable------	Wetness, rooting depth.	Erodes easily, rooting depth.
De--------------- Dundee	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Favorable------	Wetness, rooting depth.	Erodes easily, rooting depth.
Go--------------- Goldman	Moderate: seepage, slope.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Slope, erodes easily.	Erodes easily.
Ne--------------- Newellton	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly---	Wetness, percs slowly, slow intake.	Erodes easily, wetness, percs slowly.
Ng:						
Newellton--------	Moderate: seepage, slope.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, slope.	Wetness, percs slowly, slow intake.	Erodes easily, wetness, percs slowly.
Goldman----------	Moderate: seepage, slope.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Slope, erodes easily.	Erodes easily.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
Nm: Newellton.						
Tunica	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly	Wetness, slow intake, percs slowly.	Percs slowly.
NT: Newellton	Moderate: seepage.	Severe: wetness, piping.	Severe: slow refill.	Flooding, percs slowly.	Wetness, slow intake, percs slowly.	Erodes easily, wetness, percs slowly.
Tunica	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, slow intake, percs slowly.	Percs slowly.
Sa: Sharkey	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly	Wetness, percs slowly.	Wetness, erodes easily, rooting depth.
Se: Sharkey	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly	Wetness, slow intake, percs slowly.	Wetness, rooting depth.
Sh: Sharkey	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, slow intake, percs slowly.	Wetness, rooting depth.
Sk: Sharkey	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly	Wetness, fast intake, soil blowing.	Wetness, percs slowly.
Ta: Tensas	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly	Wetness, slow intake, percs slowly.	Wetness, erodes easily, rooting depth.
Td: Tensas	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly	Wetness, slow intake, percs slowly.	Wetness, erodes easily, rooting depth.
Dundee	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Favorable	Wetness, rooting depth.	Erodes easily, rooting depth.
Te: Tensas	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly	Wetness, slow intake, percs slowly.	Wetness, erodes easily, rooting depth.
Sharkey	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly	Wetness, slow intake, percs slowly.	Wetness, rooting depth.
Tn: Tunica	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly	Wetness, slow intake, percs slowly.	Percs slowly.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
Ts:						
Tunica-----------	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly---	Wetness, slow intake, percs slowly.	Percs slowly.
Sharkey----------	Slight---------	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly---	Wetness, slow intake, percs slowly.	Wetness, rooting depth.
TT:						
Tunica-----------	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, slow intake, percs slowly.	Percs slowly.
Sharkey----------	Slight---------	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, slow intake, percs slowly.	Wetness, rooting depth.

TABLE 15.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. Some soils have Unified classifications and USDA textures that are supplementary to those shown. In general, the dominant classifications and textures are shown, and the others are inferred]

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
Ar. Arents										
Br------------- Bruin	0-6	Silt loam--------	ML, CL-ML	A-4	100	100	95-100	80-100	<27	NP-7
	6-30	Silt loam, loam, very fine sandy loam.	ML, CL-ML, CL	A-4	100	100	95-100	80-100	<32	NP-10
	30-60	Variable---------	---	---	---	---	---	---	---	---
Bu:										
Bruin-----------	0-8	Silt loam--------	ML, CL-ML	A-4	100	100	95-100	80-100	<27	NP-7
	8-24	Silt loam, loam, very fine sandy loam.	ML, CL-ML, CL	A-4	100	100	95-100	80-100	<32	NP-10
	24-65	Variable---------	---	---	---	---	---	---	---	---
Commerce--------	0-6	Silt loam--------	CL-ML, CL, ML	A-4	100	100	100	75-100	<30	NP-10
	6-30	Silty clay loam, silt loam, loam.	CL	A-6, A-7-6	100	100	100	85-100	32-45	11-23
	30-60	Stratified very fine sandy loam to silty clay.	CL-ML, CL, ML	A-4, A-6, A-7-6	100	100	100	75-100	23-45	3-23
Cm------------- Commerce	0-6	Silt loam--------	CL-ML, CL, ML	A-4	100	100	100	75-100	<30	NP-10
	6-33	Silty clay loam, silt loam, loam.	CL	A-6, A-7-6	100	100	100	85-100	32-45	11-23
	33-65	Stratified very fine sandy loam to silty clay.	CL-ML, CL, ML	A-4, A-6, A-7-6	100	100	100	75-100	23-45	3-23
Co------------- Commerce	0-8	Silty clay loam	CL	A-6, A-7-6	100	100	100	90-100	32-50	11-25
	8-25	Silty clay loam, silt loam, loam.	CL	A-6, A-7-6	100	100	100	85-100	32-45	11-23
	25-70	Stratified very fine sandy loam to silty clay.	CL-ML, CL, ML	A-4, A-6, A-7-6	100	100	100	75-100	23-45	3-23
CR:										
Commerce--------	0-8	Silty clay loam	CL	A-6, A-7-6	100	100	100	90-100	32-50	11-25
	8-26	Silty clay loam, silt loam, loam.	CL	A-6, A-7-6	100	100	100	85-100	32-45	11-23
	26-60	Stratified very fine sandy loam to silty clay.	CL-ML, CL, ML	A-4, A-6, A-7-6	100	100	100	75-100	23-45	3-23
Bruin-----------	0-6	Silt loam--------	ML, CL-ML	A-4	100	100	95-100	80-100	<27	NP-7
	6-21	Silt loam, loam, very fine sandy loam.	ML, CL-ML, CL	A-4	100	100	95-100	80-100	<32	NP-10
	21-60	Variable---------	---	---	---	---	---	---	---	---
Cs------------- Crevasse	0-5	Loamy fine sand	SM	A-2	100	95-100	60-100	15-30	---	NP
	5-60	Loamy sand, loamy fine sand, fine sand.	SP-SM, SM	A-2, A-3	100	95-100	50-100	5-20	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
Cv----------------- Crevasse	0-8	Fine sand--------	SP-SM, SM	A-2-4, A-3	100	95-100	50-100	5-20	---	NP
	8-60	Loamy sand, loamy fine sand, fine sand.	SP-SM, SM	A-2, A-3	100	95-100	50-100	5-20	---	NP
Dd----------------- Dundee	0-5	Silt loam--------	CL, CL-ML, ML	A-4, A-6	100	100	90-100	75-98	20-35	3-11
	5-37	Loam, clay loam, silt loam.	CL	A-6, A-7	100	100	90-100	70-95	28-44	12-22
	37-60	Loam, very fine sandy loam, silt loam, silty clay loam.	CL, CL-ML, ML	A-4	100	100	85-100	60-90	<30	NP-8
De----------------- Dundee	0-6	Silty clay loam	CL, CL-ML, ML	A-4, A-6	100	100	90-100	75-98	20-35	3-11
	6-36	Silty clay loam, clay loam, sandy clay loam.	CL	A-6, A-7	100	100	90-100	70-95	28-44	12-22
	36-80	Loam, very fine sandy loam, silt loam.	CL, CL-ML, ML	A-4	100	100	85-100	60-90	<30	NP-8
Go----------------- Goldman	0-8	Silt loam--------	ML, CL-ML	A-4	100	100	85-100	60-90	<25	NP-5
	8-32	Loam, silt loam, very fine sandy loam.	CL-ML, CL	A-4	100	100	90-100	60-80	25-31	5-10
	32-60	Very fine sandy loam, silt loam, loamy fine sand.	ML, CL-ML	A-4	100	100	90-100	50-90	<25	NP-5
Ne----------------- Newellton	0-7	Silty clay-------	CH, CL	A-7-6	100	100	100	95-100	45-65	22-35
	7-17	Clay, silty clay	CH, CL	A-7-6	100	100	100	95-100	45-65	22-35
	17-60	Stratified very fine sandy loam to silty clay loam.	CL, CL-ML	A-4, A-6	100	100	95-100	85-100	25-35	5-15
Ng:										
Newellton--------	0-5	Clay-------------	CH, CL	A-7-6	100	100	100	95-100	45-65	22-35
	5-18	Clay, silty clay	CH, CL	A-7-6	100	100	100	95-100	45-65	22-35
	18-60	Stratified very fine sandy loam to silty clay loam.	CL, CL-ML	A-4, A-6	100	100	95-100	85-100	25-35	5-15
Goldman----------	0-8	Silty clay loam	CL, CH	A-7-6	100	100	90-100	75-90	41-56	20-33
	8-30	Loam, silt loam, very fine sandy loam.	CL-ML, CL	A-4	100	100	90-100	60-80	25-31	5-10
	30-60	Very fine sandy loam, silt loam, loamy fine sand.	ML, CL-ML	A-4	100	100	90-100	50-90	<25	NP-5
Nm:										
Newellton--------	0-7	Silty clay loam	CL	A-7-6, A-6	100	100	100	95-100	32-45	11-21
	7-17	Clay, silty clay	CH, CL	A-7-6	100	100	100	95-100	45-65	22-35
	17-60	Stratified very fine sandy loam to silty clay loam.	CL, CL-ML	A-4, A-6	100	100	95-100	85-100	25-35	5-15

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
Nm:										
Tunica	0-5	Clay	CH	A-7	100	98-100	95-100	90-100	50-92	25-62
	5-31	Clay, silty clay	CH	A-7	100	98-100	95-100	90-100	50-92	25-62
	31-60	Fine sandy loam, loam, silty clay loam.	ML, CL-ML, CL	A-4, A-6	100	95-100	65-100	51-100	<40	NP-20
NT:										
Newellton	0-8	Silty clay	CH, CL	A-7-6	100	100	100	95-100	45-65	22-35
	8-18	Clay, silty clay	CH, CL	A-7-6	100	100	100	95-100	45-65	22-35
	18-60	Stratified very fine sandy loam to silty clay loam.	CL, CL-ML	A-4, A-6	100	100	95-100	85-100	25-35	5-15
Tunica	0-8	Clay	CH	A-7	100	98-100	95-100	90-100	50-92	25-62
	8-30	Clay, silty clay	CH	A-7	100	98-100	95-100	90-100	50-92	25-62
	30-60	Fine sandy loam, loam, silty clay loam.	ML, CL-ML, CL	A-4, A-6	100	95-100	65-100	51-100	<40	NP-20
Sa Sharkey	0-10	Silty clay loam	CL	A-6, A-7-6	100	100	100	95-100	32-50	11-25
	10-60	Clay	CH	A-7-6, A-7-5	100	100	100	95-100	56-85	30-50
Se Sharkey	0-7	Clay	CH, CL	A-7-6, A-7-5	100	100	100	95-100	46-85	22-50
	7-40	Clay	CH	A-7-6, A-7-5	100	100	100	95-100	56-85	30-50
	40-68	Clay, silty clay loam, silt loam.	CL, CH	A-6, A-7-6, A-7-5	100	100	100	95-100	32-85	11-50
Sh Sharkey	0-10	Clay	CH, CL	A-7-6, A-7-5	100	100	100	95-100	46-85	22-50
	10-36	Clay	CH	A-7-6, A-7-5	100	100	100	95-100	56-85	30-50
	36-60	Clay, silty clay loam, silt loam.	CL, CH	A-6, A-7-6, A-7-5	100	100	100	95-100	32-85	11-50
Sk Sharkey	0-10	Loamy fine sand	SM, SC, SM-SC	A-1-b, A-2-4	100	100	45-80	15-35	<20	NP-10
	10-60	Clay, silty clay	CH	A-7-6, A-7-5	100	100	95-100	95-100	55-85	30-50
Ta Tensas	0-3	Silty clay	CH, CL	A-7-6	100	100	100	95-100	46-70	22-40
	3-30	Clay, silty clay	CH	A-7-6	100	100	100	95-100	51-75	26-45
	30-60	Very fine sandy loam, silty clay loam, silt loam.	CL-ML, CL	A-4, A-6	100	100	100	80-100	25-40	5-17
Td:										
Tensas	0-3	Silty clay	CH, CL	A-7-6	100	100	100	95-100	46-70	22-40
	3-21	Clay, silty clay	CH	A-7-6	100	100	100	95-100	51-75	26-45
	21-60	Very fine sandy loam, silty clay loam, silt loam.	CL-ML, CL	A-4, A-6	100	100	100	80-100	25-40	5-17

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
Td:										
Dundee	0-8	Silty clay loam	CL, CL-ML, ML	A-4, A-6	100	100	90-100	75-98	20-35	3-11
	8-29	Silty clay loam, clay loam, sandy clay loam.	CL	A-6, A-7	100	100	90-100	70-95	28-44	12-22
	29-60	Loam, very fine sandy loam, silt loam.	CL, CL-ML, ML	A-4	100	100	85-100	60-90	<30	NP-8
Te:										
Tensas	0-6	Silty clay	CH, CL	A-7-6	100	100	100	95-100	46-70	22-40
	6-27	Clay, silty clay	CH	A-7-6	100	100	100	95-100	51-75	26-45
	27-60	Very fine sandy loam, silty clay loam, silt loam.	CL-ML, CL	A-4, A-6	100	100	100	80-100	25-40	5-17
Sharkey	0-8	Clay	CH, CL	A-7-6, A-7-5	100	100	100	95-100	46-85	22-50
	8-60	Clay	CH	A-7-6, A-7-5	100	100	100	95-100	56-85	30-50
Tn: Tunica	0-6	Clay	CH	A-7	100	98-100	95-100	90-100	50-92	25-62
	6-32	Clay, silty clay	CH	A-7	100	98-100	95-100	90-100	50-92	25-62
	32-60	Very fine sandy loam, loam, silty clay loam, silt loam.	ML, CL-ML, CL	A-4, A-6	100	95-100	65-100	51-100	<40	NP-20
Ts:										
Tunica	0-6	Clay	CH	A-7	100	98-100	95-100	90-100	50-92	25-62
	6-30	Clay, silty clay	CH	A-7	100	98-100	95-100	90-100	50-92	25-62
	30-60	Fine sandy loam, loam, silty clay loam.	ML, CL-ML, CL	A-4, A-6	100	95-100	65-100	51-100	<40	NP-20
Sharkey	0-7	Clay	CH, CL	A-7-6, A-7-5	100	100	100	95-100	46-85	22-50
	7-38	Clay	CH	A-7-6, A-7-5	100	100	100	95-100	56-85	30-50
	38-60	Clay, silty clay loam, silt loam.	CL, CH	A-6, A-7-6, A-7-5	100	100	100	95-100	32-85	11-50
TT:										
Tunica	0-6	Clay	CH	A-7	100	98-100	95-100	90-100	50-92	25-62
	6-24	Clay, silty clay	CH	A-7	100	98-100	95-100	90-100	50-92	25-62
	24-60	Fine sandy loam, loam, silty clay loam, silt loam.	ML, CL-ML, CL	A-4, A-6	100	95-100	65-100	51-100	<40	NP-20
Sharkey	0-7	Clay	CH, CL	A-7-6, A-7-5	100	100	100	95-100	46-85	22-50
	7-60	Clay	CH	A-7-6, A-7-5	100	100	100	95-100	56-85	30-50

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
Ar.										
Arents										
Br	0-6	10-18	1.30-1.65	0.6-2.0	0.21-0.23	5.6-7.3	Low	0.43	5	.5-4
Bruin	6-30	10-18	1.30-1.70	0.6-2.0	0.18-0.23	6.1-8.4	Low	0.37		
	30-60	---	---	---	---	---				
Bu:										
Bruin	0-8	10-18	1.30-1.65	0.6-2.0	0.21-0.23	5.6-7.3	Low	0.43	5	.5-4
	8-24	10-18	1.30-1.70	0.6-2.0	0.18-0.23	6.1-8.4	Low	0.37		
	24-65	---	---	---	---	---				
Commerce	0-6	14-27	1.35-1.65	0.6-2.0	0.21-0.23	5.6-7.8	Low	0.43	5	.5-4
	6-30	14-39	1.35-1.65	0.2-0.6	0.20-0.22	6.1-8.4	Moderate	0.32		
	30-60	14-60	1.35-1.65	0.2-2.0	0.20-0.23	6.6-8.4	Low	0.37		
Cm	0-6	14-27	1.35-1.65	0.6-2.0	0.21-0.23	5.6-7.8	Low	0.43	5	.5-4
Commerce	6-33	14-39	1.35-1.65	0.2-0.6	0.20-0.22	6.1-8.4	Moderate	0.32		
	33-65	14-60	1.35-1.65	0.2-2.0	0.20-0.23	6.6-8.4	Low	0.37		
Co	0-8	27-39	1.45-1.70	0.2-0.6	0.20-0.22	5.6-7.8	Moderate	0.37	5	.5-4
Commerce	8-25	14-39	1.35-1.65	0.2-0.6	0.20-0.22	6.1-8.4	Moderate	0.32		
	25-70	14-60	1.35-1.65	0.2-2.0	0.20-0.23	6.6-8.4	Low	0.37		
CR:										
Commerce	0-8	27-39	1.45-1.70	0.2-0.6	0.20-0.22	5.6-7.8	Moderate	0.37	5	.5-4
	8-26	14-39	1.35-1.65	0.2-0.6	0.20-0.22	6.1-8.4	Moderate	0.32		
	26-60	14-60	1.35-1.65	0.2-2.0	0.20-0.23	6.6-8.4	Low	0.37		
Bruin	0-6	10-18	1.30-1.65	0.6-2.0	0.21-0.23	5.6-7.3	Low	0.43	5	.5-4
	6-21	10-18	1.30-1.70	0.6-2.0	0.18-0.23	6.1-8.4	Low	0.37		
	21-60	---	---	---	---	---				
Cs	0-5	5-12	1.45-1.55	6.0-20	0.08-0.08	5.6-7.3	Low	0.15	5	.5-2
Crevasse	5-60	2-8	1.40-1.50	6.0-20	0.02-0.06	5.6-7.8	Low	0.15		
Cv	0-8	2-8	1.40-1.50	6.0-20	0.02-0.06	5.6-7.3	Low	0.15	5	.5-2
Crevasse	8-60	2-8	1.40-1.50	6.0-20	0.02-0.06	5.6-7.8	Low	0.15		
Dd	0-5	10-30	1.30-1.80	0.6-2.0	0.15-0.20	4.5-6.0	Low	0.43	5	.5-1
Dundee	5-37	18-34	1.30-1.80	0.2-0.6	0.15-0.20	4.5-6.0	Moderate	0.32		
	37-60	18-25	1.30-1.80	0.6-2.0	0.15-0.20	5.1-7.3	Low	0.32		
De	0-6	10-30	1.30-1.80	0.6-2.0	0.15-0.20	4.5-6.0	Low	0.43	5	.5-1
Dundee	6-36	18-34	1.30-1.80	0.2-0.6	0.15-0.20	4.5-6.0	Moderate	0.32		
	36-80	18-25	1.30-1.80	0.6-2.0	0.15-0.20	5.1-7.3	Low	0.32		
Go	0-8	10-18	1.30-1.65	0.6-2.0	0.18-0.22	5.1-6.0	Low	0.43	5	.5-4
Goldman	8-32	10-18	1.30-1.65	0.6-2.0	0.18-0.22	5.1-6.5	Low	0.37		
	32-60	10-22	1.30-1.65	0.6-2.0	0.15-0.20	5.1-6.5	Low	0.37		
Ne	0-7	40-55	1.20-1.50	0.06-0.2	0.12-0.20	5.6-7.3	High	0.32	5	.5-4
Newellton	7-17	40-55	1.20-1.60	0.06-0.2	0.12-0.20	5.6-7.8	High	0.32		
	17-60	10-28	1.30-1.65	0.2-2.0	0.20-0.22	5.1-8.4	Low	0.37		

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
Ng:										
Newellton-------	0-5	40-55	1.20-1.50	0.06-0.2	0.12-0.20	5.6-7.3	High---------	0.32	5	.5-4
	5-18	40-55	1.20-1.60	0.06-0.2	0.12-0.20	5.6-7.8	High---------	0.32		
	18-60	10-28	1.30-1.65	0.2-2.0	0.20-0.22	5.1-8.4	Low----------	0.37		
Goldman---------	0-8	27-39	1.30-1.65	0.2-0.6	0.18-0.22	5.1-6.0	Moderate-----	0.37	5	.5-4
	8-30	10-18	1.30-1.65	0.6-2.0	0.18-0.22	5.1-6.5	Low----------	0.37		
	30-60	10-22	1.30-1.65	0.6-2.0	0.15-0.20	5.1-6.5	Low----------	0.37		
Nm:										
Newellton-------	0-7	40-55	1.20-1.50	0.06-0.2	0.12-0.20	5.6-7.3	High---------	0.32	5	.5-4
	7-17	40-55	1.20-1.60	0.06-0.2	0.12-0.20	5.6-7.8	High---------	0.32		
	17-60	10-28	1.30-1.65	0.2-2.0	0.20-0.22	5.1-8.4	Low----------	0.37		
Tunica----------	0-5	35-75	1.45-1.55	<0.06	0.15-0.20	5.6-7.8	High---------	0.32	5	1-3
	5-31	35-75	1.45-1.55	<0.06	0.15-0.20	5.6-7.8	High---------	0.32		
	31-60	10-32	1.40-1.50	0.06-2.0	0.10-0.22	5.6-7.8	Low----------	0.32		
NT:										
Newellton-------	0-8	40-55	1.20-1.50	0.06-0.2	0.12-0.20	5.6-7.3	High---------	0.32	5	.5-4
	8-18	40-55	1.20-1.60	0.06-0.2	0.12-0.20	5.6-7.8	High---------	0.32		
	18-60	10-28	1.30-1.65	0.2-2.0	0.20-0.22	5.1-8.4	Low----------	0.37		
Tunica----------	0-8	35-75	1.45-1.55	<0.06	0.15-0.20	5.6-7.8	High---------	0.32	5	1-3
	8-30	35-75	1.45-1.55	<0.06	0.15-0.20	5.6-7.8	High---------	0.32		
	30-60	10-32	1.40-1.50	0.06-2.0	0.10-0.22	5.6-7.8	Low----------	0.32		
Sa--------------- Sharkey	0-10	27-35	1.40-1.75	0.2-0.6	0.20-0.22	5.1-7.3	Moderate-----	0.37	5	.5-4
	10-60	60-90	1.20-1.50	<0.06	0.12-0.18	5.6-8.4	Very high----	0.28		
Se--------------- Sharkey	0-7	40-60	1.20-1.50	<0.06	0.12-0.18	5.1-7.3	Very high----	0.32	5	.5-4
	7-40	60-90	1.20-1.50	<0.06	0.12-0.18	5.6-8.4	Very high----	0.28		
	40-68	25-90	1.20-1.75	0.06-0.2	0.12-0.22	6.6-8.4	High---------	0.28		
Sh--------------- Sharkey	0-10	40-60	1.20-1.50	<0.06	0.12-0.18	5.1-7.3	Very high----	0.32	5	.5-4
	10-36	60-90	1.20-1.50	<0.06	0.12-0.18	5.6-8.4	Very high----	0.28		
	36-60	25-90	1.20-1.65	0.06-0.2	0.12-0.18	6.6-8.4	High---------	0.28		
Sk--------------- Sharkey	0-10	2-12	1.40-1.70	6.0-20.0	0.05-0.11	5.1-7.3	Low----------	0.17	5	.5-1
	10-60	60-80	1.20-1.50	<0.06	0.14-0.16	5.1-8.4	Very high----	0.28		
Ta--------------- Tensas	0-3	40-60	1.20-1.50	<0.06	0.12-0.18	4.5-6.0	High---------	0.32	5	.5-4
	3-30	40-60	1.20-1.50	<0.06	0.12-0.18	4.5-6.0	High---------	0.32		
	30-60	10-39	1.30-1.80	0.2-2.0	0.20-0.23	5.1-7.3	Low----------	0.37		
Td:										
Tensas----------	0-3	40-60	1.20-1.50	<0.06	0.12-0.18	4.5-6.0	High---------	0.32	5	.5-4
	3-21	40-60	1.20-1.50	<0.06	0.12-0.18	4.5-6.0	High---------	0.32		
	21-60	10-39	1.30-1.80	0.2-2.0	0.20-0.23	5.1-7.3	Low----------	0.37		
Dundee----------	0-8	10-30	1.30-1.80	0.6-2.0	0.15-0.20	4.5-6.0	Low----------	0.43	5	.5-1
	8-29	18-34	1.30-1.80	0.2-0.6	0.15-0.20	4.5-6.0	Moderate-----	0.32		
	29-60	18-25	1.30-1.80	0.6-2.0	0.15-0.20	5.1-7.3	Low----------	0.32		
Te:										
Tensas----------	0-6	40-60	1.20-1.50	<0.06	0.12-0.18	4.5-6.0	High---------	0.32	5	.5-4
	6-27	40-60	1.20-1.50	<0.06	0.12-0.18	4.5-6.0	High---------	0.32		
	27-60	10-39	1.30-1.80	0.2-2.0	0.20-0.23	5.1-7.3	Low----------	0.37		
Sharkey---------	0-8	40-60	1.20-1.50	<0.06	0.12-0.18	5.1-7.3	Very high----	0.32	5	.5-4
	8-60	60-90	1.20-1.50	<0.06	0.12-0.18	5.6-8.4	Very high----	0.28		

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
Tn----------------- Tunica	0-6	35-75	1.45-1.55	<0.06	0.15-0.20	5.6-7.8	High----------	0.32	5	1-3
	6-32	35-75	1.45-1.55	<0.06	0.15-0.20	5.6-7.8	High----------	0.32		
	32-60	10-32	1.40-1.50	0.06-2.0	0.10-0.22	5.6-7.8	Low-----------	0.32		
Ts:										
Tunica------------	0-6	35-75	1.45-1.55	<0.06	0.15-0.20	5.6-7.8	High----------	0.32	5	1-3
	6-30	35-75	1.45-1.55	<0.06	0.15-0.20	5.6-7.8	High----------	0.32		
	30-60	10-32	1.40-1.50	0.06-2.0	0.10-0.22	5.6-7.8	Low-----------	0.32		
Sharkey-----------	0-7	40-60	1.20-1.50	<0.06	0.12-0.18	5.1-7.3	Very high----	0.32	5	.5-4
	7-60	60-90	1.20-1.50	<0.06	0.12-0.18	5.6-8.4	Very high----	0.28		
TT:										
Tunica------------	0-6	35-75	1.45-1.55	<0.06	0.15-0.20	5.6-7.8	High----------	0.32	5	1-3
	6-24	35-75	1.45-1.55	<0.06	0.15-0.20	5.6-7.8	High----------	0.32		
	24-60	10-32	1.40-1.50	0.06-2.0	0.10-0.22	5.6-7.8	Low-----------	0.32		
Sharkey-----------	0-7	40-60	1.20-1.50	<0.06	0.12-0.18	5.1-7.3	Very high----	0.32	5	.5-4
	7-60	60-90	1.20-1.50	<0.06	0.12-0.18	5.6-8.4	Very high----	0.28		

TABLE 17.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
Ar. Arents									
Br-----Bruin	B	None	---	---	>6.0	---	---	High	Low.
Bu:									
Bruin	B	None	---	---	>6.0	---	---	High	Low.
Commerce	C	None	---	---	1.5-4.0	Apparent	Dec-Apr	High	Low.
Cm, Co-----Commerce	C	None	---	---	1.5-4.0	Apparent	Dec-Apr	High	Low.
CR:									
Commerce	C	Frequent	Brief to long.	Jan-Dec	1.5-4.0	Apparent	Dec-Apr	High	Low.
Bruin	B	Frequent	Brief to long.	Jan-Dec	>6.0	---	---	High	Low.
Cs-----Crevasse	A	None	---	---	3.5-6.0	Apparent	Nov-Mar	Low	Moderate.
Cv-----Crevasse	A	Frequent	Brief to very long.	Jan-Dec	3.5-6.0	Apparent	Nov-Mar	Low	Moderate.
Dd, De-----Dundee	C	None	---	---	1.5-3.5	Apparent	Jan-Apr	High	Moderate.
Go-----Goldman	C	None	---	---	3.5-5.0	Apparent	Dec-Apr	Moderate	Moderate.
Ne-----Newellton	D	None	---	---	1.0-3.0	Apparent	Dec-Apr	High	Low.
Ng:									
Newellton	D	None	---	---	1.0-3.0	Apparent	Dec-Apr	High	Low.
Goldman	C	None	---	---	3.5-5.0	Apparent	Dec-Apr	Moderate	Moderate.
Nm:									
Newellton	D	None	---	---	1.0-3.0	Apparent	Dec-Apr	High	Low.
Tunica	D	None	---	---	1.5-3.0	Apparent	Jan-Apr	High	Low.
NT:									
Newellton	D	Frequent	Brief to long.	Jan-Dec	1.0-3.0	Apparent	Dec-Apr	High	Low.
Tunica	D	Frequent	Brief to long.	Jan-Dec	1.5-3.0	Apparent	Jan-Apr	High	Low.
Sa, Se-----Sharkey	D	Rare	---	---	0-2.0	Apparent	Dec-Apr	High	Low.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
Sh----------------- Sharkey	D	Frequent----	Brief to very long.	Jan-Dec	0-2.0	Apparent	Dec-Apr	High-----	Low.
Sk----------------- Sharkey	D	None--------	---	---	0-2.0	Apparent	Dec-Apr	High-----	Low.
Ta----------------- Tensas	D	None--------	---	---	1.0-3.0	Apparent	Dec-Apr	High-----	Moderate.
Td:									
Tensas-----------	D	Rare--------	---	---	1.0-3.0	Apparent	Dec-Apr	High-----	Moderate.
Dundee-----------	C	None--------	---	---	1.5-3.5	Apparent	Jan-Apr	High-----	Moderate.
Te:									
Tensas-----------	D	None--------	---	---	1.0-3.0	Apparent	Dec-Apr	High-----	Moderate.
Sharkey----------	D	None--------	---	---	0-2.0	Apparent	Dec-Apr	High-----	Low.
Tn----------------- Tunica	D	None--------	---	---	1.5-3.0	Apparent	Jan-Apr	High-----	Low.
Ts:									
Tunica-----------	D	None--------	---	---	1.5-3.0	Apparent	Jan-Apr	High-----	Low.
Sharkey----------	D	None--------	---	---	0-2.0	Apparent	Dec-Apr	High-----	Low.
TT:									
Tunica-----------	D	Frequent----	Brief to very long.	Jan-Dec	1.5-3.0	Apparent	Jan-Apr	High-----	Low.
Sharkey----------	D	Frequent----	Brief to very long.	Jan-Dec	0-2.0	Apparent	Dec-Apr	High-----	Low.

TABLE 18.--FERTILITY TEST DATA OF SELECTED SOILS

[Analyses by the Soil Fertility Laboratory, Louisiana Agricultural Experiment Station]

Soil name and sample number	Depth	Horizon	pH 1:1 H_2O	Organic matter	Extract-able P	Exchangeable cations						Total acidity	Effective cation-exchange capacity	Cation-exchange capacity (sum)	Base saturation (sum)	Saturation	
						Ca	Mg	K	Na	Al	H					Sum of cation-exchange capacity Na	Effective cation-exchange capacity Al
	In			Pct	ppm	Meq/100g									Pct	Pct	Pct
Bruin silt loam:	0-6	Ap	7.7	0.410	242	13.9	2.6	0.3	0.5	---	---	1.9	17.3	19.2	90.1	2.6	---
(S83LA-35-6)	6-12	Bw1	7.8	0.320	218	15.6	3.2	0.2	0.5	---	---	1.9	19.5	21.4	91.1	2.3	---
	12-24	Bw2	7.8	0.320	224	18.3	3.2	0.2	0.5	---	---	3.0	22.2	25.2	88.1	2.0	---
	24-30	BC	7.9	0.500	234	21.0	3.7	0.2	0.6	---	---	4.2	25.5	29.7	85.9	2.0	---
	30-35	C1	7.7	0.150	186	15.2	2.4	0.2	0.5	---	---	2.3	18.3	20.6	88.8	2.4	---
	35-44	C2	7.8	0.320	202	19.3	3.0	0.2	0.5	---	---	3.0	23.0	26.0	88.5	1.9	---
	44-52	C3	7.8	0.280	217	18.5	3.0	0.2	0.5	---	---	2.7	22.2	24.9	89.2	2.0	---
	52-60	C4	7.6	0.810	239	37.9	8.1	0.6	0.7	---	---	6.8	47.3	54.1	87.4	1.3	---
Bruin silt loam:	0-4	Ap1	6.1	0.680	182	10.7	2.5	0.4	0.5	---	---	4.2	14.1	18.3	77.0	2.7	---
(S83LA-35-12)	4-8	Ap2	5.6	0.500	175	11.6	2.8	0.2	0.5	---	---	4.9	15.1	20.0	75.5	2.5	---
	8-14	Bw1	7.0	0.460	191	19.4	5.9	0.2	0.6	---	---	4.9	26.1	31.0	84.2	1.9	---
	14-24	Bw2	7.9	0.190	203	15.4	4.1	0.1	0.4	---	---	2.7	20.0	22.7	88.1	1.8	---
	24-31	C1	7.6	0.003	163	7.7	2.0	0.1	0.4	---	---	1.5	10.2	11.7	87.2	3.4	---
	31-42	C2	7.7	0.010	149	12.6	2.4	0.1	0.4	---	---	1.1	15.5	16.6	93.4	2.4	---
	42-65	C3	7.6	0.003	99	5.1	1.1	0.1	0.4	---	---	0.8	6.7	7.8	89.7	5.1	---
Commerce silty clay loam:	0-8	Ap	5.8	1.030	212	17.1	4.3	0.6	0.5	---	---	6.8	22.5	29.3	76.8	1.7	---
(S83LA-35-10)	8-18	Bw	6.5	0.590	138	30.4	6.7	0.6	0.6	---	---	8.4	38.3	46.7	82.0	1.3	---
	18-25	BC	6.8	0.320	198	18.8	5.1	0.3	0.6	---	---	4.6	24.8	29.4	84.4	2.0	---
	25-35	C1	7.2	0.500	234	31.2	8.2	0.7	0.7	---	---	6.8	40.8	47.6	85.7	1.5	---
	35-55	C2	7.5	0.410	266	27.4	7.9	0.7	0.7	---	---	6.1	36.7	42.8	85.7	1.6	---
	55-70	C3	7.6	0.410	310	28.9	6.3	0.6	0.6	---	---	5.3	36.4	41.7	87.3	1.4	---
Commerce silt loam:	0-4	Ap1	6.1	0.850	250	14.9	3.8	0.5	0.5	---	---	4.6	19.7	24.3	81.1	2.1	---
(S83LA-35-11)	4-8	Ap2	6.6	0.940	249	15.9	4.0	0.4	0.5	---	---	4.6	20.8	25.4	81.9	2.0	---
	8-12	Bw1	6.9	0.590	189	20.6	5.9	0.5	0.5	---	---	5.7	27.5	33.2	82.3	1.5	---
	12-17	Bw2	7.0	0.370	235	18.1	4.9	0.3	0.6	---	---	4.2	23.9	28.1	85.1	2.1	---
	17-25	C1	7.3	0.240	242	14.0	3.8	0.2	0.6	---	---	1.9	18.6	20.5	90.7	2.9	---
	25-32	C2	7.8	0.100	230	13.8	3.8	0.2	0.5	---	---	2.7	18.3	21.0	87.1	2.4	---
	32-45	C3	7.8	0.150	239	14.0	3.7	0.2	0.5	---	---	1.5	18.4	19.9	92.5	2.5	---
	45-55	C4	7.8	0.150	221	13.5	3.6	0.2	0.5	---	---	2.3	17.8	20.1	88.6	2.5	---
	55-60	C5	7.7	0.320	228	19.9	5.9	0.4	0.5	---	---	4.6	26.7	31.3	85.3	1.6	---

TABLE 18.--FERTILITY TEST DATA OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	pH 1:1 H_2O	Organic matter	Extractable P	Exchangeable cations Ca	Mg	K	Na	Al	H	Total acidity	Effective cation-exchange capacity	Cation-exchange capacity (sum)	Base saturation (sum)	Saturation: Sum of cation-exchange capacity Na	Saturation: Effective cation-exchange capacity Al
	In			Pct	ppm	Meq/100g									Pct	Pct	Pct
Crevasse loamy fine sand: (S83LA-35-1)	0-5	Ap	5.0	0.640	65	3.5	0.6	0.1	0.4	---	---	2.4	4.6	7.0	65.7	5.7	---
	5-20	C1	6.4	0.010	102	4.6	1.1	0.1	0.4	---	---	0.4	6.2	6.6	93.9	6.1	---
	20-35	C2	7.7	0.100	117	7.1	2.2	0.1	0.5	---	---	0.0	9.9	9.9	100.0	5.1	---
	35-48	C3	7.7	0.060	117	7.2	2.1	0.1	0.4	---	---	0.2	9.8	10.0	98.0	4.0	---
	48-60	C4	7.6	0.100	118	6.7	2.1	0.1	0.5	---	---	0.4	9.4	9.8	95.9	5.1	---
Dundee silty clay loam: (S83LA-35-5)	0-6	Ap	5.1	1.430	49	20.2	5.8	0.5	0.5	0.3	0.5	13.3	27.8	40.3	67.0	1.2	1.0
	6-14	Btg1	5.0	0.770	28	28.7	7.0	0.5	0.6	0.4	1.2	13.7	38.3	50.5	72.9	1.2	1.0
	14-21	Btg2	4.9	0.500	41	30.5	8.4	0.6	0.7	1.4	2.0	16.3	43.5	56.5	71.2	1.2	3.2
	21-29	BCg1	5.0	0.460	77	29.2	8.2	0.5	0.8	0.7	0.5	15.2	39.9	53.9	71.8	1.5	1.8
	29-36	BCg2	5.3	0.320	88	20.0	6.5	0.4	0.7	0.5	0.4	10.6	28.5	38.2	72.3	1.8	1.8
	36-48	2Cg1	5.5	0.240	94	18.8	5.6	0.3	0.7	0.3	0.2	9.1	25.9	34.5	73.6	2.0	1.2
	48-67	2Cg2	5.6	0.150	123	17.8	5.2	0.3	0.6	0.2	0.0	8.4	24.1	32.3	74.0	1.9	0.8
	67-80	2Cg3	5.6	0.020	159	15.9	4.1	0.2	0.6	0.2	0.0	6.1	21.0	26.9	77.3	2.2	1.0
Dundee silt loam: (S83LA-35-9)	0-5	Ap	5.4	1.520	125	14.9	3.6	0.5	0.5	---	---	6.5	19.5	26.0	75.0	1.9	---
	5-9	Btg1	5.5	0.410	103	20.0	6.1	0.5	0.6	---	---	9.1	27.2	36.3	74.9	1.6	---
	9-15	Btg2	5.7	0.240	122	20.1	6.6	0.5	0.6	---	---	8.0	27.8	35.8	77.7	1.7	---
	15-25	BCg	5.8	0.190	143	18.6	6.3	0.4	0.6	---	---	6.8	25.9	32.7	79.2	1.8	---
	25-43	2Cg1	6.1	0.150	168	17.8	6.4	0.4	0.7	---	---	6.1	25.3	31.4	80.1	2.2	---
	43-60	2Cg2	6.2	0.060	246	16.6	5.9	0.4	0.6	---	---	4.9	23.5	28.4	82.7	2.1	---
Goldman silty clay loam: (S83LA-35-8)	0-4	Ap1	5.6	1.380	141	30.3	7.0	0.8	0.5	---	---	10.6	38.6	49.2	78.5	1.0	---
	4-8	Ap2	5.9	0.460	153	28.5	7.2	0.7	0.6	0.3	---	8.7	37.3	45.7	81.0	1.3	0.8
	8-21	Bt1	5.7	0.150	125	13.2	3.5	0.3	0.5	0.3	---	4.6	17.6	22.1	79.2	2.3	1.7
	21-25	Bt2	5.5	0.060	154	12.9	3.0	0.2	0.5	0.3	---	3.8	16.5	20.4	81.4	2.5	1.8
	25-31	BC1	6.1	0.010	137	9.2	1.2	0.1	0.5	---	---	3.4	11.0	14.4	76.4	3.5	---
	31-40	BC2	6.1	0.060	159	11.4	2.7	0.2	0.5	---	---	3.8	14.6	18.6	79.6	2.7	---
	40-52	C1	6.5	0.030	118	6.8	1.4	0.1	0.5	---	---	2.7	8.8	11.5	76.5	4.3	---
	52-60	C2	6.5	0.003	130	6.1	1.2	0.1	0.4	---	---	2.3	7.8	10.1	77.2	4.0	---
Goldman silt loam: (S83LA-35-14)	0-5	Ap1	5.5	1.380	75	11.0	3.2	0.3	0.1	---	---	2.4	14.6	16.9	85.8	0.4	---
	5-8	Ap2	5.6	0.770	92	11.8	3.4	0.2	0.1	---	---	6.5	15.5	22.1	70.6	0.5	---
	8-17	Bt1	5.7	0.320	100	11.2	3.6	0.2	0.1	---	---	5.7	15.1	20.8	72.7	0.6	---
	17-22	Bt2	5.9	0.150	103	11.3	3.8	0.2	0.1	---	---	5.1	15.4	20.5	75.1	0.6	---
	22-32	BC	5.9	0.060	115	8.8	2.9	0.2	0.1	---	---	3.8	12.0	15.8	76.0	0.7	---
	32-52	C1	6.0	0.060	119	9.0	3.0	0.2	0.1	---	---	3.8	12.3	16.1	76.3	0.8	---
	52-60	C2	6.3	0.060	157	11.3	3.7	0.2	0.2	---	---	4.2	15.4	19.6	78.5	0.9	---

TABLE 18.--FERTILITY TEST DATA OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	pH 1:1 H_2O	Organic matter	Extractable P	Exchangeable cations: Ca	Mg	K	Na	Al	H	Total acidity	Effective cation-exchange capacity	Cation-exchange capacity (sum)	Base saturation (sum)	Saturation: Sum of cation-exchange capacity Na	Saturation: Effective cation-exchange capacity Al
	In			Pct	ppm	Meq/100g									Pct	Pct	Pct
Newellton silty clay: (S83LA-35-4)	0-3	Ap1	5.6	2.270	159	34.4	10.8	1.0	0.5	0.2	---	11.8	46.9	58.5	79.8	0.8	0.4
	3-7	Ap2	5.7	1.470	128	36.5	10.8	0.9	0.5	0.2	---	12.9	48.9	61.6	79.1	0.8	0.3
	7-17	Bw	5.8	0.370	75	34.0	10.6	0.8	0.6	0.2	---	19.4	46.2	65.4	70.3	0.9	0.4
	17-27	2C1	5.9	0.320	171	19.6	6.9	0.5	0.6	0.1	---	7.2	27.7	34.8	79.3	1.7	0.4
	27-37	2C2	5.8	0.280	166	19.7	6.2	0.5	0.6	0.3	---	7.6	27.3	34.6	78.0	1.7	0.9
	37-49	2C3	5.1	0.280	49	20.2	5.8	0.5	0.6	0.2	---	6.1	27.3	33.2	81.6	1.8	0.7
	49-60	2C4	5.9	0.320	195	18.4	6.1	0.3	0.5	0.2	---	6.5	25.5	31.8	79.6	1.6	0.8
Sharkey clay: (S83LA-35-2)	0-5	Ap	6.0	1.500	206	41.8	11.8	1.0	0.5	---	---	12.7	55.1	67.8	81.3	0.7	---
	5-19	Bg1	5.8	1.210	137	40.8	12.8	0.7	0.6	---	---	13.7	54.9	68.6	79.9	0.9	---
	19-28	Bg2	6.7	0.770	181	38.6	12.3	0.5	0.7	---	---	8.7	52.1	60.8	85.7	1.2	---
	28-43	BCg	7.3	0.850	172	40.8	13.7	0.6	0.8	---	---	8.0	55.9	63.9	87.5	1.3	---
	43-47	Cg1	7.6	0.810	183	46.3	13.9	0.7	0.9	---	---	6.8	61.8	68.6	90.1	1.3	---
	47-60	Cg2	7.6	0.850	136	42.1	13.8	0.8	0.9	---	---	3.8	57.6	61.4	93.8	1.5	---
Sharkey clay: (S83LA-35-15)	0-6	Ap	6.6	1.250	146	30.8	10.8	1.2	0.3	---	0.2	12.0	43.1	54.3	77.9	<1.0	---
	6-16	Bg1	6.2	0.730	102	33.0	13.2	1.0	0.4	---	0.2	13.6	47.6	61.2	77.7	<1.0	---
	16-25	Bg2	6.8	0.670	114	35.2	13.9	0.9	0.8	---	0.2	10.9	50.8	61.7	82.3	1.2	---
	25-38	BCg	6.6	0.590	104	33.4	13.4	1.0	0.8	---	0.2	10.4	48.6	59.0	82.3	1.3	---
	38-60	Cg	7.1	0.460	76	33.9	13.5	1.0	0.9	---	0.2	10.4	49.3	59.7	82.5	1.5	---
Tensas silty clay: (S83LA-35-7)	0-3	Ap1	5.3	1.560	73	38.0	13.3	1.1	0.6	---	---	16.7	53.0	69.7	76.0	0.9	---
	3-6	Ap2	5.0	0.810	36	31.9	11.6	0.7	0.8	0.5	0.1	16.3	45.6	61.3	73.4	1.3	1.1
	6-11	Bt1	4.8	0.320	76	35.9	12.8	0.6	0.9	2.2	1.0	16.3	53.4	66.5	75.5	1.4	4.9
	11-18	Bt2	4.8	0.240	60	35.7	13.1	0.6	1.0	3.2	---	17.5	53.6	67.9	74.2	1.5	5.9
	18-27	Bt3	4.8	0.190	50	33.2	12.5	0.5	1.1	2.1	1.0	15.2	50.4	62.5	75.7	1.8	4.0
	27-34	2BC1	5.3	0.240	64	27.2	10.7	0.5	1.1	0.3	0.6	9.9	40.4	49.4	80.0	2.2	0.7
	34-45	2BC2	6.3	0.100	124	18.2	6.2	0.3	0.9	---	---	4.2	25.6	29.8	85.9	3.0	---
	45-54	2C1	6.6	0.060	170	15.8	5.3	0.2	0.9	---	---	2.7	22.2	24.9	89.2	3.6	---
	54-65	2C2	6.8	0.060	118	14.1	4.2	0.2	0.7	---	---	3.0	19.2	22.2	86.5	3.2	---
Tunica clay: (S83LA-35-3)	0-6	Ap	5.9	1.300	120	38.6	12.2	1.0	0.6	---	---	12.5	52.4	64.9	80.7	0.9	---
	6-18	Bg1	6.2	0.850	98	40.9	12.2	0.9	0.6	---	---	11.4	54.6	66.0	82.7	0.9	---
	18-32	Bg2	6.6	0.850	148	42.0	12.5	0.8	0.6	---	---	8.7	55.9	64.6	86.5	0.9	---
	32-49	2C1	6.8	0.280	204	17.5	5.2	0.3	0.5	---	---	4.9	23.5	28.4	82.7	1.8	---
	49-60	2C2	7.7	0.060	206	9.8	3.2	0.2	0.4	---	---	1.1	13.6	14.7	92.5	2.7	---

TABLE 19.--PHYSICAL ANALYSES OF SELECTED SOILS

[The symbol < means less than]

Soil name and sample number	Horizon	Depth from surface	Particle-size distribution: Sand: Very coarse (2.0-1.0)	Sand: Coarse (1.0-0.5)	Sand: Medium (0.5-0.25)	Sand: Fine (0.25-0.10)	Sand: Very fine (0.10-0.05)	Sand: Total sand (2.0-0.05)	Silt (0.05-0.002)	Clay (0.002)	Water content at tension: 1/3 bar	Water content at tension: 15 bar	WRD	Bulk density *: Air-dry	Bulk density *: Oven dry	Bulk density *: Field moist	COLE*
		In	Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct	G/cm^3	G/cm^3	G/cm^3	
Commerce silt loam: (S81LA35-3)	Ap	0-6	0.1	0.1	0.1	0.2	4.2	4.7	72.0	23.3	34.9	9.9	25.0	1.59	1.60	1.37	0.05
	Bw	6-24	0.0	0.1	0.2	0.5	4.9	5.7	58.5	35.8	40.7	16.0	24.7	1.65	1.67	1.42	0.06
	BC	24-33	0.0	0.1	0.3	1.0	18.0	19.4	63.2	17.4	32.4	7.7	24.7	1.49	1.50	1.36	0.03
	C1	33-43	0.1	0.1	0.2	0.7	16.0	17.1	69.9	13.0	31.4	4.8	26.6	1.47	1.51	1.43	0.02
	C2	43-56	0.1	0.1	0.1	0.4	5.4	6.1	66.5	27.4	36.7	12.6	24.1	1.50	1.52	1.31	0.05
	C3	56-65	0.1	0.1	0.1	1.9	31.4	33.6	54.7	11.7	28.5	5.3	23.2	1.52	1.53	1.45	0.02
Dundee silt loam: (S81LA35-2)	Ap	0-5	0.1	0.1	0.2	3.7	25.2	29.3	54.7	16.0	24.5	6.5	18.0	1.46	1.46	1.39	0.02
	Btg1	5-12	0.1	0.1	0.2	2.4	20.7	23.5	50.2	26.3	28.3	10.3	18.0	1.70	1.72	1.64	0.02
	Btg2	12-23	0.1	0.2	0.2	1.0	35.5	37.0	30.4	32.6	34.6	13.8	20.8	1.70	1.72	1.62	0.02
	BC1	23-29	0.1	0.3	0.2	1.9	34.5	37.0	40.7	22.3	30.6	9.5	21.1	1.59	1.59	1.53	0.01
	BC2	29-37	0.1	0.4	0.4	2.1	27.2	30.2	51.2	18.6	28.4	8.5	19.9	1.53	1.54	1.48	0.01
	2Cg1	34-47	0.1	0.3	0.4	1.6	10.8	13.2	61.6	25.2	32.2	11.6	20.6	1.55	1.56	1.48	0.01
	2Cg2	47-55	0.1	0.1	0.1	0.5	9.0	9.8	52.1	38.1	38.4	16.3	22.1	1.77	1.81	1.58	0.05
	2Cg3	55-60	0.1	0.3	0.4	1.2	20.1	22.1	54.0	23.9	32.0	10.6	21.4	1.59	1.60	1.49	0.02
Sharkey clay: (S81LA35-1)	Ap1	0-4	0.1	0.2	0.2	0.2	0.6	1.3	40.1	58.6	43.4	22.1	21.3	1.75	1.80	1.13	0.17
	Ap2	4-7	0.0	0.1	0.1	0.7	0.6	1.5	39.7	58.8	45.0	23.3	21.7	1.97	1.99	1.54	0.09
	Bg1	7-16	0.0	0.0	0.2	0.3	0.6	1.1	29.1	69.8	54.9	26.8	28.1	1.86	1.92	1.38	0.12
	Bg2	16-25	0.0	0.0	0.2	0.4	0.5	1.1	32.7	66.2	50.9	26.4	24.5	1.80	1.85	1.34	0.11
	BCg	25-40	0.0	0.0	0.0	0.3	0.4	0.7	28.2	71.1	58.9	28.3	30.6	1.78	1.82	1.31	0.12
	Cg	40-68	0.1	0.3	0.2	0.5	0.6	1.7	25.7	72.6	56.6	28.6	28.0	1.80	1.85	1.28	0.13

* COLE (Coefficient of Linear Extensibility): A quantitative method of determining shrink-swell behavior of soil. It is an estimate of the vertical component of swelling of a natural soil clod. COLE is expressed as: low (0.03), moderate (0.03-0.06), and high (0.06).

TABLE 20.--CHEMICAL ANALYSES OF SELECTED SOILS

Soil series and sample number	Horizon	Depth from surface	Extractable bases: Ca	Extractable bases: Mg	Extractable bases: K	Extractable bases: Na	Extractable acidity	Cation-exchange capacity (NH$_4$OAc)	Base saturation (NH$_4$OAc)	Organic matter	Nitrogen	C/N	pH 1:1 H_2O	pH 1:1 KCl	pH 1:2 $CaCl_2$	Extractable Iron	Extractable Aluminum	Extractable Hydrogen	Extractable Phosphorus: Bray 1	Extractable Phosphorus: Bray 2
		In	------------Meq/100g					------------	Pct	Pct	Pct	Pct				Pct	--Meq/100g	---	ppm	ppm
Commerce silt: (S81LA35-3)	Ap	0-6	18.0	4.8	0.8	0.3	0.5	17.8	134.0	1.0	0.11	9.3	7.3	6.5	6.8	0.4	0.0	0.0	39	462
	Bw	6-24	20.0	7.5	0.4	0.4	3.6	24.5	116.0	0.5	0.07	7.3	7.2	6.1	6.7	0.6	0.0	0.0	40	238
	BC	24-33	12.0	4.2	0.3	0.4	1.5	13.8	122.0	0.2	0.06	3.8	7.4	6.3	6.8	0.4	0.0	0.0	8	346
	C1	33-43	21.4	3.4	0.2	0.3	0.0	10.2	243.0	0.2	0.03	5.3	7.6	6.6	7.1	0.3	0.0	0.0	8	323
	C2	43-56	19.4	6.1	0.4	0.4	1.0	19.0	133.0	0.3	0.07	7.0	7.5	6.4	7.0	0.5	0.0	0.0	11	343
	C3	56-65	10.8	3.1	0.2	0.4	0.0	10.0	145.0	0.2	0.02	8.0	7.5	6.5	6.9	0.3	0.0	0.0	20	346
Dundee silt loam: (S81LA35-2)	Ap	0-5	6.7	1.4	0.2	0.1	3.2	11.6	72.4	0.5	0.08	6.6	5.0	4.2	4.5	0.4	0.0	0.2	40	59
	Btg1	5-12	8.9	3.0	0.1	0.3	7.3	17.4	70.7	0.3	0.05	6.0	4.7	3.5	4.1	0.5	1.0	0.3	13	24
	Btg2	12-23	11.0	4.6	0.3	0.5	11.4	22.2	73.9	0.2	0.02	11.0	4.7	3.4	4.0	0.4	2.1	0.4	20	33
	BC1	23-29	8.3	3.0	0.2	0.7	5.2	16.1	75.8	0.2	0.03	5.7	4.9	3.5	4.1	0.3	0.9	0.3	33	59
	BC2	29-37	7.8	3.0	0.2	1.2	4.2	15.0	81.3	0.1	0.03	4.3	5.0	3.7	4.4	0.2	0.2	0.2	40	107
	2Cg1	37-47	11.2	5.8	0.2	2.6	5.2	19.8	100.0	0.1	0.03	4.7	5.2	4.0	4.7	0.2	0.2	0.2	41	125
	2Cg2	47-55	17.0	9.2	0.4	3.7	6.2	33.4	90.7	0.2	0.04	5.0	6.6	5.4	6.2	0.1	0.0	0.0	45	151
	2Cg3	55-60	13.0	6.5	0.2	2.7	2.1	18.9	117.5	0.1	0.04	2.5	7.4	6.1	6.7	0.3	0.0	0.0	45	204
Sharkey clay: (S81LA35-1)	Ap1	0-4	24.9	10.0	0.9	0.6	8.3	35.0	104.0	6.4	0.13	49.1	6.0	5.2	5.7	0.8	0.0	0.0	60	159
	Ap2	4-7	26.0	10.5	0.7	0.4	10.9	30.4	124.0	1.0	0.13	8.1	6.3	5.2	5.8	0.8	0.0	0.0	41	166
	Bg1	7-16	26.7	12.8	0.7	1.0	11.4	39.5	104.0	0.5	0.09	5.9	6.3	5.1	5.8	0.9	0.0	0.0	28	104
	Bg2	16-25	25.7	14.0	0.7	1.2	10.4	35.3	118.0	0.5	0.08	6.2	6.5	5.3	6.2	0.6	0.0	0.0	41	140
	BCg	25-40	26.9	15.4	0.8	1.8	10.4	35.7	126.0	0.5	0.08	6.2	6.9	6.0	6.7	0.8	0.0	0.0	30	123
	Cg	40-68	39.1	16.0	0.8	2.2	6.2	37.7	154.0	0.4	0.08	5.0	7.1	6.4	7.0	0.7	0.0	0.0	28	120

* To calculate percent base saturation by sum of cations, divide sum of extractable bases by sum of extractable acidity multiplied by 100.

TABLE 21.--MINERALOGY DATA. ESTIMATED PERCENTAGES OF VERY FINE SAND, SILT, AND CLAY FRACTIONS OF SELECTED SOILS

[The symbol < means less than. Dashes indicate analyses not made or that no trace of the mineral was detectable]

Soil series and sample numbers	Depth from surface	Horizon	Very fine sand and silt fraction 2-100 microns: Weatherable minerals: Feldspars	Weatherable minerals: Micas	Weatherable minerals: Other	Resistant minerals: Quartz	Resistant minerals: Iron oxides	Resistant minerals: Other	Clay fraction < 2.0 microns: Smectite	Micaceous	Kaolinite	Quartz	Feldspar
	In												
Commerce silt loam:													
(S81LA35-3)	0-6	Ap	---	---	---	---	---	---	---	---	---	---	---
	6-24	Bw	27	4	3	63	1	2	---	---	---	---	---
	24-33	BC	26	3	4	64	1	2	---	---	---	---	---
	33-43	C1	27	3	4	62	1	3	---	---	---	---	---
	43-56	C2	---	---	---	---	---	---	---	---	---	---	---
	56-65	C3	---	---	---	---	---	---	---	---	---	---	---
Dundee silt loam:													
(S81LA35-2)	0-5	Ap	---	---	---	---	---	---	---	---	---	---	---
	5-12	Btg1	20	2	2	71	2	3	---	---	---	---	---
	12-23	Btg2	26	5	3	63	1	2	---	---	---	---	---
	23-29	BC1	29	5	4	60	1	1	---	---	---	---	---
	29-37	BC2	33	4	3	57	1	2	---	---	---	---	---
	37-47	2Cg1	31	4	3	58	1	2	---	---	---	---	---
	47-55	2Cg2	---	---	---	---	---	---	---	---	---	---	---
	55-60	2Cg3	---	---	---	---	---	---	---	---	---	---	---
Sharkey clay:	0-4	Ap1	---	---	---	---	---	---	---	---	---	---	---
(S81LA35-1)	4-7	Ap2	---	---	---	---	---	---	---	---	---	---	---
	7-16	Bg1	---	---	---	---	---	---	70-80	10-15	5-10	<5	Trace
	16-25	Bg2	---	---	---	---	---	---	70-80	10-15	5-10	<5	Trace
	25-40	BCg	---	---	---	---	---	---	70-80	10-15	5-10	<5	Trace
	40-68	Cg	---	---	---	---	---	---	---	---	---	---	---

TABLE 22.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Bruin	Coarse-silty, mixed, thermic Fluvaquentic Eutrochrepts
Commerce	Fine-silty, mixed, nonacid, thermic Aeric Fluvaquents
*Crevasse	Mixed, thermic Typic Udipsamments
Dundee	Fine-silty, mixed, thermic Aeric Ochraqualfs
Goldman	Coarse-silty, mixed, thermic Aquic Hapludalfs
Newellton	Clayey over loamy, montmorillonitic, nonacid, thermic Aeric Fluvaquents
Sharkey	Very-fine, montmorillonitic, nonacid, thermic Vertic Haplaquepts
Tensas	Fine, montmorillonitic, thermic Aeric Ochraqualfs
Tunica	Clayey over loamy, montmorillonitic, nonacid, thermic Vertic Haplaquepts

* The Crevasse soils in map unit Cs are taxadjuncts to the Crevasse series, because the surface layer is very strongly acid or strongly acid.

* U.S. GOVERNMENT PRINTING OFFICE : 1987 O - 493-554 : QL 3

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