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SOIL SURVEY

Cherokee County Texas

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

HOW TO USE THE SOIL SURVEY REPORT

THIS SURVEY of Cherokee County will help you plan the kind of farming that will protect your soils and provide good yields. It describes the soils; shows their location on a map; and tells what they will do under different kinds of management.

Find Your Farm on the Map

In using this survey, start with the soil map, which consists of the 79 sheets bound in the back of this report. These sheets, if laid together, make a large photographic map of the county as it looks from an airplane. You can see woods, fields, roads, rivers, and many other landmarks on this map.

To find your farm or ranch on the large map, use the index to map sheets. This is a small map of the county on which numbered rectangles have been drawn to show where each sheet of the large map is located.

When you have found the map sheet for your farm, you will notice that boundaries of the soils have been outlined, and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map.

Suppose you have found on your land an area marked with the symbol Ac. You learn the name of the soil this symbol represents by looking at the map legend. The symbol Ac identifies Amite fine sandy loam.

Learn About the Soils on Your Farm

Amite fine sandy loam and all the other soils mapped are described in the section, Descriptions of the Soils. Soil scientists, as they walked over the fields and through the woodlands, described and mapped the soils, dug holes and examined surface soils and subsoils; measured slopes with a hand level; noted differences in growth of crops, weeds, brush, or trees; and, in fact, recorded all the things about the soils that they believed might affect their suitability for farming.

As they mapped the soils, the scientists talked with farmers and others who work with soils. Then they placed the soil in a management group and in a land-capability group. A management group is a group of similar soils that need and respond to about the same kind of management. A land-capability group consists of one or more management groups; it shows the uses that can be made of the soil, and the kind and amount of managements needed to protect the soil and to obtain useful crops and other plants.

Amite fine sandy loam is in management group 1. Turn to the section, Use and Management of Soils, and read what is said about soils of group 1. You will want to study the table which tells you how much you can expect to harvest from Amite fine sandy loam under two levels of management.

Make a Farm Plan

For the soils on your farm or ranch, compare your yields and farm practices with those given in this report. Look at your fields for signs of runoff and erosion. Then decide whether or not you need to change your methods. The choice, of course, must be yours. This survey will aid you in planning new methods, but it is not a plan of management for your farm or any other farm in the county.

If you find that you need help in farm planning, consult the local representative of the Soil Conservation Service or the county agricultural agent. Members of the staff of your State agricultural experiment station and others familiar with farming in your county will also be glad to help you.

This publication on the soil survey of Cherokee County, Texas, is a cooperative contribution from the—

SOIL CONSERVATION SERVICE
TEXAS AGRICULTURAL EXPERIMENT STATION

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SOIL SURVEY OF CHEROKEE COUNTY, TEXAS

REPORT BY IRVIN C. MOWERY, TEXAS AGRICULTURAL EXPERIMENT STATION, AND HARVEY OAKES, SOIL SURVEY,[1] UNITED STATES DEPARTMENT OF AGRICULTURE

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UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH THE TEXAS AGRICULTURAL EXPERIMENT STATION

General Description of the County

THE SOIL survey of Cherokee County was made by the United States Department of Agriculture and the Texas Agricultural Experiment Station. Fieldwork was begun in 1939 and completed in 1948. The latest available census data and weather information have been incorporated in tables in the report; otherwise statements in this report refer to conditions in 1948.

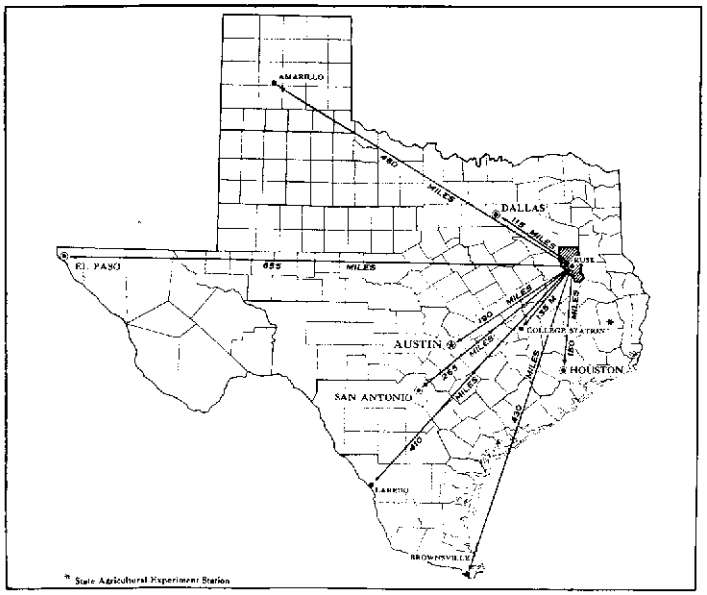


Figure 1.—Location of Cherokee County in Texas.

Location and Extent

Cherokee County is in east-central Texas, which is part of the forested Gulf Coastal Plain. It is bordered on the west by the Neches River, on the east by Rusk and Nacogdoches Counties, on the north by Smith County, and on the south by Angelina County. The approximate land area is 1,054 square miles, or 674,560 acres. Rusk, the county seat, is southeast of Dallas and north of Houston, the nearest deep-water port. Distances by air from Rusk to principal cities in the State are shown in figure 1.

History and Population

The county was first settled by white people in the early 1820's. It was organized in 1846, but before that, it was a part of Nacogdoches County. The name was taken from the Cherokee Indians who inhabited the county but were expelled after the Cherokee War in 1839. Most of the white settlers came from the older southeastern States; many brought slaves with them. A few settlers came from Mexico by way of El Camino Real (the King's Highway), which is now State Highway 21. The first settlements were at Larissa, Mount Selman, Grange Hall School, Rusk, Jacksonville, and Alto.

The population is unevenly distributed. The most thickly populated areas are in the northern third of the county, along most highways, and near small towns and communities. The county is sparsely settled in the hilly central parts, in the southwest, and in the southeast where lumber companies own large acreages of forests.

The population of the county, according to the 1950 census, was 38,694. Rusk, the county seat, had a population of 6,598; Jacksonville, the largest town, 8,607; Alto, 1,021; and Wells, 718.

Physiography, Relief, and Drainage

Cherokee County is in the interior of the Gulf Coastal Plain. The sandy, leached, medium to strongly

[1] Fieldwork for this survey was completed when Soil Survey was part of the Bureau of Plant Industry, Soils, and Agricultural Engineering. Soil Survey was transferred to the Soil Conservation Service on November 15, 1952.

acid soils have developed principally from clays and unconsolidated sands. The materials from which the soils weathered came from either continental or marine deposits. Several times during the Tertiary period, when these materials were being formed, the land was depressed below the sea and elevated above it. Consequently, marine deposits alternate with those formed under land conditions.

The Gulf Coastal Plain in Cherokee County slopes to the southeast. Although the prevailing terrain in the county is sloping, there are both hilly and nearly level areas. Most of the farming is practiced in the northern third of the county where the slopes are broad and gently rolling. Nearly all the drainageways are flanked by relatively short, strongly sloping sides, but the hills or strongly sloping terrain are mainly in the central part of the county. They extend from just north of Mount Selman southward, almost to Alto. This hilly section, however, is interspersed by smoother terrain. The hills have steep, rocky slopes and fairly flat sandy tops. The sandy mesas are underlain by a stratum of brown iron-bearing ore.

The nearly level areas are scattered throughout the county. They include about 22 square miles of stream terraces, which occur mainly in several small areas adjacent to the flood plains of the Neches and Angelina Rivers and Mud Creek. The largest stream terraces are southwest and west of Alto and Maydelle along the Neches River, and east and southeast of Alto along the Angelina River. About 10 miles east of Rusk is a small area of nearly level upland. Small depressions, known locally as mayhaw ponds, occasionally occur on nearly level areas. They are poorly drained and usually from 1 to 5 acres in extent. The depressions are seldom farmed. In the southern end of the county is an area of about 5 square miles of nearly level, heavy upland soils known locally as flatwoods. This area is dissected by shallow drainageways, but the heavy soils have a characteristic hog-wallowed surface consisting of shallow depressions and low mounds.

Cherokee County is well dissected by creeks and rivers. Except for the small flatwoods area, the mayhaw ponds, and some of the broad, poorly drained flood plains, most of the soils are drained sufficiently for the crops commonly grown in the county. Nearly all of the bottom lands overflow too frequently for use as cropland. The Neches River on the west, the Angelina River on the southeast, and Mud Creek in the eastern part of the county have broad, poorly drained flood plains. After the fall and winter overflow, 5 to 8 months are needed before these streams recede completely into their channels.

According to the United States Geological Survey, elevations in Cherokee County range from about 220 feet where the Neches and Angelina Rivers flow out of the county at the southern boundary to above 700 feet on the divide near Mount Selman.

Climate

The climate is warm-temperate, humid, and continental. The continental climate is modified by winds from the Gulf of Mexico. Summers are long and warm. The short and mild winters are characterized by short periods of clear, cold, or freezing weather, interspersed with cloudy and rainy periods and clear pleasant days. Valleys and low divides are often covered with frost in early morning, but freezing temperatures are of short duration.

Extremely hot or cold temperatures are rare. Sudden temperature changes are not very common during summer, but may occur frequently in winter. Rapid drops in winter temperature are caused by cold waves or sudden strong north winds called northers. Freezing weather is uncommon. Occasionally, the ground is frozen 4 to 6 inches deep, but cold spells seldom last longer than 4 or 5 days.

Temperature and precipitation data compiled from United States Weather Bureau station at Dialville are given in table 1.

The average frost-free season is 246 days, or from March 15 to November 16. The earliest recorded killing frost in fall was on October 27, and the latest in spring, April 25. Late killing frosts in spring do

TABLE 1.—*Normal temperature and precipitation*

[DIALVILLE, TEX., ELEVATION 575 FEET]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1917)	Wettest year (1946)	Average snowfall
	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*	*Inches*
December	49.2	92	13	4.68	0.70	3.33	0.6
January	48.1	83	−5	3.88	2.10	6.99	.5
February	51.4	92	−5	3.47	2.10	5.53	.2
Winter	49.6	92	−5	12.03	4.90	15.85	1.3
March	58.2	94	20	4.10	1.80	8.08	[3]
April	65.2	97	28	4.67	4.00	3.87	0
May	72.1	101	37	4.53	4.12	8.00	0
Spring	65.2	101	20	13.30	9.92	19.95	[3]
June	79.7	110	48	3.36	2.50	5.15	0
July	82.5	111	58	3.61	5.60	1.24	0
August	82.8	111	54	2.68	.20	6.07	0
Summer	81.7	111	48	9.65	8.30	12.46	0
September	77.7	108	40	2.95	3.20	3.08	0
October	67.8	101	25	3.46	.60	1.92	0
November	56.8	89	20	3.90	1.61	11.37	[3]
Fall	67.4	108	20	10.31	5.41	16.37	[3]
Year	66.0	111	−5	45.29	28.53	64.63	1.3

[1] Average temperature based on a 52-year record, through 1955; highest and lowest temperatures on a 32-year record, through 1930.

[2] Average precipitation based on a 52-year record, through 1955; wettest and driest years based on a 47-year record, in the period 1903–1955; snowfall, based on a 27-year record, through 1930.

[3] Trace.

more damage than early killing frosts in fall. A severe frost late in spring is particularly harmful to tomatoes because the young plants can be injured or lost while still in the coldframe. Peach buds, which have developed prematurely during a continued warm spell, are also damaged by spring frosts. Unless the orchards are protected by smudges during late cold spells, the peach crop can be damaged or, in some instances, completely destroyed. Field crops are also vulnerable and can be damaged severely or killed. Such crops are seldom planted, however, until the danger of a late frost is past.

The long warm summers are suited to many kinds of crops. Tomatoes and peaches do especially well, and they are grown for shipment to northern markets. Forage crops can be cut twice, and sometimes three times, during very favorable years. The long growing season favors the development of pastures and the production of livestock. Although animal production was not a major industry in the past, many farmers are now raising beef or dairy cattle on their improved pastureland.

Precipitation is rather uniform over the county and fairly well distributed throughout the year. Normally, it is heaviest in December, March, April, and May, and lowest in August. Rainfall varies from year to year, but the average is about 45 inches. This amount is sufficient for nearly all field crops and vegetables. Occasional torrential rains, especially in winter and spring, cause much damage through the erosion of unprotected fields. Light snows fall occasionally in winter but melt in a short time. Hailstorms are infrequent and occur locally, but occasionally they severely damage crops, especially tomatoes.

Water Supply

The water supply is obtained from wells, springs, streams, and artificial lakes. In general, the water is soft and of good quality, but in places it is hard and contains iron and other minerals. Water for drinking and household use in rural areas is obtained from wells near the house or from nearby springs. Depths of the wells vary from 15 to 50 feet, but most of them are about 30 feet deep. The wells seldom go dry, and they furnish ample water for home use. The county has many springs, most of which flow the year round. According to a ground-water survey made in 1936, the average spring flow is about 3 or 4 gallons per minute. Most farms have a plentiful supply of water for livestock.

City water comes from deep wells or artificial lakes. These wells are drilled to depths of 530 to 570 feet in the Carrizo sand, which yields good soft water. All city water is purified. Water from the shallow Queen City sands contains iron, but it can be used for livestock or irrigation. A few small areas near Alto are irrigated with water from shallow wells in the Queen City sands.

Vegetation

Cherokee County was forested originally by excellent stands of pine and hardwood trees. The sandy upland soils were covered by forests, mainly shortleaf pine, loblolly pine, hickory and post, blackjack, and southern red oaks. The bottom lands and heavy soils of the uplands were covered by hardwoods consisting mainly of oak, elm, pecan, and birch. The understory was a thin growth of broomsedge *(Andropogon virginicus)*, big bluestem *(A. gerardi)*, and other miscellaneous grasses with a scattering of small bushes *(7)*[2]. Those who have lived in the county a long time say that the original forest was reasonably free of scrubby oak, gum, French mulberry *(Callicarpa americana)*, and other shrubs which now form a dense undergrowth.

The deep loamy sands have a characteristic cover of sand jack and blackjack oaks mixed with pine, post oak, and a thin undercover of broomsedge, small shrubs, and bullnettle.

The flat, poorly drained river bottoms contain water and willow oaks, ironwood, mayhaw, and miscellaneous shrubs. In places there is an undercover of coarse water-loving grasses and reeds. The better drained bottom lands support a dense growth of winged elm, birch, pine, and post oak, with an undercover of switch cane *(Arundinaria tecta)* and unidentified grasses.

Idle or abandoned farm land is quickly revegetated by a dense cover of broomsedge, rosinweed, partridge-pea (*Cassia fasciculata* Michx.), and some sassafras and persimmon bushes. Oak, gum, and pine trees soon encroach upon the land from the sides and become established. Bermudagrass *(Cynodon dactylon)*, although not native, occurs in nearly every cleared area, regardless of whether it is being cultivated or not. Nearly all cultivated fields are infested with Texas millet *(Panicum texanum)*, locally known as Coloradograss, and with bermudagrass, crabgrass, unidentified vines, sassafras, and persimmon. Carpetgrass and common lespedeza grow well on practically all soils of the bottom lands and moderately well on those of the uplands.

Industries

More industries are located in Cherokee County than in neighboring counties. Agriculture, however, has been the principal industry since the county was first settled.

One of the earliest industries in the county was the smelting of iron ore mined from the caps of the hills nearby. Although this industry has never been very successful, large sums of money have been spent in an effort to develop it. The poor grade of ore and the lack of fuel for smelting retarded the successful development of the iron industry. After World War II a steel corporation completed the construction of a furnace at Rusk, which is now in operation. In 1948, about 100 tons per day of pig iron was being produced.

The lumber industry has always been an important source of income in Cherokee County. Productivity of the forests, however, has been so seriously impaired by poor management that the income from this re-

[2] Numbers in paraentheses refer to Literature Cited, page 57.

source will be reduced for many years. A few large areas of forests owned by lumber companies and by the State are being properly managed and harvested. These areas demonstrate the feasibility of sustained-yield management of private forests in the area. In 1948 small portable sawmills were located in all parts of the county, and large stationary mills were at Wells, Rusk, and Jacksonville. Logs were hauled by motortruck to the stationary mills from a radius of 40 to 50 miles. Most of the finished lumber was shipped by motortruck to markets outside the area.

Several industrial plants were located at Jacksonville and the larger towns in 1948. They were engaged in the manufacture of baskets and crates, garments and underwear, furniture, candy, and steel bodies for school buses. There were three canneries, two bottling plants, and a monument works in the county.

The extreme northeastern corner of the county is at the edge of the huge east Texas oilfield, the center of which lies to the north and east. Practically no petroleum is produced in Cherokee County.

Transportation and Markets

Lines of three major railroad systems—St. Louis Southwestern, Missouri Pacific, and Southern Pacific—intersect the county. Four Federal highwavs—U. S. routes 69, 79, 175, and 84—and four State highways —Texas routes 21, 294, 135, and 110—also serve the county. Direct connections can be made with northern markets and with Houston, the nearest deep-water port. U. S. Highway 175 gives a direct all-weather connection with Dallas and Fort Worth. Texas Highway 110 from Rusk connects the county with the east Texas oilfields.

Hard-surfaced, farm-to-market roads have been constructed. Nearly all farms are on or within 4 miles of an all-weather road. The unsurfaced roads are fairly well maintained. They are seldom impassable, except in the sandy places during extremely wet weather.

Most agricultural and industrial products are shipped out of the county. Tomatoes and other vegetables are sold to buyers from northern and eastern markets at the packing sheds in Jacksonville, Rusk, Alto, Wells, and other towns. This produce is shipped in carload lots to city markets. Jacksonville is the center of the east Texas green-wrap tomato industry.

Most of the lumber is sold at the mill and shipped by truck to other points in Texas and to adjacent States to the north and west. Cotton is sold to local buyers at the gin and shipped by truck or rail to Houston or Dallas. Beef cattle are auctioned locally or shipped to Fort Worth and Dallas. Cannery products are purchased at Jacksonville and Rusk by wholesalers for distribution throughout the country. Products of the eight crate and basket factories are sold both locally and to all parts of the United States.

Soil Survey Methods and Definitions

The scientist who makes a soil survey examines soils in the field, classifies the soils in accordance with facts that he observes, and maps their boundaries on an aerial photograph or other map.

FIELD STUDY.—The soil surveyor bores or digs many holes to see what the soils are like. The holes are not spaced in a regular pattern, but are located according to the lay of the land. Usually they are not more than a quarter of a mile apart and sometimes they are much closer. In most soils such a boring or hole reveals several distinct layers, called horizons, which collectively are known as the soil profile. Each layer is studied to see how it differs from others in the profile and to learn the things about this soil that influence its capacity to support plant growth.

Color is usually related to the amount of organic matter. The darker the surface soil, as a rule, the more organic matter it contains. Streaks and spots of gray, yellow, and brown in the lower layers generally indicate poor drainage and poor aeration.

Texture, or the content of sand, silt, and clay, is first determined by the way the soil feels when rubbed between the fingers, and it is later checked by laboratory analysis. Texture determines how well the soil retains moisture, plant nutrients, and fertilizer, and whether it is easy or difficult to cultivate.

Structure, which is the way the individual soil particles are arranged in larger grains and the amount of pore space between grains, gives us clues to the ease or difficulty with which the soil is penetrated by plant roots and by moisture.

Consistence, or the tendency of the soil to crumble or to stick together, indicates whether it is easy or difficult to keep the soil open and porous under cultivation.

Other characteristics observed in the course of the field study and considered in classifying the soil include the following: The depth of the soil over bedrock or compact layers; the presence of gravel or stones in amounts that will interfere with cultivation; the steepness and pattern of slopes; the degree of erosion; the nature of the underlying rocks or other parent material from which the soil has developed; and acidity or alkalinity of the soil as measured by chemical tests.

CLASSIFICATION.—On the basis of the characteristics observed by the survey team or determined by laboratory tests, soils are classified into phases, types, and series. The soil type is the basic classification unit. A soil type may consist of several phases. Types that resemble each other in most of their characteristics are grouped into soil series.

Soil type.—Soils having the same texture in the surface layer and similar in kind, thickness, and arrangement of other layers are classified as one soil type.

Soil phase.—Because of differences other than those of kind, thickness, and arrangement of layers, some soil types are divided into two or more phases. Slope variations, frequency of rock outcrops, degree of erosion, depth of soil over the substratum, or natural drainage, are examples of characteristics that suggest dividing a soil type into phases.

The soil phase (or the soil type if it has not been subdivided) is the unit shown on the soil map. It is the unit that has the narrowest range of character-

istics. Use and management practices, therefore, can be specified more easily than for soil series or yet broader groups that contain more variation.

Soil series.—Two or more soil types that differ in surface texture but are otherwise similar in kind, thickness, and arrangement of soil layers, are normally designated as a soil series. In a given area, however, it frequently happens that a soil series is represented by only one soil type. Each series is named for a place near which the soil was first mapped.

As an example of soil classification, consider the Susquehanna series. This series is made up of three soil types, all but one of which are subdivided into phases:

Series	*Type*	*Phase*
Susquehanna	Fine sandy loam	Gently sloping.
		Sloping.
		Sloping, eroded.
	Clay loam	Gently sloping.
		Sloping.
	Clay	Nearly level.

Miscellaneous land types.—Fresh stream deposits, or rough, stony, and severely gullied land that have little true soil are not classified into types and series, but are identified by a descriptive name, such as Marsh.

Soil complex.—When two or more soils are so intricately associated in small areas that it is not feasible to show them separately on the soil map, they are mapped together and called a soil complex. An example is the Bub-Nacogdoches complex.

Undifferentiated soils.—Two or more soils that are not regularly associated geographically may be mapped as an undifferentiated group (a single mapping unit) if the differences between them are too slight to justify a separation. Example: Cuthbert and Ruston fine sandy loams, sloping.

Soils of Cherokee County, Texas

General Soil Areas

The soils of Cherokee County are in four general soil areas: (1) Sandy and clayey soils of flood plains; (2) sandy and clayey soils of the redlands; (3) soils with compact subsoils; and (4) sandy soils with friable subsoils.

Each general soil area consists of soils that occur together in a characteristic pattern and make up a soil association. An association may consist of only a few or of many soils. The soils may be similar or may be of many types. Although closely associated geographically, the soils in an association may differ in their suitability for agricultural use. The colored map in the back of the report shows the generalized boundaries of the soil areas and soil associations.

Sandy and clayey soils of flood plains

Iuka-Bibb association.—Soils in this association occupy 106,400 acres, or about 16 percent of the county. They occur in small and large areas on the flood plains of streams throughout the county, but the largest areas are along the Neches and Angelina Rivers and Mud Creek. The soil series and percentages of each in the association are: Bibb, 37; Hannahatchee, 15; Iuka, 45; Ochlockonee, 2, and the miscellaneous land type, Marsh, 1. Bibb soils occur mainly in flood plains of the larger streams; Iuka and Ochlockonee soils are associated mainly with sandy soils that have friable and compact subsoils; and Hannahatchee soils occur mainly in the redlands section.

The soils of this association are not used extensively for crops because they are frequently overflowed, poorly drained, and mixed with poor soils. About 41 percent has been cleared, but only a small part is used for crops. The better drained, occasionally overflowed, Hannahatchee, Iuka, and Ochlockonee soils are cropped every year, but most of the soils are cropped intermittently or used for pasture. Bibb soils are seldom cleared because they are overflowed too often and are too poorly drained for crops.

Alluvial soils, except those of the Bibb series, are moderately productive and responsive to management. Frequent floods restrict their use for crops. Individual farmers cannot afford to protect the better drained soils on the narrow flood plains from overflow. Consequently, the best use of cleared areas is for improved pasture or for meadow. The soils are moderately well suited to forestry. Lands that contain good stands of commercially valuable forests should not be cleared. Bibb soils are better suited to hardwood trees than to pasture, and uncleared areas should remain in forest. Marsh is not suited to agriculture.

Soils of the Iuka-Bibb association also occur in small areas in association with soils of the uplands. They seldom account for more than 15 to 20 percent of the land on any one farm and, consequently, are used and managed in the same manner as the dominant upland soils. Alluvial soils, however, are more productive and drought resistant and less susceptible to erosion. Where floods are infrequent, the flood plain soils can be used for corn, cotton, or sorghum; where overflows and inadequate drainage make them unsuitable for crops, they can be used for hay or pasture. Fertilizer and legumes easily increase soil productivity; consequently, the management of these soils is less expensive and difficult than that of upland soils. On most farms, alluvial soils are the most valuable because they are well suited to cultivated crops, pasture, hay, or forestry. Their best use is determined by frequency of overflow, drainage, size of area, and type or system of farming practiced by the operator.

Soils well suited to crops occupy 66,100 acres, or 62 percent of the Iuka-Bibb association. Soils not suited to crops but suitable for pasture or forestry occupy 40,300 acres, or 38 percent.

Sandy and clayey soils of the redlands

Nacogdoches-Magnolia-Bub association.—This association contains 171,800 acres, or about 25 percent of the land in the county. It extends northwesterly in an irregular strip along both sides of U. S. Highway 69

from south of Alto northward to the county line. The soil series and percentage of each in the association are: Alto, 2.1; Amite, 0.3; Bub, 21.9 (in the mapping unit called Bub-Nacogdoches complex); Magnolia, 31; Nacogdoches, 41.9 and Percilla, 2.8.

Several soils in the association occur in a well-defined topographic pattern, whereas the remaining soils occupy a general position that is intermediate between the lowest and highest lying members of the association. Alto soils occupy nearly level shallow valleys or divides between heads of drainageways. The Bub-Nacogdoches complex occurs on strongly sloping to steep slopes above the other soils or on strongly sloping narrow areas adjacent to streams within areas of the less sloping soils. Nacogdoches and Magnolia soils occupy gently to strongly sloping areas between the extremes of these two topographic positions. Amite soils occur in a single large area on a high bench or terrace southwest of Alto. Percilla soils occupy small depressions.

Except for the Bub-Nacogdoches complex and the Percilla soils, this association contains some of the most productive and desirable soils for crops in the county. About 80 percent of the nearly level, gently sloping, and sloping areas have been cleared. Nearly half of the association, except the Bub-Nacogdoches complex, is used for crops. This is a high proportion, considering that, for the county as a whole, only a fourth of the land is cropped.

Because most of these soils occur in fairly large areas, the farmer has little difficulty in laying out fields that contain a large proportion of soils that are well suited to crops. The use of his soil largely depends on the size of his holdings and the type of farming he prefers. Soils suitable for crops are slightly to very susceptible to water erosion. Some soils are suitable for crops but require careful management. The management problems are controlling or reducing runoff and erosion, maintaining fertility, and selecting crops best adapted to the soils. These problems are not serious, and they are more or less common throughout the eastern part of the State.

Corn and cotton are the chief crops grown on this association. Small acreages are used for pasture, for tomatoes, peppers, cowpeas, melons, and other vegetables and fruits, and for forest. The strongly sloping soils not suited to crops are in forest. More owner-operators live on this association than in other parts of the county, although the soil management is only slightly, if any, better than in other areas. These naturally productive soils support the most prosperous type of agriculture in the county.

The Bub-Nacogdoches complex is unsuitable for crops and has low value for pasture, but it is well suited to timber. Percilla soils are not suited to crops, unless they are artificially drained. They are moderately well suited to pasture or forest.

Other soils in the association are well suited to special and common field crops, vegetables, and tree fruits; to the raising of livestock; or to a combination of these uses with forestry. Topography favors the use of motor-driven equipment and the efficient operation and management of large farms.

Soils well suited to crops occupy 66,000 acres, or 38 percent of the association; those moderately well suited to crops 15,400 acres, or 9 percent; and those unsuited to crops but suitable for pasture or forestry 90,400 acres, or 53 percent.

Soils with compact subsoils

Boswell-Susquehanna association.—This soil association contains about 118,350 acres, or about 18 percent of the county. The soil series and percentage of each in the association are: Boswell, 86; Garner, 1; and Susquehanna, 13. Garner clay, the nearly level phase of Susquehanna clay, and the gently sloping phase of Susquehanna clay loam occur in the southern part of the county. The various phases of Boswell and Susquehanna fine sandy loams are mainly in the east-central and northeastern parts, where they occur in a poorly defined pattern. For the most part, Boswell soils occupy ridgetops and the stronger sloping hillsides above the less sloping Susquehanna soils. However, either soil may occur in any position.

These soils are of low to moderate fertility, and consequently, as cropland, they are the least valuable and desirable in the county. They are droughty and hard to work because the surface soils are thin and the subsoils are of dense clay. In years of low rainfall, the yields are very uncertain. Corn, cotton, sorghum, peanuts, and early tomatoes are the principal crops grown on the sandy loams, and sorghum and cotton are the main crops on the clays and clay loams. Yields are low to moderate. Pears and other tree fruits do well on the Boswell and Susquehanna fine sandy loams. All soils in the association are well suited to pine and, except for the gently sloping and nearly level phases, should be used for forestry. Very good pastures can be developed on the less sloping areas if large quantities of fertilizers are used.

The soils are very susceptible to erosion, and only a small part of their acreage is suitable for cultivation. Where gradients exceed 2 or 3 percent, very careful management is needed to reduce runoff, to control erosion, and to maintain productivity. The profits derived from farming these soils do not pay the extra cost of the careful management that is needed to increase productivity, reduce runoff, and prevent erosion. Small areas of nearly level and gently sloping soils are intermixed with large areas of strongly sloping soils. Consequently, fields suitable for tillage are generally small. The rigid management required for these soils does not allow them to be used intensively for crops. It is best to use large blocks of this land for combined production of crops, livestock, and forest.

Subsistence farming is common in this soil association. Corn, feed, and vegetables are grown mainly for home use in small irregular-shaped fields. Farm operators obtain most of their income by working in local sawmills, cutting timber, or from other enterprises. Only a small part of the land is cropped or used for pasture. The greater part is in forest. Better management of pastures, forests, and croplands would improve the standard of living for the people on these soils.

Soils moderately well suited to crops occupy 58,000 acres, or 49 percent of this association. Those not

suited to crops but suitable for pasture or forestry cover 60,350 acres, or 51 percent. No soil in the association is well suited to crops.

Sandy soils with friable subsoils

Bowie-Lakeland-Eustis association.—This association occupies 277,900 acres, or about 41 percent of the county. It occurs in large areas, mainly in the north-central, southern, and western parts of the county. Other small areas are scattered throughout the county. The soil series and percentage of each in the association are: Bowie, 41.6; Caddo, 2.6; Cahaba, 0.4; Cuthbert, 8.1 (in the undifferentiated mapping unit, Cuthbert and Ruston soils); Eustis, 14.9; Huckabee, 1.3; Independence, 3.8; Lakeland, 15.8; and Ruston, 11.5. The Eustis, Huckabee, Independence, and Lakeland soils are deep loamy sands.

The soils of this association are intermixed in small and large areas. The soil pattern is indefinite except on mesas, which have large areas of Lakeland soils, and on major stream terraces, which have Independence, Huckabee, and Cahaba soils.

Soils in the Bowie-Lakeland-Eustis association are fine sandy loams and loamy fine sands; they have friable subsoils. Few farms, if any, consist entirely of only one of these soils. These deep friable soils are of low productivity and very susceptible to leaching. Large quantities of mixed fertilizers and frequent additions of organic matter are needed to produce high crop yields. The soils are easily worked, very responsive to management, and adapted to many crops. Sloping areas are very susceptible to erosion, which can be controlled by using erosion-resistant crops and keeping the land in forests.

This association is the largest and contains the most important group of agricultural soils in the county. On these soils is grown a large part of the county's special crops, field crops, and vegetables. In the last decade the trend has been toward growing tomatoes, peppers, yams, peanuts, and cowpeas. Although only small quantities of these crops are now grown, it is probable that the acreage may be expanded in the future.

Small farms, irregular fields, and small implements characterize the farming in this association. Operators use large quantities of commercial fertilizers, but other management is not practiced. Most of the farm income is derived from special crops and truck crops. Much of the cleared land is idle each year, owing to the scarcity of labor and mechanical equipment. Idle land is pastured, but it furnishes little income. Moderate to high yields of valuable crops are grown. On the whole, operators of small farms do not enjoy a high standard of living because they depend on one crop for cash income. Soils suitable for crops occur mainly in small areas. Strongly sloping soils unsuitable for crops, intermixed with the better soils, limit the size of fields and restrict large-scale farming in the association.

The loamy sands are well suited to early vegetables, special crops or truck crops, and small fruits, whereas the fine sandy loams are moderately well suited to the field crops commonly grown. Except for the loamy sands, most of the soils are moderately well suited to pasture. As the raising of livestock increases, many old fields will be developed into pastures of moderate to high carrying capacity. The loamy sands are poor for pasture but are moderately well suited to pine trees. All soils in the association are moderately well suited to forestry, and the more sloping areas probably will remain in trees.

Soils well suited to crops occupy 131,000 acres, or 47 percent of the association; those moderately well suited to crops occupy 74,100 acres, or 27 percent; and those unsuited to crops but suitable for pasture or forestry occupy 72,700 acres, or 26 percent.

TABLE 2.—*Approximate acreage and percentage in various uses and total acreage of soils mapped*

Soils	Uses of Soils						Total in county [1]	
	Cropland		Pasture [2]		Forest			
	Acres	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*
Alto clay loam	1,755	45	1,950	50	195	5	3,900	0.6
Alto loam	224	56	156	39	20	5	400	.1
Amite fine sandy loam	640	80	160	20			800	.1
Bibb clay loam			2,317	7	30,783	93	33,100	4.9
Bibb fine sandy loam			464	8	5,336	92	5,800	.9
Boswell fine sandy loam:								
Gently sloping	1,850	50	999	27	851	23	3,700	.6
Sloping	7,704	18	12,840	30	22,256	52	42,800	6.3
Sloping, eroded	1,710	45	1,292	34	798	21	3,800	.6
Strongly sloping			935	2	45,815	98	46,750	6.9
Strongly sloping, eroded			3,510	90	390	10	3,900	.6
Boswell sandy clay loam, strongly sloping, severely eroded			200	100			200	(3)
Bowie fine sandy loam:								
Nearly level	990	90	55	5	55	5	1,100	.2
Gently sloping	9,744	58	4,536	27	2,520	15	16,800	2.5
Sloping	18,225	45	13,365	33	8,910	22	40,500	6.0
Sloping, eroded	636	53	504	42	60	5	1,200	.2
Bowie loamy fine sand:								
Gently sloping	5,916	51	2,784	24	2,900	25	11,600	1.7
Sloping	19,125	45	12,325	29	11,050	26	42,500	6.3
Sloping, eroded	1,064	56	741	39	95	5	1,900	.3
Bub-Nacogdoches complex			1,128	3	36,472	97	37,600	5.6

TABLE 2.—*Approximate acreage and percentage in various uses and total acreage of soils mapped—Continued*

Soils	Uses of Soils						Total in county[1]	
	Cropland		Pasture[2]		Forest			
	Acres	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*
Caddo fine sandy loam:								
Level			174	3	5,626	97	5,800	0.9
Sloping			10	1	990	99	1,000	.2
Caddo very fine sandy loam, mound phase			140	35	260	65	400	(3)
Cahaba fine sandy loam	980	98			20	2	1,000	.1
Cuthbert and Ruston fine sandy loams:								
Sloping	264	33	296	37	240	30	800	.1
Strongly sloping			1,224	6	19,176	94	20,400	3.0
Strongly sloping, eroded	154	11	1,176	84	70	5	1,400	.2
Eustis loamy fine sand:								
Nearly level	4,692	51	2,852	31	1,656	18	9,200	1.4
Sloping	9,900	50	6,336	32	3,564	18	19,800	2.9
Sloping, eroded	66	33	124	62	10	5	200	(3)
Strongly sloping	708	6			11,092	94	11,800	1.7
Strongly sloping, eroded	20	5	360	90	20	5	400	.1
Garner clay			14	1	1,386	99	1,400	.2
Hannahatchee clay loam	99	11	621	69	180	20	900	.1
Hannahatchee fine sandy loam	1,520	10	11,400	75	2,280	15	15,200	2.3
Huckabee loamy fine sand	396	11	576	16	2,628	73	3,600	.5
Independence loamy fine sand:								
Nearly level	1,105	13	1,020	12	6,375	75	8,500	1.3
Sloping	84	6	154	11	1,162	83	1,400	.2
Strongly sloping					600	100	600	.1
Iuka clay loam	274	2	3,836	28	9,590	70	13,700	2.0
Iuka fine sandy loam	1,023	3	22,506	66	10,571	31	34,100	5.1
Lakeland loamy fine sand:								
Nearly level	3,276	42	2,652	34	1,872	24	7,800	1.2
Sloping	8,815	41	7,525	35	5,160	24	21,500	3.2
Sloping, eroded	46	46	49	49	5	5	100	(3)
Strongly sloping			435	3	14,065	97	14,500	2.2
Magnolia fine sandy loam:								
Gently sloping	6,160	80	770	10	770	10	7,700	1.1
Sloping	18,060	70	2,580	10	5,160	20	25,800	3.8
Strongly sloping			382	2	18,718	98	19,100	2.8
Marsh			1,400	100			1,400	.2
Nacogdoches fine sandy loam:								
Gently sloping	5,775	75	770	10	1,155	15	7,700	1.1
Sloping	10,752	56	4,992	26	3,456	18	19,200	2.8
Sloping, eroded	7,395	51	6,380	44	725	5	14,500	2.2
Strongly sloping			1,266	6	19,834	94	21,100	3.1
Strongly sloping, eroded	468	6	6,552	84	780	10	7,800	1.2
Nacogdoches clay loam:								
Gently sloping	335	67	155	31	10	2	500	.1
Sloping	220	55	160	40	20	5	400	.1
Sloping, eroded	225	45	275	55			500	.1
Strongly sloping, eroded			200	100			200	(3)
Ochlockonee loamy fine sand	110	5	1,430	65	660	30	2,200	.3
Percilla soils	92	2	414	9	4,094	89	4,600	.7
Ruston fine sandy loam:								
Gently sloping	1,340	67	360	18	300	15	2,000	.3
Sloping	2,850	57	1,200	24	950	19	5,000	.7
Sloping, eroded	165	55	135	45			300	(3)
Ruston loamy fine sand:								
Gently sloping	1,740	60	725	25	435	15	2,900	.4
Sloping	3,773	49	2,233	29	1,694	22	7,700	1.1
Ruston and Bowie loamy fine sands, strongly sloping			994	7	13,206	93	14,200	2.1
Susquehanna fine sandy loam:								
Gently sloping	366	6	1,586	26	4,148	68	6,100	.9
Sloping	527	17	1,271	41	1,302	42	3,100	.5
Sloping, eroded	286	22	884	68	130	10	1,300	.2
Susquehanna clay loam:								
Gently sloping	240	6	1,120	28	2,640	66	4,000	.6
Sloping	45	5	378	42	477	53	900	.1
Susquehanna clay, nearly level			36	9	364	91	400	.1
Total	163,929		162,389		348,132		674,450	99.8

[1] Does not include 50 acres in miscellaneous land (cemeteries, 25 acres; gravel pits, 25 acres) and 60 acres in water.

[2] Includes idle and urban areas.

[3] Less than 0.1 percent.

Descriptions of the Soils

In the following pages the soil series, soil types and phases, and miscellaneous land types are described in detail and their relationship to agriculture is explained to the extent that present knowledge permits. The approximate acreage in various uses and total acreage of the soils mapped in this county are listed in table 2. The location and distribution of the soils are shown on the soil map at the end of the report.

Alto series

The Alto series consists of dark soils with yellowish-brown clayey subsoils (fig. 2). Alto soils developed on the uplands from slowly drained glauconitic formations. Their development took place under a savannah vegetation. Alto soils are associated with soils of the Bub, Nacogdoches, and Percilla series. Alto soils are nearly all cleared. They are better drained than the lower situated Percilla soils, but less well drained than the surrounding sloping and strongly sloping areas occupied by the Bub and Nacogdoches soils.

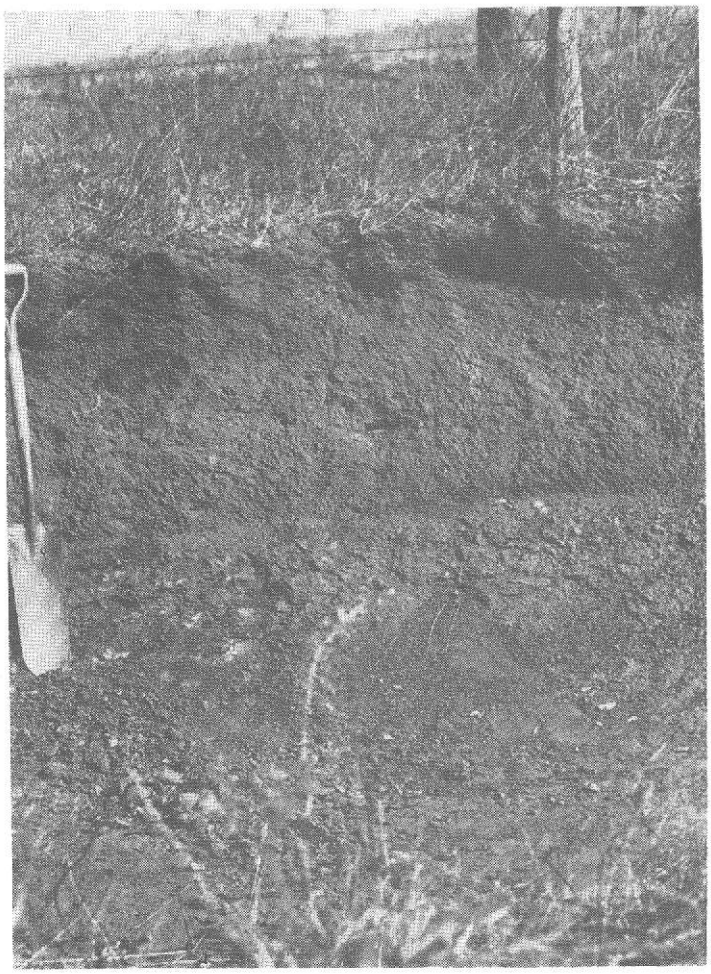


***Figure 2.*—Soil profile of Alto clay loam showing contact with ironstone in substratum.**

Alto clay loam (0 to 1 percent slopes) (Ac).—This soil is the most extensive member of the Alto series. It drains slowly and cannot be plowed until late in spring, but in years of normal rainfall it is very productive. Crop yields are irregular when the summer rains are scanty.

Representative profile (1 mile south of Alto):

0 to 10 inches, dark-brown or dark grayish-brown gritty clay loam; small shotlike iron oxide concretions are numerous; strongly granular; friable; slightly acid.

10 to 24 inches, dark yellowish-brown gritty clay or heavy clay loam; small iron oxide concretions make up 15 to 30 percent of the volume; massive but permeable; friable when moist; very hard and, in places, moderately to weakly cemented when dry; strongly acid.

24 to 44 inches, yellowish-brown gritty clay or clay loam; slightly less hard and contains fewer iron concretions than layer above.

44 to 77 inches +, mottled yellowish-brown and pale-yellow clay loam; contains a few large iron oxide concretions; grades into residuum of glauconitic earth at depths of 5 to 8 feet; strongly acid.

VARIATIONS: Surface soil ranges from dark brown to dark grayish brown or grayish brown in color and from 8 to 18 inches in thickness; volume of fine iron oxide concretions ranges from 5 to 25 percent; subsoil is yellowish brown or brownish yellow, and slightly mottled with pale yellow or with other shades of brown in places; cementation of upper subsoil ranges from none to moderate in small local areas but varies within short distances. Ironstone of the kind in Ground-Water Laterite soils occurs erratically below depths of 2½ to 4 feet.

Parent Material: Residuum from glauconite or glauconitic earth of the Weches greensand member of the Mount Selman formation.

Relief and Drainage: Nearly level areas and shallow valleys on the uplands; surfaces, concave to flat, with slopes of less than 1 percent; surface drainage is slow or lacking, and internal drainage is slow to very slow; water table near the surface in undisturbed areas during wet seasons. Field crops are successfully grown on undrained soil, but inadequate drainage limits the yields and kinds of crops that may be grown.

Erosion: Not susceptible.

Native Vegetation: Savannah forest of willow oak, pin oak, and elm; a fairly dense cover of coarse grasses.

Location: In small areas, mainly in the south-central part of the county, and is associated with large areas of Nacogdoches soils; largest area is near Alto.

Utilization: Practically all of this soil is cleared and used for pasture, native hay, and cotton, corn, sorghum, and cowpeas.

Suitability: Moderately suited to crops if not drained; well suited and moderately to highly productive if artificially drained. Excellent for improved pasture, meadow, or cultivated hay crops. Pasture is probably the best use for this soil, as excellent stands of lespedeza and dallisgrass can be grown. Management group 3.

Alto loam (0 to 1 percent slopes) (Ab).—This soil differs from Alto clay loam in having a coarser textured and slightly lighter colored surface layer. In addition, it warms up and dries earlier in spring. Alto loam is slightly less productive than Alto clay loam, but internal drainage and crop adaptations are about the same.

Representative profile (5 miles southeast of Jacksonville):

0 to 10 inches, brown to dark-brown loam; small dark shotlike concretions numerous; friable; lower 3 to 6 inches a gritty clay loam; medium acid.
10 to 34 inches, yellowish-brown gritty clay loam or light clay; small concretions of iron oxide numerous; massive; permeable; friable when moist, very hard when dry; strongly acid.
34 to 50 inches +, yellowish-brown sandy clay or clay loam; soil, by volume, is 30 to 50 percent iron oxide concretions; crumbly and friable when moist, weakly cemented when dry; strongly acid.
VARIATIONS: Surface soil ranges from 8 to 14 inches in thickness. Where overwash came from light-colored sandy soils, surface texture is fine sandy loam. Second horizon yellowish brown to dark yellowish brown, weakly cemented. Parent material, beginning at depths of 28 to 45 inches, is weakly to strongly cemented when dry.

Parent Material: Residuum from glauconite or glauconitic earth.
Relief and Drainage: Nearly level areas and shallow valleys with slopes of less than 1 percent; surface drainage slow; internal drainage very slow; water table near the surface during wet seasons; drainage is adequate for field crops commonly grown, but planting is delayed occasionally in wet years.
Erosion: Not susceptible.
Native Vegetation: Post and water oaks, elm, and some pine.
Location: In small areas, mainly in the north-central part of the county.
Utilization: Nearly all cleared and cultivated; principal crops are corn, cotton, and sorghum, in the order named.
Suitability: Well suited to common field crops; pasture, or meadow. Management group 3.

Amite series

The soil of the Amite series has a well-drained reddish surface layer and red friable sandy clay subsoil. It occurs on nearly level to gently sloping, high, old stream terraces. The alluvium on which it formed has washed mainly from the Nacogdoches, Magnolia, Bub, Boswell, and associated soils. The Amite series resembles the Cahaba and Independence series but differs from them principally in having a redder surface soil and a more reddish and clayey subsoil.

Amite fine sandy loam (0 to 1 percent slopes) (Ac).—This productive soil occurs mainly on the nearly level high terraces along the Neches River. It is one of the best soils in the county. It is easy to work and is very responsive to management. The soil readily absorbs and retains moisture for plant growth.

Representative profile (6 miles southwest of Alto along State Highway 21):

0 to 14 inches, reddish-brown fine sandy loam; very friable; slightly acid.
14 to 24 inches, red sandy clay loam; crumbly and friable; permeable; medium acid.
24 to 40 inches, red sandy clay; weakly blocky and moderately crumbly; friable when moist, sticky and plastic when wet; strongly acid.
40 to 60 inches, red sandy clay loam; massive; permeable; friable; strongly acid.
60 to 80 inches +, yellowish-red acid sandy and clayey alluvium, mottled or splotched with yellow; more or less stratified.
VARIATIONS: Surface soil ranges from brown to reddish-brown in color, from fine sandy loam to loam in texture, and from 10 to 20 inches in thickness; heavier where surface soil has been thinned by erosion; second horizon, sandy clay to clay loam.

Parent Material: Sandy and clayey alluvial sediments washed mainly from the redlands and the associated forested soils of east Texas; acid.
Relief and Drainage: Level to very gently sloping; slopes usually less than 1 percent; surface and internal drainage both medium and very favorable for crops. About 5 percent of this soil is in bands that surround small depressed areas of Percilla soils and have surface gradients of 1 to 2 percent.
Erosion: Not susceptible except in narrow bands on gently sloping areas.
Native Vegetation: Savannah forest with thick ground cover of bunchgrasses, mainly little bluestem and broomsedge; now largely cleared and cultivated.
Location: Mostly in two areas, one about 5 miles southwest and the other 7 miles east of Alto.
Utilization: For orchards, truck crops, and general crops. Principal crops, in the order of their importance, are cotton, corn, tomatoes, peanuts, sorghum, vegetables, and nursery trees.
Suitability: Well suited to all crops commonly grown in the area. Management group 1.

Bibb series

The Bibb series consists of poorly drained acid alluvial soils. Bibb soils occupy nearly level flood plains of streams that drain light-colored forested soils. They are frequently under water for long periods in the cool season, and, consequently, are generally too wet for crops. They are associated with the better drained brownish soils of the Ochlockonee and Iuka series.

Bibb clay loam (0 to 1 percent slopes) (Bc).—This is the most extensive soil of the Bibb series. It occurs largely under a cover of water-loving hardwood trees.

Representative profile (7 miles southwest of Alto on the flood plain of the Neches River):

0 to 8 inches, light-gray clay loam slightly mottled with brown; massive; permeable; friable when moist, very hard when dry; medium to strongly acid.
8 to 50 inches +, light-gray or white clay loam, in places mottled or splotched with pale yellow and brown; massive; permeable; very hard when dry; weakly stratified by materials that contain more sand and clay at depths below about 20 inches; strongly acid.
VARIATIONS: Surface soil ranges from 4 to 10 inches thick; light brownish gray to white, and occasionally mottled with brown; second layer ranges from clay loam to silty clay; weakly stratified in places.

Parent Material: Alluvial sediments washed from light-colored forested upland soils of the Bowie, Lakeland, Susquehanna, and associated series; acid.
Drainage: Surface drainage is very slow; internal drainage is slow or very slow because of a high water table during part of the year; too wet for crops unless artificially drained; frequently inun-

dated for several weeks or months in winter and spring.

Erosion: Not susceptible.

Native Vegetation: Hardwood forest, mainly gum, oak, and elm.

Location: On flood plains of the Angelina and Neches Rivers, Mud Creek, and the larger streams in the county.

Utilization: Nearly all in forest, but small local areas are used for corn, cotton, or pasture.

Suitability: Well suited to forests or pasture; if artificially drained and protected from overflow, corn, cotton, and sorghum can be grown. Management group 17.

Bibb fine sandy loam (0 to 1 percent slopes) (Bb).—This soil differs from Bibb clay loam in having a fine sandy loam surface soil.

Representative profile (7 miles northeast of Alto on the flood plain of the Angelina River) :

0 to 20 inches, light-gray fine sandy loam, slightly mottled with brown; massive; friable when moist, hard when dry; strongly acid.

20 to 50 inches +, light-gray sandy clay loam mottled with brownish yellow; massive; friable when moist, very hard when dry; strongly acid.

VARIATIONS: Surface soil ranges from light brownish gray to white, and from 10 to 30 inches in thickness; second horizon, a fine sandy loam to clay loam, may be weakly stratified by materials that contain greater quantities of sand and clay.

Parent Material: Sandy and clayey alluvial sediments washed from light-colored forested soils; acid.

Drainage: Surface drainage is very slow. Internal drainage is slow to very slow because of a high water table during part of the year; frequently inundated.

Erosion: Not susceptible.

Native Vegetation: Hardwood forest, mainly gum, oak, and elm.

Location: On both wide and narrow flood plains of streams that drain light-colored soils of the Bowie, Lakeland, and Susquehanna series.

Utilization: Mainly in forest; small cleared areas are occasionally used for corn and cotton or pasture.

Suitability: Well suited to forestry or pasture; not suited to crops unless artificially drained and protected from overflow. Management group 17.

Boswell series

Soils of the Boswell series have brownish surface soils and reddish upper subsoils and are mottled with yellow and light gray in the lower subsoils. The red upper subsoil distinguishes this soil from the Susquehanna, which is mottled throughout the subsoil. Boswell soils occur on gently to strongly sloping areas and occupy ridgetops and divides above the less sloping soils of the Susquehanna, Bowie, and Ruston series (fig. 3).

Boswell fine sandy loam, gently sloping (1 to 3 percent slopes) (Bc).—The productivity of this soil is low to moderate. However, yields of crops are moderately good if fertility is maintained and erosion is prevented by good management. A higher percentage of this soil is cultivated than that of any other member of the Boswell series.

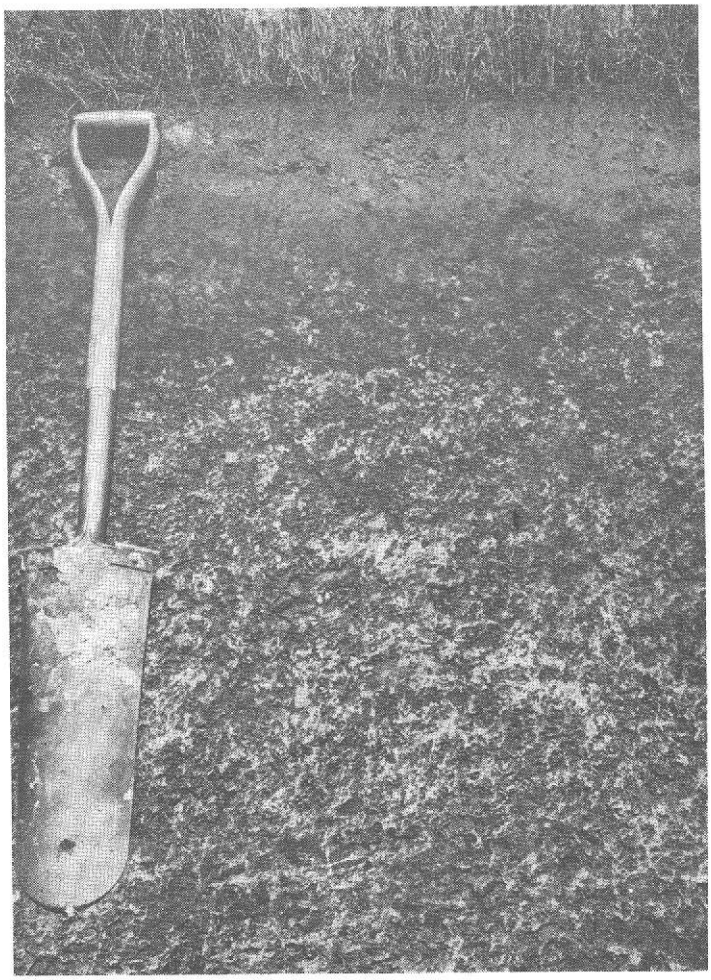


***Figure 3.*—Profile of Boswell fine sandy loam.**

Representative profile (6½ miles northeast of Alto) :

0 to 8 inches, light-brown fine sandy loam; structureless; very friable; rests on horizon below; medium acid.

8 to 18 inches, red heavy clay, slightly mottled brownish yellow in the lower part; medium blocky; crumbly when slightly moist, very sticky and plastic when wet; very hard; strongly acid.

18 to 44 inches, red heavy clay, strongly mottled with brownish yellow and light gray; mottling increases with depth; very sticky and plastic when wet, extremely hard when dry; strongly acid.

44 to 60 inches +, mottled light-gray and brownish-yellow clay with few spots and splotches of red; acid.

VARIATIONS: Surface soil ranges from pale brown to brown in color, and from 6 to 12 inches in thickness; may be reddish brown in cultivated areas where subsoil is mixed with plow layer; fragments of ferruginous sandstone and concretions of iron oxide occur on the surface and in the profile where this soil is associated with Bub and Nacogdoches soils. The unmottled red clay upper subsoil is 5 to 15 inches thick.

Parent Material: Light-gray clay or sandy clay somewhat mottled with yellow; medium to strongly acid.

Relief and Drainage: Slopes of 1 to 3 percent. Surface drainage is medium; internal drainage is slow or very slow but adequate for all crops commonly grown.

Erosion: Slightly to moderately susceptible if culti-

vated; slight erosion on about 30 percent of area has removed 25 percent of surface soil. Occasional shallow gullies and rills have formed but do not interfere with cultivation.

Native Vegetation: Mixed pine and hardwood forest, chiefly shortleaf pine, post oak, and gum.

Location: Many small areas throughout the county.

Utilization: Pasture, forest, and crops.

Suitability: Well suited to forestry; moderately well suited to crops if adequately fertilized and otherwise properly managed; moderately well suited to pasture. Management group 9.

Boswell fine sandy loam, sloping (3 to 8 percent slopes) (Bd).—This soil occupies moderate slopes and is associated with the gently sloping phase of Boswell fine sandy loam. If carefully managed most areas can be successfully cultivated.

Representative profile (6 miles east of Rusk):

0 to 7 inches, light-brown fine sandy loam; very friable; abrupt transition to horizon below; medium acid.
7 to 15 inches, red heavy clay; medium blocky; moderately crumbly when slightly moist, very sticky and plastic when wet; strongly acid.
15 to 38 inches, mottled red, brownish-yellow, and light-gray heavy clay; strongly acid.
38 to 50 inches +, light-gray heavy clay, slightly mottled with red and brownish yellow; medium to strongly acid.
VARIATIONS: Surface soil ranges from about 4 to 8 inches in thickness; color ranges from pale brown in undisturbed areas to light reddish brown in cleared areas where surface soil is thin; upper subsoil ranges from about 4 to 12 inches in thickness. Fragments of iron-bearing sandstone occur on the surface in places.

Parent Material: Light-gray clay or sandy clay somewhat mottled with yellow; commonly interbedded with thin strata of iron-bearing sandstone; acid.

Relief and Drainage: Slopes are dominantly 3 to 6 percent; runoff, rapid to very rapid; internal drainage, slow.

Erosion: Very susceptible if cultivated; slight to no erosion on about 75 percent of the area that is under forest. The rest is slightly to moderately eroded but has lost less than a third of the original surface soil.

Native Vegetation: Mixed pine and hardwood forest originally formed a thick cover; most areas are now under a thin to moderately dense forest.

Location: Small and large areas throughout the county.

Utilization: Mainly in forest; pine, oak, and gum reseeding in many cleared areas; small acreage occasionally used for crops.

Suitability: Not well suited to field crops under ordinary management because of low productivity and susceptibility to erosion; yields from peach orchards, sorghum, and cowpeas are moderate under good management; well suited to forestry; moderately well suited to pasture. Management group 11.

Boswell fine sandy loam, sloping, eroded (3 to 8 percent slopes) (Be).—This soil is similar to Boswell fine sandy loam, sloping phase, but it has a thinner surface soil in which rills and gullies have formed. The surface soil is a reddish-brown fine sandy loam about 4 to 6 inches thick.

VARIATIONS: Surface soil 2 to 3 inches thick in level areas, but ranges up to 8 inches between rills and gullies; plow layer is a sandy clay loam if it has been mixed with clay subsoil during tillage.

Utilization: Formerly almost all cleared and cultivated; now half the acreage in old-field pasture or in second-growth pine and hardwoods; remaining area used for corn, cotton, and sorghum.

Location: Scattered throughout the county in association with other Boswell soils.

Suitability: Not well suited to crops; old fields covered with weeds and grasses of low forage value, but can be used for grazing by improving the pasture management. Soil should be used for pasture only as a means of reestablishing the pine forest. Management group 18.

Boswell fine sandy loam, strongly sloping (8 to 15 percent slopes) (Bf).—This soil differs from other soils in the Boswell series in that all layers are somewhat thinner. It occurs on narrow valley walls and in dissected areas that are cut deeply by small streams.

PROFILE: Surface soil, 5 to 8 inches thick; depth to the slightly weathered gray clay parent material, about 30 inches.

Relief and Drainage: Areas sloping and irregular; runoff is rapid even under natural cover.

Native Vegetation: Mainly shortleaf pine and some post oak, mixed with sweetgum and other hardwoods.

Utilization: Practically all in forest.

Suitability: Suited only to forestry; low value for pasture; not suited to crops. Management group 18.

Boswell fine sandy loam, strongly sloping, eroded (8 to 15 percent slopes) (Bg).—This soil differs from the strongly sloping phase of Boswell fine sandy loam in that it has been substantially damaged by erosion and, consequently, has a thinner surface soil. In most areas rills and gullies are active. This soil occurs in positions similar to those of the strongly sloping phase.

PROFILE: The fine sandy loam surface soil ranges from about 4 to 6 inches in thickness. In cultivated fields tillage has exposed the red clay subsoil in places.

Utilization: Nearly all areas were cultivated at one time but are now idle or in old-field pasture.

Suitability: Suited to forestry; unsuited to crops; low value for pasture; should revert to forest either by planting pine seedlings or natural reseeding. Management group 18.

Boswell sandy clay loam, strongly sloping, severely eroded (8 to 15 percent slopes) (Bh).—Sheet and gully erosion have removed practically all of the original surface layer from this soil.

PROFILE: The surface soil is a reddish-brown sandy clay loam that ranges from almost none in small spots to a thickness of about 3 or 4 inches between rills and gullies.

Native Vegetation: Forest; all areas were formerly cleared and cultivated.

Utilization: Cleared areas have been abandoned and are used for pasture or covered with a thin stand of weeds and grasses of low forage value. Some areas have reverted to second-growth pine and sweetgum.

Suitability: Unsuitable for crops; low value for pasture. Should revert to pine forest, and the young trees should be protected until they are established. Management group 18.

Bowie series

Soils of the Bowie series have light-brown surface soils and mottled, yellow and red sandy clay loam subsoils. They have developed under forest from acid, moderately sandy earths. Bowie soils are associated with Ruston, Lakeland, and Eustis soils. They are less red than Ruston soils, and more loamy within the 3-foot subsoil section than the Lakeland and Eustis soils. Fertility is low to moderate, but the soils respond to management and are easy to work. They are among the most desirable upland soils in east Texas for field crops, cotton, and vegetables (figs. 4 and 5).

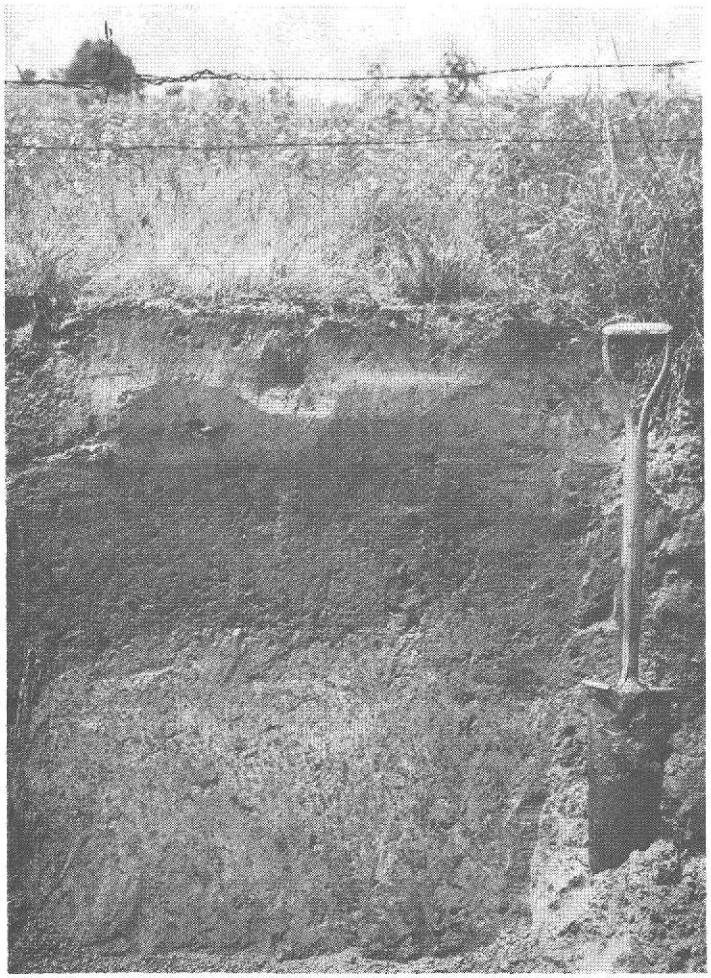


Figure 4.—**Profile of Bowie fine sandy loam.**

Bowie fine sandy loam, nearly level (0 to 1 percent slopes) (Bk).—This soil resembles the Bowie loamy fine sand, on 1 to 3 percent slopes, but it is more fertile, slightly less droughty, and has a more loamy surface soil. It is easily worked.

Representative profile (10 miles east of Rusk along a farm-to-market road):

0 to 14 inches, very pale brown light fine sandy loam; the 6-inch plow layer is light gray; very friable; nearly loose when dry; medium acid.

14 to 26 inches, yellow or brownish-yellow sandy clay loam; massive; crumbly and friable when moist, slightly sticky when wet; medium acid.

26 to 56 inches, yellow sandy clay loam or light sandy clay, mottled with red and light gray; crumbly and friable when moist, moderately sticky and plastic when wet; strongly acid.

56 to 70 inches +, pale-yellow sandy clay loam, slightly mottled or banded with red and light gray; strongly acid.

VARIATIONS: Surface soil ranges from about 10 to 18 inches in thickness and is thicker and more sandy in areas that grade toward the texture of loamy fine sand; subsoil ranges from yellowish brown to strong brown and from sandy clay loam to light sandy clay; a few concretions of iron oxide are on the surface and in all horizons; some low sandy mounds occur on nearly level areas. Small areas are included that have a firm to friable moderately heavy sandy clay subsoil. These variations grade toward Alto loam but are somewhat better drained than that soil. The included areas are slightly more productive, but they are used the same as Bowie fine sandy loam, nearly level phase.

Parent Material: Moderately sandy Coastal Plain sediments consisting of thick- or thin-bedded, pale-yellow and light-gray sandy clay, clay loam, and loamy sand.

Relief and Drainage: Dominant gradients less than 1 percent; runoff is slow; internal drainage is medium.

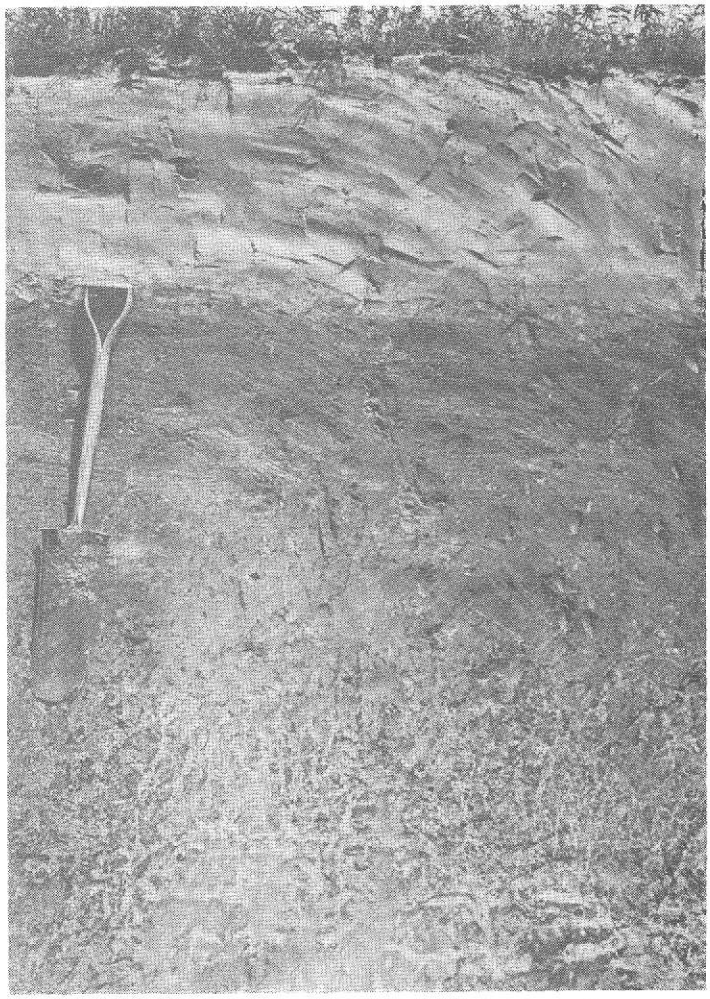


Figure 5.—**Profile of Bowie loamy fine sand.**

Erosion: Not susceptible.
Native Vegetation: Mixed pine and hardwood forest, mainly shortleaf pine, post and blackjack oaks, sweetgum, elm, and hickory.
Location: Near Atoy, about 10 miles east of Rusk, in association with other members of the Bowie series.
Utilization: Nearly all cleared and cultivated; used for general and special crops.
Suitability: Well suited to most field crops commonly grown and to special crops such as tomatoes, peppers, and cowpeas. Management group 1.

Bowie fine sandy loam, gently sloping (1 to 3 percent slopes) (Bm).—This light-colored friable soil is more sloping and more susceptible to erosion than the nearly level phase of Bowie fine sandy loam. Crop adaptations and productivity, however, are similar to those of the nearly level phase. This soil occurs throughout the county in large and small areas.
Erosion: Slightly susceptible; slight erosion on 40 percent of areas, none on remaining areas. Productivity lowered 10 to 20 percent on eroded areas, but it can be restored by several years of good management.
Utilization: Mainly for corn, cotton, peanuts, and vegetables; some acreage in pasture and forest.
Suitability: Well suited to crops. Management group 2.

Bowie fine sandy loam, sloping (3 to 8 percent slopes) (Bn).—This soil differs from the gently sloping phase of Bowie fine sandy loam in having stronger slopes, somewhat thinner soil layers, and greater susceptibility to erosion. It is the most extensive member of the Bowie series. Although it is very good for crops, it is not so well suited as the less sloping phases of Bowie soils. It needs more careful management to prevent deterioration.

Representative profile (2 miles southeast of Troup):

0 to 12 inches, very pale brown light fine sandy loam; plow layer light gray; very friable when moist, nearly loose when dry; medium acid.
12 to 20 inches, yellow sandy clay loam; crumbly and friable; hard when dry, moderately sticky when wet; medium to strongly acid.
20 to 38 inches, yellow heavy sandy clay loam, mottled with red and light gray; crumbly and friable when moist, hard when dry; strongly acid.
38 to 50 inches +, yellow or brownish-yellow sandy clay loam, mottled with pale yellow and red; strongly acid.
VARIATIONS: Surface soil ranges from 8 to 15 inches in thickness and from light brownish gray to pale or very pale brown in color. Second and third horizons range from brownish yellow to strong brown and from sandy clay loam to light sandy clay.

Parent Material: Moderately sandy, pale-yellow and light-gray, thick- or thin-bedded Coastal Plain deposits.
Relief and Drainage: Dominant slopes, 3 to 6 percent; runoff, medium to rapid; internal drainage, medium.
Erosion: Moderately susceptible if cultivated. Slight to moderate erosion has occurred on 40 percent of acreage, which means 20 to 30 percent of the original surface soil has been lost, and 30 percent of its productivity. Rills and gullies have formed. Remaining acreage is not eroded or only very slightly eroded.
Native Vegetation: Mixed pine and hardwood forest.
Location: Throughout the county in many small and large areas.
Utilization: Cotton, peanuts, corn, and cowpeas are the principal crops grown. More than half of this soil is in pasture or forest.
Suitability: Suited to crops or pasture if management is good; well suited to forest. Management group 5.

Bowie fine sandy loam, sloping, eroded (3 to 8 percent slopes) (Bo).—This soil differs from the sloping phase of Bowie fine sandy loam in that the surface soil is only 5 to 8 inches thick. About half the original surface soil has been removed by erosion. Numerous gullies and rills interfere with cultivation; during heavy rains they also carry runoff that damages young crops.
Utilization: Formerly cleared and cultivated; now about half the acreage is in old-field pasture or is reverting to forest; remaining areas are used mainly for cotton, corn, sorghum, cowpeas, and melons.
Suitability: Suitable for crops, but careful management is needed to control erosion and to maintain productivity; productivity can be restored to that of uneroded phase if management is good; well suited to peaches and pears because air drainage is good and risk from frost is less than in low areas. Sloping and eroded areas should revert to pine and be protected until the young trees are established. Management group 10.

Bowie loamy fine sand, gently sloping (1 to 3 percent slopes) (Bp).—This soil differs from Bowie fine sandy loam, gently sloping, in having a thicker and sandier surface soil. It is low to moderate in fertility but very responsive to management. It is associated with Lakeland loamy fine sand but differs from it in having sandy clay loam within 3 feet of the surface.

Representative profile (1¾ miles northwest of Rusk on U. S. Highway 69):

0 to 10 inches, very pale brown loamy fine sand; structureless; nearly loose when dry; medium acid.
10 to 26 inches, pale-yellow loamy fine sand; very friable; 2- to 3-inch transition to the horizon below; strongly acid.
26 to 32 inches, brownish-yellow sandy clay loam; massive; porous; friable; strongly acid.
32 to 50 inches +, brownish-yellow sandy clay loam, mottled with red and light gray; strongly acid.
VARIATIONS: The layer of loamy fine sand ranges from 18 to 36 inches in thickness. It is usually about 30 inches thick, except in areas that are transitional toward the Lakeland soil. Small concretions of iron oxide are scattered in all horizons but are most abundant in the transitional zone between the layers of loamy fine sand and sandy clay loam.

Parent Material: Coastal Plain sediments consisting of thin- or thick-bedded, pale-yellow and light-gray loamy sands and sandy clays; acid.
Drainage: Runoff is slow; internal drainage is medium and very favorable for most crops; after extended wet periods in spring, a temporary high water table may delay early planting.
Erosion: Only slightly susceptible or not susceptible. Most areas can be cultivated without special measures for controlling erosion.

Native Vegetation: Mixed pine and hardwood forest.
Location: In large and small areas throughout the county; associated with the Lakeland and other Bowie soils.
Utilization: About half in pasture or forest; remaining acreage mainly used for peanuts, tomatoes, yams, cowpeas, melons, corn, and cotton.
Suitability: Well suited to special crops and vegetables; moderately well suited to other crops if soil management is good. Management group 4.

Bowie loamy fine sand, sloping (3 to 8 percent slopes) (Br).—Stronger slopes and slightly thinner soil layers differentiate this soil from Bowie loamy fine sand, gently sloping. It is farmed in the same manner but in slightly less productive and probably slightly more droughty.
Relief and Drainage: Dominant slopes of 4 to 6 percent; permeable and absorbs water rapidly.
Erosion: Not seriously susceptible, except on the more sloping areas; gullies and rills have formed in cultivated areas where water has concentrated.
Utilization: About half the acreage in cultivation; rest in forest and old-field pasture, or is idle. Main crops are corn, yams, peanuts, cowpeas, cotton, and vegetables.
Suitability: Suitable for crops; needs vegetation to control erosion on more sloping areas; good management needed to maintain fertility of soil. Management group 6.

Bowie loamy fine sand, sloping, eroded (3 to 8 percent slopes) (Bs).—This soil is more eroded and has slightly thinner surface soils than the sloping phase of Bowie loamy fine sand. Numerous shallow and deep gullies interfere with cultivation.
Inclusion: Small areas of Ruston loamy fine sand, sloping, eroded phase, total 11 acres; differs from Bowie loamy fine sand, sloping, eroded, in having slightly browner surface soil and a redder subsoil; low in fertility but used in same way as Bowie loamy fine sand, sloping, eroded.
Location: In small areas on moderate slopes below the less sloping and less sandy soils.
Utilization: About half the acreage is cultivated; remaining area in old-field pasture and forest or is idle. Used for about the same crops as the gently sloping phase, but yields are lower.
Suitability: Not well suited to cultivation and of low value for pasture. Should revert to pines. Management group 15.

Bub series

The Bub series consists of forested, very shallow (skeletal), and usually stony soils. They are underlain by ironstone formed through the laterization of iron-bearing and glauconitic earths (fig. 6). In Cherokee County, soils of the Bub series occur in a complex with soils of the Nacogdoches series.

Bub-Nacogdoches complex (8 to 40 percent slopes) (Bt).—This complex occurs on strongly sloping to steep sides of sand-capped mesas, locally called mountains. Bub soils make up most of the complex; Nacogdoches soils are less extensive. Small areas of each soil are intermixed or occur in narrow ledges and bands that are intermingled with small areas of deeper Nacogdoches soils and members of the Cuthbert and Boswell series. These included soils comprise about 20 percent of the delineated areas, and Bub and Nacogdoches soils comprise about 80 percent. Outcrops and fragments of ironstone on the surface are characteristic features of this complex.

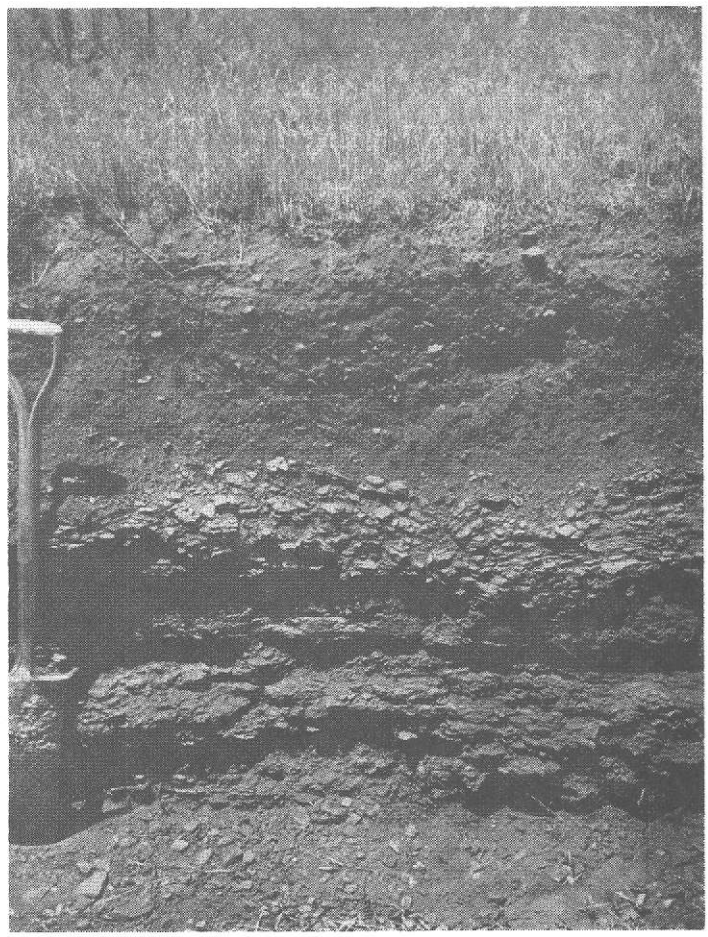


Figure 6.—**Profile of Bub stony clay showing sandy ironstone in the substratum.**

Representative profile of Bub stony clay (about 4.8 miles north of Jacksonville on U. S. Highway No. 69):

0 to 5 inches, dark reddish-brown clay or clay loam; outcrops and numerous fragments of ironstone 2 to 10 inches in diameter occur throughout the horizon and on the surface in places; crumbly and friable; slightly acid to medium acid.
5 to 10 inches, reddish-brown clay containing fragments of ironstone; slightly mottled with yellow in lower part; crumbly when slightly moist, and moderately sticky and plastic when wet; slightly acid.
10 to 50 inches +, yellowish-brown or brownish-yellow glauconitic clay containing seams or thin ledges of ironstone (laterite); slightly acid to alkaline.

Representative profile of Nacogdoches clay loam (examined a short distance from the profile of Bub stony clay):

0 to 8 inches, reddish-brown clay loam or loam; crumbly and friable when moist, hard when dry; slightly acid.

8 to 18 inches, red clay; crumbly and friable when slightly moist, moderately sticky and plastic when wet; medium acid.
18 to 26 inches, same as layer above but with splotches and spots of reddish yellow and yellow.
26 to 50 inches +, strong-brown or reddish-yellow slightly sandy clay streaked or splotched with red; contains fragments of soft sandy ironstone and pockets or seams of glauconitic sandy clay.
VARIATIONS: In some areas the Bub surface soil ranges from brown to reddish brown and red in color; from a fine sandy loam to clay in texture; and from 3 to 10 inches in thickness. Parent material is 5 to 20 inches below the surface. The Nacogdoches surface soil ranges from red to brown in color; from fine sandy loam to clay in texture; and from 4 to 12 inches in thickness. Parent material is 15 to 36 inches below the surface.

Parent Material: Yellowish or strong-brown glauconitic clay that contains thin strata, or seams, of ironstone (laterite); slightly acid to weakly calcareous.
Relief and Drainage: Strongly sloping to steep; dominant slopes range from 8 to 40 percent, but a few small areas are less sloping; runoff is rapid to very rapid; internal drainage is slow.
Erosion: Only slightly eroded because practically all areas are forested; very susceptible if cover is destroyed.
Native Vegetation: Mixed pine and hardwood forest consisting of pine, post oak, some blackjack oak, some hickory, elm, and sweetgum.
Location: Moderate to large areas, mainly in the central and northern parts of the county.
Utilization: Mainly forest; about 3 percent, once cleared and used for pasture, is restocking with pine and gum.
Suitability: Not suited to crops; low value for pasture, if cleared; trees can be grown but not a good soil for forests. Management group 18.

Caddo series

Soils of the Caddo series have light-gray or very pale brown surface soils and mottled light-gray and yellow friable sandy clay loam subsoils. They are medium to strongly acid and poorly drained. Caddo soils occupy flat or sloping positions below deep sandy soils. Seepage from the higher lying soils causes a high water table in Caddo soils during the cool season. The associated Bowie soils have less grayish surface soils and yellowish upper subsoils that are practically free of mottling.

Caddo fine sandy loam, level (0 to 1 percent slopes) (Ca).—This soil occupies nearly level positions at the heads of streams. It is associated with higher, better drained soils of the Bowie, Lakeland, and Ruston series. It is of very low fertility.

Representative profile (virgin area, 2½ miles southeast of Alto along U. S. Highway 69):

0 to 4 inches, gray fine sandy loam; very friable; strongly acid.
4 to 15 inches, light-gray very fine sandy loam slightly mottled with yellowish brown; contains a few rounded concretions of iron oxide; very friable; hard when dry; grades to horizon below; strongly acid.
15 to 40 inches, mottled yellow and light-gray sandy clay loam; massive; porous; friable; strongly acid.
40 to 60 inches +, light-gray sandy clay loam, mottled with yellow; contains a few spots of reddish yellow or strong brown; strongly acid.
VARIATIONS: In tilled areas, the surface layer is light gray or white; first and second horizons range from loamy sand to fine sandy loam.

Parent Material: Light-gray or mottled light-gray and yellow sandy loam and clay loam; more or less thin-bedded and stratified; acid.
Relief and Drainage: Gradients up to 3 percent in small areas but dominantly less than 1 percent; runoff is very slow; internal drainage is slow, mainly because the water table is at or near the surface during the cool season.
Erosion: Not susceptible.
Native Vegetation: Forest, mainly water oak, gum, and shortleaf pine; ground cover is a dense stand of shrubs, brambles, and sedges.
Location: Small areas scattered throughout the county.
Utilization: Mainly in forest; small areas cleared and used for pasture.
Suitability: Not suited to crops unless drained; suitable for pasture, as good stands of lespedeza, dallisgrass, carpetgrass, and bermudagrass can be developed; best use is forestry. Management group 16.

Caddo fine sandy loam, sloping (3 to 8 percent slopes) (Cb).—Stronger slopes and more yellowish mottling in the subsoil differentiate this soil from Caddo fine sandy loam, level phase. Fertility of this soil is low.
Native Vegetation: Forest mainly of pine and water-tolerant hardwood trees; dense ground cover of shrubs, brambles, and sedges.
Location: Occurs in small areas in association with Susquehanna, Boswell, Bowie, and other Caddo soils.
Utilization: Nearly all in forest; too wet for crops in most years.
Suitability: Cleared areas have low value for crops, but they produce moderately good pasture if properly managed. In dry summers soil has limited suitability for crops. Best use is forestry. Managemen group 16.

Caddo very fine sandy loam, mound phase (0 to 1 percent slopes) (Cc).—This soil consists of areas having a microrelief of more or less circular mounds scattered over 10 to 25 percent of the soil area. The surface soil between the mounds is a very fine sandy loam, but the profile otherwise is similar to that of Caddo fine sandy loam, level phase. The mounds are 1 to 3 feet high and 15 to 30 feet in diameter. They have thick, light-gray, sandy A horizons. The subsurface layer is a very pale brown loamy fine sand to fine sandy loam, 18 to 36 inches thick. The subsoil of the mounds is sandy clay loam that is dominantly mottled yellow and light gray.
Drainage: Generally poorly drained. Mounds are well drained during droughts or when water table is several feet below the surface. After winter rains, water stands on the surface soil between the mounds for several days, or until the water table is lowered.
Location: Occupies small areas, mainly in the north-

eastern part of county in association with gently sloping Bowie and Boswell soils.

Utilization: Mainly in forest; cleared areas either in pasture or second-growth pine and sweetgum.

Suitability: Limited for crops, but fair pasture of lespedeza and dallisgrass can be established if phosphorus and potassium are used; best use is forestry. Management group 16.

Cahaba series

The Cahaba series consists of light-brown to reddish-yellow sandy soils that developed on old stream terraces. Cahaba soils are underlain by acid sandy sediments that were washed from light-colored forested soils. They are moderately fertile, easily worked, and very responsive to management. They closely resemble soils of the Ruston series but are generally more level and have more sand in the parent material than the Ruston soils.

Cahaba fine sandy loam (0 to 1 percent slopes) (Cd).—This soil occurs on nearly level stream terraces in the valleys of the larger streams. It is one of the most desirable soils in the county for crops and vegetables.

Representative profile (7 miles southwest of Alto):

0 to 10 inches, reddish-yellow friable fine sandy loam; plow layer is less reddish and more brown; medium to strongly acid.
10 to 24 inches, yellowish-red sandy clay loam; crumbly and friable when moist, slightly plastic when wet; medium acid.
24 to 44 inches, yellowish-red sandy clay loam; slightly more sandy and friable than layer above; lower part is heavy sandy loam; medium acid.
44 to 60 inches +, reddish-yellow weakly stratified sandy clay and loamy sand; medium to strongly acid.
VARIATIONS: Sandy surface soil ranges from light brown to reddish brown in color, and from 8 to 15 inches in thickness; second horizon ranges from reddish yellow to yellowish red or light red.

Parent Material: Reddish sandy to sandy clay loam alluvial sediments, with or without stratification; acid.

Drainage: Runoff is very slow; internal drainage is medium but very favorable to crops.

Erosion: Not susceptible.

Native Vegetation: Mixed pine and hardwood forest.

Location: On old high terraces, mainly along the Angelina and Neches Rivers.

Utilization: Practically all cleared and used mainly for corn, cotton, peanuts, peas, and vegetables; about 2 percent is wooded.

Suitability: Well suited to practically all crops common to the area. Management group 1.

Cuthbert series

Soils of the Cuthbert series are light colored, of medium depth, and forested. They are associated with soils of the Ruston, Bowie, and Boswell series. Cuthbert soils differ from the somewhat similar Boswell soils in that the clay subsoil of the Cuthbert series is sandier and more friable and the parent material is sandier at depths of 20 to 30 inches.

Cuthbert and Ruston fine sandy loams, sloping (5 to 8 percent slopes) (Ce).—This undifferentiated soil group consists of fine sandy loams of Cuthbert and Ruston soils that are so intermixed that it is not feasible to map them separately. Their productivity is low to moderate, and if they are used for crops or orchards, careful soil management is needed.

Representative profile of Cuthbert fine sandy loam, sloping (7 miles northeast of New Summerfield):

0 to 8 inches, light-brown fine sandy loam; the top 4 inches in undisturbed areas is grayish brown; layer is very friable; concretions and small fragments of ironstone totaling 10 to 40 percent of soil volume are present in most areas; strongly acid.
8 to 16 inches, yellowish-red sandy clay faintly mottled with yellow; sticky and plastic when wet, very hard when dry; strongly acid.
16 to 26 inches, mottled yellowish-red and yellow light sandy clay or clay loam; strongly acid.
26 to 46 inches +, thin-bedded, or laminated, yellowish-red sandy clay and yellow or reddish-yellow fine sandy loam.

The Ruston member of this mapping unit has a profile similar to that of the Ruston fine sandy loam, which is described under the Ruston series.

VARIATIONS: The Cuthbert surface soil ranges from very pale brown to light brown in color and from 6 to 14 inches in thickness. Second horizon ranges from reddish yellow to red, and is mottled or unmottled. Fragments of iron-bearing sandstone are scattered on the surface in some areas. The variations of the intermixed Ruston fine sandy loam, which comprise 30 to 50 percent of this mapping unit, are described under the Ruston series.

Inclusions: A few small areas, totaling about 15 percent of mapping unit, consist of Bowie and Ruston loamy fine sand and of Boswell fine sandy loam.

Parent Material: Reddish thin or thick sedimentary beds of sandy clay to loamy sand; acid.

Relief and Drainage: Moderately sloping knolls and ridgetops; runoff is medium; internal drainage, medium.

Erosion: Very susceptible if cultivated; practically all cleared areas moderately eroded.

Native Vegetation: Mixed pine and hardwood forest.

Location: Small and large areas occur throughout the county.

Utilization: About one-third of acreage used for corn, cotton, sorghum, and hay; remaining area in forest or old-field pasture.

Suitability: Well suited to forestry; moderately well suited to orchards; not well suited to crops or pasture. Management group 10.

Cuthbert and Ruston fine sandy loams, strongly sloping (8 to 15 percent slopes) (Cf).—This undifferentiated group of soils consists of forested light-colored fine sandy loams, mainly of the Cuthbert and Ruston series. It also contains small areas of Bowie and Boswell fine sandy loams, which occupy less than 15 percent of the mapping unit. Profile characteristics are similar to those of the sloping phases of Cuthbert and Ruston fine sandy loams, but the soil layers are slightly thinner. The group occupies sloping surfaces; gradients of 8 to 15 percent are dominant, but slopes range up to 20 percent in small included areas.

The Cuthbert member of the group occupies about

35 to 45 percent of the area. Its surface soil is pale-brown to light-brown fine sandy loam, 6 to 12 inches thick. The surface soil contains numerous small fragments and concretions of iron oxide. The subsoil is reddish-yellow or strong-brown moderately plastic sandy clay. Reddish, thin-bedded sandy clays, sandy loams, and loamy sands are at depths of 25 to 40 inches.

The Ruston member of the group occupies 35 to 50 percent of the area. It is a fine sandy loam, but it differs from the Ruston fine sandy loam, sloping phase, in having a slightly more sandy surface soil and a somewhat thinner profile over the sandy parent material.

This undifferentiated group of soils is strongly sloping, shallow over sandy material, droughty, susceptible to erosion, and of low fertility. For representative profiles, see the descriptions of Cuthbert fine sandy loam, sloping, and Ruston fine sandy loam, sloping.

VARIATIONS: The undifferentiated group includes small areas with slopes up to 20 percent that contain Ruston and Bowie loamy fine sands, and Boswell fine sandy loam. In local areas a few fragments of iron-bearing sandstone occur on the surface and in the profile.

Parent Material: Reddish sandy clays, clay loams, and loamy sands more or less interbedded with lenticles of sandstone; acid.

Drainage: Surface runoff is rapid, and internal drainage is medium.

Erosion: Very susceptible if cultivated; most areas under a forest cover and not seriously affected by erosion.

Native Vegetation: Mixed pine and hardwood forest.

Location: Large and small areas occur throughout the county.

Utilization: Mainly in forest; a small acreage in cultivation or in old-field pasture.

Suitability: Well suited to forestry; unsuited to crops, and of low value for pasture. Management group 18.

Cuthbert and Ruston fine sandy loams, strongly sloping, eroded (8 to 15 percent slopes) (Cg).—This undifferentiated group consists principally of Cuthbert and Ruston soils. Profiles are similar to those of the strongly sloping phases of Cuthbert and Ruston soils, except that surface soils are thinner as a result of erosion. Over most of the area the light-colored fine sandy loam surface soil is only 3 to 5 inches thick. Between gullies it is 5 to 8 inches thick, but the surface soil is thin or lacking on sides of shallow gullies and rills. The subsoil is reddish or yellowish sandy clay or sandy clay loam. Cultivation is almost impossible because of the numerous gullies and rills.

Utilization: Mostly in old-field pasture and a few acres in forest; less than a tenth of the acreage is cultivated.

Suitability: Unsuited to crops and of low value for pasture; best use is forestry. Management group 18.

Eustis series

The Eustis series consists of brownish deep sandy soils developed under a forest cover from acid sandy clays and sands. Eustis soils are acid, rapidly drained, and of low fertility. They occur in association with soils of the Bowie, Lakeland, and Ruston series. Eustis soils are more reddish than the Bowie or Lakeland soils, and their sandy A horizons are thicker than those of the Ruston soils.

Eustis loamy fine sand, nearly level (0 to 3 percent slopes) (Ea).—This soil occurs mainly on the flat sandy tops of high hills, locally called mountains. It is very responsive to management.

Representative profile (6 miles southeast of Rusk):

0 to 10 inches, pale-brown loamy fine sand; structureless; very friable; strongly acid.
10 to 46 inches, reddish-yellow loamy fine sand; structureless; very friable when moist, loose when dry; grades into horizon below; strongly acid.
46 to 60 inches, reddish-yellow light sandy clay loam; friable; strongly acid.
60 to 90 inches +, reddish-yellow sandy clay loam mottled with yellow and light gray; strongly acid.

VARIATIONS: Surface soil ranges from brown to pale brown and from 8 to 15 inches in thickness. The second horizon ranges from reddish yellow to reddish brown, and it is reddish yellow in the lower part. The loamy subsoil occurs 40 to 60 inches below the surface. A few small fragments of iron-bearing sandstone occur in all horizons.

Parent Material: Thick beds of unconsolidated, somewhat reddish sands, loamy sands, and clays; acid.

Relief and Drainage: Dominant slopes of about 1 percent; drainage is rapid, particularly internal drainage, through the horizons of porous sands.

Erosion: Only slightly susceptible, and not susceptible in some places; slight erosion and occasional shallow rills on cultivated areas; surface soil and productivity not noticeably reduced by erosion.

Native Vegetation: Dominantly shortleaf and loblolly pines, but also blackjack, sand jack, and post oaks.

Location: Mainly on mesas; also in small areas throughout the county.

Utilization: About half the acreage is used for corn, cotton, melons, tomatoes, and peppers; remaining area is forested, pastured, or idle.

Suitability: Suited to forestry, and to truck crops if management is good and fertility is maintained. Management group 12.

Eustis loamy fine sand, sloping (3 to 8 percent slopes) (Eb).—This soil has stronger slopes than the nearly level phase of Eustis loamy fine sand, and the surface soil is slightly thinner. Dominant slopes are 3 to 6 percent. Because runoff is greater, this soil is more susceptible to erosion than that of the nearly level phase. It is of low inherent fertility.

Erosion: Not susceptible to sheet erosion; gullies form where surface water concentrates; slight erosion or no erosion on 65 percent of soil area, moderate erosion on 35 percent; thickness of surface soil and productivity only slightly reduced by erosion.

Utilization: About half the acreage is used for cotton, corn, peanuts, watermelons, sorghum, and tomatoes; remaining area in old-field pasture of low carrying capacity, or in forest.

Suitability: Not well suited to crops, but yields of special crops are moderate to high if management is good. Management group 13.

Eustis loamy fine sand, sloping, eroded (5 to 8 per-

cent slopes) (Ec).—This soil differs from the sloping phase of Eustis loamy fine sand in having a thinner surface soil. Numerous rills and gullies are active in all cultivated fields and in most abandoned pastures. The thickness of the surface soil ranges from 4 to 10 inches but averages about 6 inches.

Drainage: Water is readily absorbed if held where it falls. However, runoff is rapid because of the sloping surfaces, the high intensity of the rains, and the sparse plant cover.

Utilization: One-third of acreage is used mainly for corn, cotton, peanuts, cowpeas, and sorghum; the rest is in old-field pasture and forest.

Suitability: More droughty and less productive than other soils of the Eustis series. Management group 15.

Eustis loamy fine sand, strongly sloping (8 to 15 percent slopes) (Ed).—This deep sandy soil occurs on strong slopes and is associated with the less sloping Eustis, Bowie, and Lakeland soils.

Representative profile:

0 to 4 inches, grayish-brown loamy fine sand; very friable when moist, loose when dry; medium acid.
4 to 40 inches, reddish-yellow or reddish-brown loamy fine sand; loose when dry; strongly acid.
40 to 60 inches, reddish-yellow sandy clay loam; massive; friable; strongly acid.
60 to 80 inches +, reddish-yellow sandy clay loam mottled or splotched with yellow and some light gray; strongly acid.
VARIATIONS: Surface soil ranges from 2 to 10 inches in thickness; sandy clay loam horizon is from 36 to 50 inches below surface.

Parent Material: Beds of reddish unconsolidated sandy clays and sands; acid.

Relief and Drainage: Dominant gradients, 12 to 15 percent; runoff is medium to rapid; internal drainage is rapid.

Erosion: Moderately susceptible to gully erosion if cleared; 85 percent of acreage not eroded or slightly eroded; remaining area, once cleared and is now partly in cultivation, is moderately eroded, mainly by rills and gullies.

Native Vegetation: Shortleaf pine, loblolly pine, blackjack oak, and post oak.

Location: Many small areas are scattered throughout the county.

Utilization: Nearly all in forest; a small acreage is used for cowpeas, peanuts, watermelons, cotton, and corn.

Suitability: Unsuited to crops; well suited to forestry. Management group 19.

Eustis loamy fine sand, strongly sloping, eroded (8 to 15 percent slopes) (Ee).—This soil is more eroded and lighter in color than Eustis loamy fine sand, strongly sloping phase. The original surface soil has been mixed with the lighter colored subsurface layer during tillage, so the plow layer is lighter in color than the original surface layer. Rills and gullies are common. Some sheet erosion has occurred, but gully erosion is active in all cleared areas.

Utilization: Nearly all of this soil was once cleared, but 90 percent is now abandoned; the fields are in pasture or reverting to shortleaf pine; a small acreage is in crops and forest.

Suitability: Not suited to crops and poorly suited to pasture. Best use is forestry. Shortleaf pine becomes established in a few years if protected from fire. All areas should be used for growing shortleaf pine and slash pine. Management group 19.

Garner series

The Garner series consists of level to nearly level, grayish-brown soils that developed, under forest, from marine or alluvial sediments. They are lighter colored, more clayey throughout, and more mottled in the subsoil than the Alto soils. They differ from the Susquehanna soils in having darker surface soils and subsoils that are less mottled with red. Percilla soils are somewhat similar to Garner soils, but they have lighter colored surface soils, lighter colored and less mottled sandy clay subsoils, and occupy slightly depressed areas that usually have no surface drainage.

Garner clay (0 to 1 percent slopes) (Ga).—This soil developed from slightly acid clay or shale parent materials. Its gilgai or hog-wallowed relief consists of microdepressions 10 to 25 feet in diameter and intervening microknolls that are 6 to 18 inches higher than the bottoms of the depressions. This mapping unit is essentially a complex of two clay soils, one of which occupies the microknolls and the other the microdepressions. Neither soil occurs separately, and for practical purposes both are mapped and used as a single unit.

Representative profile (2½ miles northwest of Wells in the bottom of a microdepression):

0 to 5 inches, drak grayish-brown heavy clay; moderate medium granular; crumbly when slightly moist, very sticky and plastic when wet; slightly to medium acid.
5 to 10 inches, grayish-brown heavy clay slightly mottled with yellowish brown; same structure and consistence as layer above; medium acid.
10 to 36 inches, mottled light-gray and brownish-yellow heavy clay; very compact; very sticky and plastic when wet; very slowly permeable; medium acid.
36 to 56 inches, gray heavy clay mottled or streaked with yellowish brown; very sticky and plastic when wet; medium to strongly acid.
56 to 74 inches, light-gray heavy clay mottled or streaked with brownish yellow; has a few small crystals of gypsum in low part; strongly acid.
74 to 84 inches +, light-gray and pale-yellow noncalcareous clay or shale with lenses or thin seams of limonite (iron oxide) and greensand (glauconite).

Representative profile (2½ miles northwest of Wells on a microknoll 20 feet from the profile of the microdepression described above):

0 to 8 inches, yellowish-brown clay mottled with light gray in the lower part; coarse subangular blocky; very hard when dry, very sticky and plastic when wet; strongly acid.
8 to 38 inches, mottled light-gray and pale-brown heavy clay; very compact; very sticky and plastic when wet; strongly acid.
38 to 66 inches, gray heavy clay splotched or streaked with red and yellowish brown; medium acid.
66 to 78 inches +, light-gray and very pale brown heavy clay; contains a few crystals of gypsum; slightly acid.
VARIATIONS: Shallow microdepressions alternating with slightly higher microknolls 10 to 25 feet in diameter give fields a spotted and irregular pattern

of grayish brown and brownish yellow. Subsoil mottling ranges from brown to reddish yellow, or red, but subsoil may be brown and light gray, or light gray, and have only slight mottlings of the the brighter colors.

Parent Material: Pale-yellow or light olive-gray shale or clay of marine or alluvial origin; acid to calcareous reaction.
Drainage: Runoff is very slow or lacking; internal drainage is very slow; water stands in shallow depressions for several days or weeks after heavy rains.
Erosion: Not susceptible.
Native Vegetation: Mixed pine and hardwood forest with a fairly dense cover of haw bushes, hardwood shrubs, and coarse grasses.
Location: Several large areas occur near Wells and Forest.
Utilization: In forest; only about 1 percent of the acreage has been cleared, and now is used for crops or is in old-field pasture.
Suitability: Not well suited to crops; drainage is slow and the heavy intractable clay is very hard to cultivate; well suited to forestry. Management group 14.

Hannahatchee series

The Hannahatchee series consists of reddish-brown acid alluvial soils that occur on nearly level flood plains of streams in the redlands section. The alluvium from which they are developing washed mainly from the Bub, Nacogdoches, Magnolia, and associated soils. Hannahatchee soils are more reddish than Ochlockonee and Iuka soils and are better drained than Bibb soils. They are moderately fertile and moderately to highly productive. They are usually the most fertile soils in the localities where they occur. Many narrow areas, however, are overflowed too frequently for crops.

Hannahatchee clay loam (0 to 1 percent slopes) (Ha).—This is an alluvial soil. As a rule it resembles the Iuka soils but is slightly less acid.

Representative profile (3½ miles east of Jacksonville on U. S. Highway 79 in the flood plains of Keyes Creek):

0 to 10 inches, light-brown or light reddish-brown clay loam; weakly granular; friable; slightly plastic when wet; slightly acid.
10 to 45 inches +, reddish-brown clay loam slightly mottled with yellowish brown and strong brown; weakly stratified with sandy and clayey sediments; crumbly and friable; moderately permeable; slightly acid to medium acid.
VARIATIONS: Surface soil ranges from reddish brown to light reddish brown or brown; medium acid to neutral. Subsoil ranges from reddish brown to brown and has a distinct reddish hue; mottling of red and brown is either distinct or absent but usually is not noticeable in dry soil.

Parent Material: Recent stream sediments.
Drainage: Several overflows of short duration occur each year; runoff is slow; internal drainage is medium; water table is near the surface during the wet season.
Erosion: Not susceptible.
Native Vegetation: Forest of shortleaf pine, oak, pecan, elm, birch, and sweetgum.
Location: Mainly in narrow flood plains.
Utilization: Nearly all in pasture; small areas in forest, and other small areas used for corn, cotton, and sorghum.
Suitability: Well suited to crops if not flooded too frequently; excellent for pasture. Management group 8.

Hannahatchee fine sandy loam (0 to 1 percent slopes) (Hb).—This soil differs from Hannahatchee clay loam in texture, friability, and drainage. It is moderately fertile and is easy to work.

Representative profile (3 miles east of Jacksonville on the flood plain of Keyes Creek):

0 to 8 inches, reddish-brown or strong-brown fine sandy loam; very friable; slightly acid.
8 to 44 inches +, strong-brown fine sandy loam, slightly mottled with pale brown; contains thin lenses of brown clay loam; friable and permeable; slightly acid to medium acid.
VARIATIONS: Surface soil ranges from dark red through brown to light brown; subsoil ranges from light reddish brown to strong brown; slight to moderate mottling, usually not noticeable in dry soil.

Parent Material: Sandy alluvial sediments; acid.
Drainage: Runoff is slow and internal drainage is medium; frequent floods during the wet season seldom last more than 24 hours.
Erosion: Not susceptible.
Native Vegetation: Pine, oak, pecan, ash, sweetgum, and elm.
Location: Narrow flood plains.
Utilization: One-tenth of soil used for corn, cotton, sorghum, and special crops; remaining area mainly in pasture, and a few areas in forest.
Suitability: Well suited to crops if not overflowed too frequently; well suited to pasture. Management group 7.

Huckabee series

The Huckabee series consists of light-colored soils that developed on stream terraces from acid sandy old alluvium. As a rule, Huckabee soils are less sloping than the Lakeland soils and have developed from more recent sediments. The associated Independence soils have similar but browner sandy horizons, whereas the Cahaba soil is reddish and has a sandy clay loam subsoil within 18 inches of the surface.

Huckabee loamy fine sand (0 to 1 percent slopes) (Hc).—This deep, loose, sandy soil occurs on level or nearly level terraces, mainly along the Neches and Angelina Rivers. It is of low fertility but is very responsive to management. Huckabee loamy fine sand is the light-colored member of the group of sandy soils that occur on stream terraces along these two rivers.

Representative profile (5½ miles south of the northwest corner of Cherokee County on a terrace of the Neches River):

0 to 7 inches, grayish-brown loamy fine sand; very friable when moist, nearly loose when dry; slightly acid.

7 to 28 inches, very pale brown loamy fine sand; loose when dry; medium acid.
28 to 54 inches, brownish-yellow loamy fine sand faintly splotched with reddish yellow; friable when moist; not as loose as layer above when dry; medium acid.
54 to 70 inches +, very pale brown nearly loose loamy fine sand; medium acid.
VARIATIONS: Where cultivated, the surface soil is pale or very pale brown; in places yellowish sandy clay loam is at depths of 36 to 50 inches.

Parent Material: Sandy alluvial sediments washed from the light-colored forested soils.
Drainage: Internal drainage is rapid through the thick permeable sandy layers. Subject to rapid leaching.
Erosion: Not susceptible.
Native Vegetation: Sand jack, blackjack, and post oaks, and shortleaf pine.
Location: Large areas along the Angelina and Neches Rivers.
Utilization: Three-fourths the acreage in forest; remaining area used for pasture and for peas, peanuts, tomatoes, corn, and cotton.
Suitability: Well suited to vegetable crops if properly managed and fertilized; suitability for forestry is low to medium. Management group 12.

Independence series

The Independence series consists of brownish sandy soils that developed under forest, on old stream terraces from acid sandy alluvium. These soils differ from the associated Cahaba soil in thickness of sandy surface and subsurface layers. Huckabee loamy fine sand is also associated with these soils, but it has a lighter colored surface soil and is underlain by more yellowish sediments. Independence soils closely resemble the Eustis soils of the uplands but are developing on stream terraces.

Independence loamy fine sand, nearly level (1 to 3 percent slopes) (Ia).—This soil occurs on stream terraces that are situated above the flood plains. It is of low fertility, but it responds to management and produces moderate to high yields of special crops. It is probably the most productive and desirable deep sandy soil in the area.

Representative profile (northeast corner of Cherokee County on a low terrace along Striker Creek):

0 to 8 inches, brown loamy fine sand; very friable when moist, very loose when dry; slightly acid.
8 to 42 inches, strong-brown to reddish-yellow loamy fine sand; structureless; very friable when moist, nearly loose when dry; strongly acid.
42 to 60 inches +, reddish-yellow loamy fine sand; slightly more loamy than layer above; strongly acid.
VARIATIONS: Moist surface soil ranges from dark brown to brown in virgin areas and from brown to light brown in cultivated areas; second and third horizons range from brown to strong brown or reddish yellow.

Parent Material: Reddish sandy alluvial sediments; acid.
Relief and Drainage: Dominant gradients less than 2 percent; runoff is slow; internal drainage is rapid; rainfall rapidly penetrates the permeable deep sandy soil; subject to rapid leaching.
Erosion: Not susceptible.
Native Vegetation: Mixed pine and oak forest, but mainly species of oak.
Location and Extent: Mainly on terraces of larger streams.
Utilization: Three-fourths in forest; remaining acreage used mainly for cowpeas, peanuts, watermelons, tomatoes, peppers, corn, and cotton.
Suitability: Well suited to special crops and to vegetables; moderately well suited to forestry. Management group 12.

Independence loamy fine sand, sloping (3 to 8 percent slopes) (Ib).—This soil differs from the nearly level phase of Independence loamy fine sand in having stronger slopes and thinner layers of sand. The depth to the sandy clay loam or fine sandy loam subsoil ranges from 3 to 6 feet but the average is about 4 feet. Dominant surface gradients are less than 6 percent. The soil is of low fertility, but yields are moderate to high if management is good.
Drainage: Surface drainage is medium to rapid; internal drainage is rapid.
Erosion: Not seriously susceptible, but gullies and rills form where runoff waters concentrate. Erosion-control practices are needed on cultivated areas.
Location: Occupies small areas; is associated with Huckabee and Cahaba soils and with other soils of the Independence series.
Utilization: Mainly in forest; cultivated areas used for cowpeas, peanuts, tomatoes, watermelons, corn, and cotton.
Suitability: Not well suited to crops, but yields are fair if management is good; forested areas should not be cleared. Management group 13.

Independence loamy fine sand, strongly sloping (8 to 15 percent slopes) (Ic).—This soil is similar to the less sloping phases of Independence loamy fine sand but has stronger slopes. Some areas have gradients ranging from 15 to 20 percent.
Extent: Occupies small areas and is associated with other deep sandy soils.
Utilization: The few small areas once cleared are now reforesting to shortleaf pine and hardwood trees; mainly in forest.
Suitability: Too steep for crops and of low value for pasture. Should be used for forestry. Management group 19.

Iuka series

The Iuka series consists of brown or grayish-brown acid alluvial soils that have mottled friable subsoils. Iuka soils occur on the level to nearly level flood plains of those streams that drain the light-colored forested soils. They are moderately well drained and are among the most productive soils in the county. However, they are subject to occasional or frequent overflows. Iuka soils differ from Hannahatchee soils mainly in being darker and less reddish, and from Ochlockonee in having mottled subsoils.

Iuka clay loam (0 to 1 percent slopes) (Id).—This soil is moderately fertile and highly productive except

where it is frequently flooded. It usually stays wet late in spring and is, therefore, an uncertain producer of field crops.

Representative profile (½ mile northeast of Gould in the flood plain of Caney Creek):

0 to 12 inches, grayish-brown clay loam; weakly granular; crumbly and friable; moderately sticky when wet; medium to strongly acid.
12 to 40 inches +, light yellowish-brown clay loam mottled with yellowish brown and light gray; crumbly and friable; has thin lenses of fine sandy loam and clay in lower part; strongly acid.
VARIATIONS: Surface soil ranges from grayish brown to brown or yellowish brown in color, and from 8 to 20 inches in thickness. Second horizon ranges from brown to yellowish brown and is slightly to strongly mottled with yellow and light gray. Strata of sandy loam and clay may or may not be present in subsoil.

Parent Material: Sandy and clayey alluvial sediments washed from surrounding light-colored soils.
Drainage: Surface drainage is slow; internal drainage is medium but is restricted by a high water table in winter and spring; short periods of flood occur several times a year.
Erosion: Not susceptible.
Native Vegetation: Mainly oak, gum, ash, pecan; some pine.
Location: Narrow and wide flood plains of creeks throughout the county.
Utilization: Mainly in forest or pasture; small acreage occasionally used for corn and cotton.
Suitability: Well suited to crops if not overflowed frequently; excellent for pasture or meadow. Management group 8.

Iuka fine sandy loam (0 to 1 percent slopes) (Ie).—This alluvial soil differs from Iuka clay loam in that it is slightly lighter in color and sandier in texture. It is moderately fertile and easy to work. Many areas occur in narrow, frequently overflowed stream bottoms. Floods late in spring are hazardous to crops.

Representative profile (2 miles northwest of Jacksonville in the flood plain of a small creek that drains large areas of Bowie, Boswell, and Lakeland soils):

0 to 15 inches, light yellowish-brown fine sandy loam; weakly granular; friable; slightly to medium acid.
15 to 50 inches +, light yellowish-brown fine sandy loam, mottled yellowish brown and light brownish gray; mottling increases with depth; friable and permeable; thin strata of loamy sand and clay loam common in lower part; slightly acid to medium acid.
VARIATIONS: Surface soil ranges from grayish brown to yellowish brown in color, from loamy fine sand to light loam in texture, and from 8 to 20 inches in thickness; mottling in second horizon ranges from slight to strong; occasionally little or no mottling at a depth less than 24 inches.

Parent Material: Sandy alluvial sediments from light-colored, forested soils; acid.
Drainage: Surface drainage is slow; internal drainage is medium but restricted by a high water table in cool wet seasons; drainage adequate for crops commonly grown, floods in winter and spring are frequent but seldom last for more than 24 hours.
Erosion: Not susceptible.
Native Vegetation: Forest, mainly oak, sweetgum, ash, elm, birch, and shortleaf pine.
Location: On narrow stream bottoms.
Utilization: Pasture, forestry, and a small acreage used for corn, cotton, and sorghum.
Suitability: Excellent for crops where not flooded frequently; good for pasture if proper forage mixtures are established. Management group 7.

Lakeland series

Soils of the Lakeland series have pale-brown sandy surface soils and a very pale brown or pale yellow sandy subsurface. Lakeland soils are nearly loose sands of low fertility. They developed on nearly level to strongly sloping surfaces under a forest. The parent material was acid sandy sediments. The Lakeland soils are similar to Bowie soils, but their surface layers are sandier and their subsurface layers are thicker. Lakeland soils are much like soils of the Independence series but they are paler in color, have developed from older sediments, and occur on higher elevations (fig. 7).

Figure 7.—Profile of Lakeland loamy fine sand.

Lakeland loamy fine sand, nearly level (1 to 3 percent slopes) (La).—This is a light-colored deep sandy soil that is deeply leached and of low fertility.

Representative profile (2 miles north of Jacksonville

on cultivated lands at the Tomato Disease Laboratory of the Texas Agricultural Experiment Station):

0 to 7 inches, pale-brown loamy fine sand; very friable when moist, nearly loose when dry; strongly acid.
7 to 38 inches, very pale brown loamy fine sand; nearly loose when dry; strongly acid.
38 to 44 inches, yellowish-brown fine sandy loam; friable; grades into light sandy clay loam in the lower part; strongly acid.
44 to 72 inches +, yellowish-brown sandy clay loam strongly splotched with reddish brown and pale yellow; crumbly and friable; strongly acid.
VARIATIONS: Surface soil in cultivated areas is light brownish gray to very pale brown. Second horizon ranges from very pale brown to pale yellow. Layer of sandy clay loam is 36 to 72 inches or more below the surface.

Parent Material: Yellowish sandy clay loam to loamy sand of marine origin; acid.
Relief and Drainage: Dominant slopes less than 2 percent; drainage is rapid through the thick permeable sandy layers.
Erosion: Not susceptible.
Native Vegetation: Mixed pine and oak forest, mainly shortleaf pine and blackjack, sand jack, and post oaks.
Location: Scattered throughout the county; main areas are on the mesas or on tops of "sand mountains."
Utilization: More than half of acreage in forest and pasture; remaining area used mainly for cowpeas, peanuts, sweetpotatoes, watermelons, and tomatoes.
Suitability: Moderately well suited to special crops or truck crops if adequately fertilized; suited to forestry; not well suited to field crops or pasture. Management group 12.

Lakeland loamy fine sand, sloping (3 to 8 percent slopes) (Lb).—This soil has stronger slopes than the nearly level phase of Lakeland loamy fine sand. It is also more droughty and less desirable for crops. Fertility is low. The soil is associated with soils of the Bowie series and with other members of the Lakeland series.
Drainage: Some runoff occurs during heavy rains; permeable sandy layers are leached deeply.
Erosion: Susceptible to gully erosion if runoff water is allowed to concentrate.
Utilization: About 60 percent of land is in forest and pasture; rest used for crops.
Suitability: Poor for general crops; fairly good for special crops and vegetables if carefully managed. Management group 13.

Lakeland loamy fine sand, sloping, eroded (5 to 12 percent slopes) (Lc).—This soil is more eroded than the sloping phase of Lakeland loamy fine sand. A few gullies have formed in some places and in others they are so numerous as to almost prevent cultivation. They are difficult to control on cultivated areas, and if runoff is allowed to concentrate, new gullies and rills develop.
Location: Occupies small areas and is associated with other sloping sandy soils.
Utilization: About half of the acreage is cleared and used mainly for melons, peas, and peanuts; remaining area in pasture and forest.
Suitability: Best use is forestry; should not be used for crops if better land is available or if intensive erosion control practices are necessary; careful management allows use of small areas for crops. Management group 15.

Lakeland loamy fine sand, strongly sloping (8 to 15 percent slopes) (Ld).—This light-colored deep sandy soil has stronger slopes and a thinner surface layer than Lakeland loamy fine sand, nearly level phase. Gradients range up to 20 percent in small areas.
Utilization: Practically all in forest; the few cleared acres are now idle or reforesting to pine, gum, sassafras, and sand jack, and blackjack oaks.
Suitability: Unfit for crops and of low value for pasture. Pines should be protected to increase reproduction and the supply of timber. Management group 19.

Magnolia series

Soils of the Magnolia series have light-brown sandy loam surface soils and permeable red sandy clay subsoils. They occur on undulating to strongly sloping areas and have developed under forest from impure greensand and sandy clay. They are among the most desirable soils for agriculture in the county. Magnolia soils are deep, easy to work, very responsive to management, and moderately productive. They differ from the associated Nacogdoches soils in having lighter colored, less reddish, deeper surface soils and more friable, less clayey subsoils.

Magnolia fine sandy loam, gently sloping (1 to 3 percent slopes) (Ma).—This is one of the most productive and desirable soils in the redlands section of east Texas. It is easily worked and moderately fertile.

Representative profile (in a cultivated field 6 miles south-southwest of Jacksonville and 1/10 mile west of Antioch Church):

0 to 6 inches, light-brown fine sandy loam; weakly granular; very friable; slightly acid.
6 to 13 inches, pink or reddish-yellow fine sandy loam; structureless; friable; grades through a 2- or 3-inch transitional layer into horizon below; medium acid.
13 to 24 inches, light-red sandy clay loam; friable and permeable; moderately sticky when wet; becomes more sticky and less sandy in lower part; strongly acid.
24 to 40 inches, red clay; massive; crumbly and friable when slightly moist, sticky and plastic when wet; permeable; strongly acid.
40 to 75 inches +, red friable sandy clay, slightly mottled with yellow below depths of 36 to 46 inches; slightly acid.
VARIATIONS: Surface soil pink, light brown, or brown, 18 inches thick, and a loamy fine sand in a few included areas. Small rounded concretions of iron oxide common in all horizons.

Parent Material: Residuum from impure greensand or marl, or from stratified greensand and reddish sandy clay; acid to alkaline.
Relief and Drainage: Dominant gradients less than 2 percent; runoff is slow to medium; internal drainage is medium and very favorable for crops.
Erosion: Slightly susceptible if cultivated; no problem if management is good.
Native Vegetation: Mixed pine and oak forest; considerable red oak.

Location: Many small areas, mainly in central and northern part of county.

Utilization: Practically all cleared and used mainly for corn, cotton, peanuts, and vegetables; 20 percent of area in forest and pasture.

Suitability: Excellent for crops or forestry; fair for pasture. Management group 2.

Magnolia fine sandy loam, sloping (3 to 8 percent slopes) (Mb).—This soil has stronger gradients than the gently sloping phase of Magnolia fine sandy loam and is more susceptible to erosion. It is closely associated with Nacogdoches soils and with other soils of the Magnolia series.

Erosion: Moderately susceptible if cultivated; rills and gullies have formed on the more sloping areas; surface soil has been slightly thinned by sheet erosion; terracing and careful management needed if soil is kept in cultivation.

Utilization: About 70 percent of soil is used principally for corn, cotton, cowpeas, sorghum, yams, and peanuts; remaining acreage in cutover pine and oak forest and pasture.

Suitability: Well suited to row crops and orchards; careful management required to control erosion and to maintain fertility; badly eroded areas should be reforested to pine and the seedlings protected until they are established. Management group 5.

Magnolia fine sandy loam, strongly sloping (8 to 15 percent slopes) (Mc).—This soil differs from the nearly level phase mainly in having stronger slopes and thinner soil layers. It occupies hilly areas that are too steep for cultivation.

Representative profile under a natural forest cover:

0 to 5 inches, light-brown fine sandy loam; weakly granular; very friable; slightly acid.
5 to 8 inches, pink or reddish-yellow fine sandy loam; structureless; very friable; clear (2-inch) transition to horizon below; medium acid.
8 to 20 inches, light-red sandy clay loam; massive, permeable; friable; medium acid.
20 to 34 inches, red sandy clay or clay; crumbly and friable when slightly moist, sticky and plastic when wet; strongly acid.
34 to 50 inches, red friable sandy clay mottled with yellow; thin lenses of yellow sandy clay in the lower part; medium to slightly acid.
VARIATIONS: Friable sandy loam surface soil ranges from 6 to 10 inches thick; small rounded concretions of iron oxide common in all horizons.

Parent Material: Yellowish or reddish sandy clay residuum from impure greensand that contains lenses of laterite; acid.

Drainage: Surface runoff is rapid; internal drainage, medium.

Erosion: Very susceptible if cultivated; most areas are in forest and not damaged by erosion.

Native Vegetation: Mainly shortleaf pine mixed with oak, gum, and hickory.

Location: Small and large areas in the redlands section.

Utilization: Practically all in forest; a few acres in crops and pasture.

Suitability: Not suitable for crops; well suited to forest. Management group 18.

Marsh

Marsh (0 percent slope) (Md).—This miscellaneous land type occurs in the flood plains of small streams. Large areas of Marsh are shown on maps by the conventional marsh symbol, and small areas are shown by the letter symbol Md. Marsh is under 6 to 24 inches of water most of the time. Dense stands of grasses, rushes, and sedges cover the surface. The land type consists of a gray silty layer of peat several feet thick. The peat is underlain by acid, stratified, moderately sandy alluvium.

Location: In several small areas in the eastern part of the county.

Suitability: Furnishes browse of coarse grasses for cattle and a habitat for wildlife; of little agricultural value. Management group 20.

Nacogdoches series

Soils of the Nacogdoches series are the principal red soils in the redlands section of east Texas. They have reddish-brown friable surface soils and red crumbly clay subsoils. They developed from glauconitic clays under the influence of forest vegetation. These soils, where gently sloping, are highly prized by farmers. Nacogdoches soils are associated with the darker, less red, and less well-drained Alto soils, and with the shallow, stony, strongly sloping Bub soil. Nacogdoches and Bub soils have developed from similar parent materials.

Nacogdoches fine sandy loam, gently sloping (1 to 3 percent slopes) (Ne).—This soil is deep moderately fertile, easy to work, and very responsive to good management. This is the best soil for agriculture in the Nacogdoches series and is highly prized by farmers. It is associated with Magnolia fine sandy loam, gently sloping phase, but differs from it in having a more reddish surface soil and a heavier, darker red, crumbly clay subsoil. Both soils developed from similar parent materials and have about the same productivity and use.

Representative profile (4 miles north-northwest of Alto along U. S. Highway 69):

0 to 12 inches, reddish-brown fine sandy loam; weakly granular; very friable; gradual (2- or 3-inch) transition to clay loam in lower part of layer; slightly acid.
12 to 30 inches, red clay; crumbly and friable when moist, easily crumbles to a mass of fine subangular aggregates when dry; strongly acid.
30 to 50 inches, red crumbly clay with a few splotches and streaks of reddish yellow; strongly acid.
50 to 80 inches +, yellowish-red and reddish-yellow gritty glauconitic clay; thin seams or lenses of partly weathered greensand in the lower part; medium to strongly acid.
VARIATIONS: Surface soil is light reddish brown to red or dark reddish brown and 8 to 15 inches thick. Second horizon ranges from dark red to reddish brown. Numerous angular fragments and rounded concretions of ironstone are common throughout profile. Parent material at depths of 3 to 10 feet.

Parent Material: Greensand marl or glauconitic sandy clay and clay; usually acid but locally calcareous.

Drainage: Surface and internal drainage are medium; soil is well drained, and moisture content is very favorable for crops.
Erosion: Slightly susceptible if cultivated; some of the more sloping areas slightly damaged by erosion, and their productivity slightly reduced.
Native Vegetation: Mainly post and red oaks, gum, and shortleaf pine; hardwoods dominant in the original forest.
Location: Small and large areas scattered throughout all of the county except the northeastern corner.
Utilization: Three-fourths of land used for corn, cotton, sorghum, and tomatoes; remaining area in forest or pasture.
Suitability: Excellent for crops; moderately well suited to pasture or forestry. Management group 2.

Nacogdoches fine sandy loam, sloping (3 to 8 percent slopes) (Nf).—This reddish soil is associated with the gently sloping phase of Nacogdoches fine sandy loam but differs from it mainly in having stronger slopes and a slightly thinner surface layer. The surface soil is a reddish-brown friable fine sandy loam, 8 to 12 inches thick, and the subsoil is a red crumbly clay. Crops similar to those grown on the gently sloping phase can be produced, but this soil is slightly less fertile and more droughty. It gives somewhat lower yields, especially during dry years.
Parent Material: Yellowish-red and reddish-yellow gritty sandy clay that occurs at depths of 30 to 50 inches.
Erosion: Very susceptible; nearly all cleared areas are slightly damaged; shallow gullies and rills common on the stronger slopes; erosion has reduced productivity by about 25 percent, but original productivity can be restored in 2 or 3 years by good management, which includes terracing and use of winter legumes for green manure.
Utilization: Slightly more than half the acreage is used for crops; remaining area in forest, old-field pasture, or is idle.
Suitability: Suitable for crops if carefully managed; good for peaches and pears. Management group 5.

Nacogdoches fine sandy loam, sloping, eroded (3 to 8 percent slopes) (Ng).—Erosion has removed about half of the surface layer from this soil. Numerous shallow gullies and rills interfere with cultivation and prevent the establishment of crops, especially in years of heavy rainfall. Erosion has reduced soil productivity by half, and further deterioration can be expected unless management is improved.
Utilization: About half of the acreage is used for crops, mainly corn and cotton; most of the remaining area is in pasture, and a small percentage is in forest.
Suitability: Suitable for crops and orchards if terraced and properly managed; should not be used for row crops if less eroded soil is available. Management group 11.

Nacogdoches fine sandy loam, strongly sloping (8 to 15 percent slopes) (Nh).—This soil differs from the less sloping phases of Nacogdoches soils mainly in having stronger slopes and thinner soil layers.

Representative profile (2½ miles southeast of Rusk):

0 to 7 inches, reddish-brown fine sandy loam; weakly granular; very friable; slightly acid.
7 to 20 inches, red or reddish-brown clay; crumbly and friable when moist, moderately sticky and plastic when wet; separates easily into a mass of fine angular aggregates on drying; strongly acid.
20 to 30 inches, red or light-red crumbly clay with streaks or lenses of reddish yellow; strongly acid.
30 to 50 inches +, yellowish-red and yellowish-brown friable clay (glauconitic material) with thin lenses of yellowish sandy clay and soft sandstone; slightly to strongly acid.
VARIATIONS: Small angular fragments and rounded concretions of ironstone are common in all horizons.

Parent Material: Reddish or yellowish-brown glauconitic clay and sandy clay; acid to alkaline.
Relief and Drainage: Gradients may range up to 20 percent; runoff is rapid and internal drainage is medium.
Erosion: Very susceptible if cultivated; not appreciably damaged if under native forest.
Native Vegetation: Forest consisting mainly of post and blackjack oaks, gum, and shortleaf pine.
Location: Throughout county except in northeastern corner.
Utilization: Nearly all in forest; most of the small acreage once cleared has been abandoned.
Suitability: Not suited to crops and of low value for pasture; moderately well suited to forest. Management group 18.

Nacogdoches fine sandy loam, strongly sloping, eroded (8 to 15 percent slopes) (Nk).—Erosion has removed about half of the original surface soil from most of the acreage in this mapping unit. In small localized spots, all of the surface soil has been lost and tillage has exposed the clay subsoil. Gullies and rills are so numerous in places that they almost prevent cultivation.
Utilization: Nearly all of this soil was formerly cultivated, but only a small part is used now for crops; about one-tenth is in forest.
Suitability: Not suited to crops, and should revert to trees; pastures of moderate carrying capacity can be developed in some areas. Management group 18.

Nacogdoches clay loam, gently sloping (1 to 3 percent slopes) (Na).—This soil is closely associated with Nacogdoches fine sandy loam, gently sloping, but has a shallower profile, a darker red more clayey surface soil, and thinner soil layers. In addition, it is more droughty and generally somewhat less productive.

Representative profile (4½ miles east of Alto):

0 to 7 inches, dark-red or dark reddish brown clay loam; medium granular; friable when moist, moderately sticky when wet; slightly to medium acid.
7 to 20 inches, dark-red clay; very crumbly and friable; slightly sticky and plastic when wet; medium to strongly acid.
20 to 38 inches, red clay; crumbly and friable; slightly sticky when wet; mottled with strong brown in the lower part; strongly acid.
38 to 60 inches +, mottled yellowish-red and strong-brown clay; friable; contains thin seams of yellowish-brown sandy clay and soft yellowish sandstone.
VARIATIONS: Surface soil ranges from dark reddish brown to reddish brown or red; small fragments

and concretions of ironstone occur in all horizons but are most numerous on the surface of eroded soils.

Parent Material: Reddish and yellowish-brown glauconitic sandy clay or clay; acid to weakly alkaline.
Relief and Drainage: Dominant gradients are less than 2 percent; runoff is slow to medium; internal drainage, medium.
Erosion: Slightly to moderately susceptible; most cultivated areas are slightly eroded, but their productivity is only slightly reduced.
Native Vegetation: Forest, mainly oak, gum, elm, and shortleaf pine.
Location: Small areas occur throughout most of the county, except in the northeastern corner.
Utilization: Two-thirds of acreage is used mainly for corn, cotton, and sorghum, remaining area in pasture and forest.
Suitability: Well suited to most field crops; fair for pasture or forestry. Management group 2.

Nacogdoches clay loam, sloping (3 to 8 percent slopes) (Nb).—This red soil differs from the Nacogdoches clay loam, gently sloping phase, in having stronger and more irregular slopes.
Drainage: Runoff is medium to rapid.
Erosion: Very susceptible if cultivated; careful management required to maintain fertility and control erosion.
Location: In small areas scattered throughout most of the county; associated with Bub, Alto, and other soils of the Nacogdoches series.
Utilization: More than half of the acreage is cropped, principally to corn, cotton, and sorghum. Most of remaining area is in pasture; a small percentage is forested.
Suitability: Suitable for cultivation but droughty. The less sloping areas can be used for field crops and orchards if terraced and well managed. Stronger slopes should be seeded or sodded to pasture or reforested. Management group 11.

Nacogdoches clay loam, sloping, eroded (3 to 8 percent slopes) (Nc).—This soil has been more damaged by erosion than Nacogdoches clay loam, sloping phase, and consequently has a thinner surface layer. It is also somewhat more droughty and less productive.

Representative profile (2 miles southwest of Alto in an abandoned field):

0 to 4 inches, reddish-brown clay loam; weakly granular; crumbly and friable when moist, hard when dry; moderately sticky when wet; medium acid.
4 to 20 inches, red clay; weakly granular; moderately crumbly and friable when moist, very hard when dry; strongly acid.
20 to 34 inches, red clay; mottled or streaked with reddish yellow in the lower part; crumbly and friable when moist, moderately sticky when wet; strongly acid.
34 to 54 inches +, mottled reddish-yellow and strong-brown clay with spots and streaks of dark red; thin lenses or seams of dark yellowish-brown sandy clay loam below depth of 40 inches; strongly acid.

VARIATIONS: Surface soil ranges from red to dark red and reddish brown and from 3 to 6 inches in thickness; small fragments and concretions of ironstone are common on the surface and in the upper soil layers; thin layers of yellowish-brown sandy clay or soft sandstone commonly occur in the lower subsoil.

Parent Material: Reddish and yellowish-brown glauconitic sandy clay and clay; acid to alkaline.
Drainage: Runoff is rapid; internal drainage is medium.
Erosion: Very susceptible if used for crops under ordinary management; about half of the original surface soil has been removed by erosion; shallow gullies and rills are common.
Native Vegetation: Forest, mainly oak, gum, elm, and shortleaf pine.
Location and Extent: In small areas in the redlands section, where it is associated with Bub soils and with other Nacogdoches soils.
Utilization: Formerly all cultivated; now about half the acreage is used for corn, cotton, and sorghum; remaining area idle, reforesting, or in pasture.
Suitability: Moderately well suited to crops or pasture; if cultivated, careful management is required to control erosion and maintain fertility; well suited to forest. Management group 11.

Nacogdoches clay loam, strongly sloping, eroded (8 to 12 percent slopes) (Nd).—This red soil differs from Nacogdoches clay loam, sloping, eroded phase, mainly in having stronger slopes. It is very susceptible to erosion. Included in this mapping unit is 51 acres of Nacogdoches clay loam, sloping, severely eroded phase, which has lost practically all of its surface soil. The included soil contains numerous shallow gullies and rills and is not suited to crops.
Relief and Drainage: Gradients up to 15 percent; occational gullies and deep narrow channels of small streams cause irregular and variable slopes; runoff is rapid.
Utilization: Formerly cultivated but now idle and reverting to forest or in pasture.
Suitability: Unsuitable for crops and of low value for pasture; best use is forestry. Should be reforested to pines and protected from fire. Management group 18.

Ochlockonee series

The Ochlockonee series consists of grayish-brown or brown friable alluvial soils in the flood plains of small streams. The alluvium from which they formed washed mainly from light-colored sandy soils of the Bowie, Lakeland, Boswell, and associated series. Soils of the Ochlockonee series are associated with soils of the Bibb and Iuka series. Ochlockonee soils differ mainly in being bettter drained and free of mottling to depths of 30 inches or more.

Ochlockonee loamy fine sand (0 to 1 percent slopes) (Oo).—This soil is deep, low to moderate in productivity, and very responsive to management. It is well suited to crops where not frequently overflowed.

Representative profile (about 6 miles east of Jacksonville on U. S. Highway 79 in the flood plain of Mud Creek):

0 to 12 inches, grayish-brown loamy fine sand; very friable; the plowed layer is nearly loose when dry; medium acid.

12 to 50 inches +, yellowish-brown very friable loamy fine sand; below about 40 inches this layer is slightly mottled with gray; contains thin strata of fine sandy loam; medium to strongly acid.

VARIATIONS: Surface layer ranges from grayish brown to light yellowish brown, texture from fine sandy loam to loamy fine sand, and thickness from 8 to 20 inches; second horizon is yellowish brown; thin strata of finer sediments slightly mottled with gray may occur below about 30 inches.

Parent Material: Sandy alluvial sediments; acid.
Drainage: Well drained but subject to overflow; floodwaters rarely cover soil more than 24 hours.
Erosion: Not susceptible.
Native Vegetation: Mainly hardwood forest of gum, oak, elm, pecan, and some shortleaf pine.
Location: Mostly in narrow first bottoms of small streams throughout the county.
Utilization: Nearly all in pasture or forests; a few acres used for cotton, corn, and sugarcane; special crops and vegetables also grown.
Suitability: Well suited to crops; moderately productive if not flooded too often; well suited to pasture. Management group 7.

Percilla series

Soils of the Percilla series are poorly drained, acid, and have a light-gray surface soil and a light brownish-gray subsoil of sandy clay or clay. They occur in depressed areas on the uplands. They are somewhat similar to the Garner soil, but they lack the heavy clay surface soil and subsoil of that series. Moreover, Percilla soils have developed from more sandy and permeable parent material than the Garner and usually contain some ferruginous or glauconitic material weathered from greensand. Percilla soils are commonly associated with soils of the Alto series, which are darker colored and better drained.

Percilla soils (0 percent slope) (Pa).—Percilla soils occur in poorly drained depressed areas.

Representative profile of Percilla clay loam (3 miles east of Rusk):

0 to 18 inches, light-gray clay loam slightly mottled with brown; friable when moist, very hard when dry; strongly acid.
18 to 35 inches, light brownish-gray sandy clay slightly mottled with brown; firm when moist, extremely hard when dry; numerous small concretions of iron oxide occur throughout the soil or in pockets or thin layers; strongly acid.
35 to 45 inches +, mottled light-gray and brownish-yellow sandy clay or sandy clay loam; strongly acid.

VARIATIONS: The surface soil ranges from gray or light brownish gray to white, and it is mottled with brown in places. The texture ranges from fine sandy loam to clay loam. A few to many small concretions of iron oxide occur on the surface and throughout the profile. The subsoil is a compact sandy clay or clay. Locally, lower part of the subsoil or the substratum is weakly cemented by iron oxide.

Parent Material: Sandy clays and clays containing some glauconitic material; acid.
Relief and Drainage: Level, concave, or depressed areas commonly without outlets; surface drainage lacking or very slow; internal drainage slow; high water table at or near the surface during the cool wet season.
Erosion: Not susceptible.
Native Vegetation: Mainly post and willow oaks with an understory of haw bushes and other shrubs.
Location: Many small areas are scattered throughout the county.
Utilization: Practically all in woodland and pasture; only a few acres in cultivation.
Suitability: Not suited to crops unless artificially drained; well suited to pasture or meadows of lespedeza and dallisgrass; high yields are possible on areas that can be fertilized and drained. Management group 17.

Ruston series

Soils of the Ruston series have brownish, friable, acid surface soils and reddish-yellow friable subsoils. They have developed in material derived from marine sediments. The soils are low to moderate in fertility but are very responsive to good management. They are well suited to crops commonly grown in the area. Ruston soils are associated with soils of the Bowie, Lakeland, and Eustis series. Lakeland soils are sandier and lighter colored than Ruston soils, the Eustis soils have a thicker sandy A horizon, and the Bowie soils have yellowish-brown subsoils.

Ruston fine sandy loam, gently sloping (1 to 3 percent slopes) (Ra).—This deep sandy loam soil is only moderately fertile but is very responsive to good management.

Representative profile (5½ miles southwest of Jacksonville on U. S. Highway 79):

0 to 8 inches, very pale brown fine sandy loam; very friable; nearly loose when dry; medium to strongly acid.
8 to 14 inches, light-brown fine sandy loam grading into reddish yellow in the lower part; very friable; strongly acid.
14 to 30 inches, reddish-yellow sandy clay loam; crumbly and friable when moist, slightly sticky when wet; strongly acid.
30 to 46 inches, same as layer above but more sandy and friable; slight yellow mottling in the lower part.
46 to 66 inches +, reddish-yellow fine sandy loam, slightly mottled with light gray and yellow; very friable; strongly acid.

VARIATIONS: Surface soil ranges from very pale brown to light brown; sandy clay loam subsoil occurs at depths of 10 to 18 inches; a few rounded concretions of iron oxide commonly occur in all horizons.

Parent Material: Thick beds of light-yellow to reddish-yellow sandy sediments; acid.
Relief and Drainage: Dominant gradients are less than 2 percent; runoff is slow to medium; internal drainage is medium and very favorable for crops.
Erosion: Slightly susceptible; can be controlled by good soil management.
Native Vegetation: Mixed pine and hardwood forest.
Location: Generally in the northern half of the county.
Utilization: Two-thirds of acreage used mainly for corn, cotton, sweetpotatoes, tomatoes, cowpeas, or-

chards, and other special and vegetable crops; remaining area in pasture and forest.

Suitability: Well suited to crops, pasture, or forest; one of the best and most responsive soils of the uplands for practically all crops. Management group 2.

Ruston fine sandy loam, sloping (3 to 8 percent slopes) (Rb).—The profile of this soil is about the same as that of Ruston fine sandy loam, gently sloping phase, but it differs in having slightly thinner soil layers. In addition, this soil is less productive, more droughty, and more susceptible to erosion.

Drainage: Runoff is medium to rapid.

Erosion: Moderately susceptible if cultivated; all cultivated areas slightly eroded, but productivity is reduced no more than 20 percent; terracing, contour cultivation, and selection of crops allow land to be cultivated safely and productivity maintained.

Location: In small areas in association with the gently sloping phase of Ruston fine sandy loam.

Utilization: Slightly more than half the acreage is cultivated; remaining area in forest and pasture.

Suitability: Especially suited to tree fruits, such as peaches and pears, because the root feeding zone is deep, air drainage is favorable, and the risk from frost is less than in lower lying areas; also suited to about the same crops as are grown on the gently sloping phase. Management group 5.

Ruston fine sandy loam, sloping, eroded (3 to 8 percent slopes) (Rc).—This soil differs from Ruston fine sandy loam, sloping phase, in having a thinner surface soil. Shallow gullies and rills are common, and the surface soil is only 5 to 8 inches thick. Several years of careful management are needed to restore original productivity and to correct the damage from erosion. However, this soil is easy to work, very responsive to good management, and fair for agriculture.

Drainage: Runoff from cultivated fields is medium to rapid.

Utilization: About half the acreage is cropped, chiefly to corn, cotton, sorghum, and cowpeas; the rest is idle or in abandoned pasture.

Suitability: Suitable for field crops that require little cultivation; especially well suited to peaches and pears. Runoff and erosion must be controlled on cultivated lands. If better land is available for crops, this soil should be used for orchards, pasture, or forestry. Management group 10.

Ruston loamy fine sand, gently sloping (1 to 3 percent slopes) (Rd).—This is a moderately loose deep sandy soil. It differs from Ruston fine sandy loam, gently sloping, mainly in having a thicker and sandier surface soil. The soil is only moderately fertile but is very responsive to good management.

Representative profile (4¼ miles southeast of Alto):

0 to 10 inches, very pale brown loamy fine sand; nearly loose when dry, very friable when moist; strongly acid.
10 to 20 inches, light-brown loamy fine sand; very friable; strongly acid.
20 to 30 inches, light reddish-brown or reddish-yellow friable fine sandy loam; strongly acid.
30 to 48 inches, reddish-yellow sandy clay loam; crumbly and friable when moist, hard when dry; strongly acid.
48 to 64 inches +, reddish-yellow light sandy clay loam or fine sandy loam, slightly streaked or mottled with yellow; strongly acid.

VARIATIONS: Surface soil ranges from pale brown to light brown; second and third horizons range from light brown to light reddish brown or pink; sandy clay loam subsoil occurs 18 to 36 inches below the surface; a few small roundish concretions of iron oxide in all layers.

Parent Material: Thick beds of reddish or reddish-yellow sandy marine sediments; acid.

Drainage: Runoff is slow and internal drainage is medium, but the soil is well drained.

Erosion: Very slightly susceptible; special measures not needed to control erosion.

Native Vegetation: Mixed pine and hardwood forest.

Location: Occupies many small areas, mostly in the northern half of the county.

Utilization: Most of the acreage is used for field and special crops or vegetables; 15 percent is in forest, and 25 percent in pasture.

Suitability: Well suited to special and vegetable crops or forest; moderately well suited to field crops. Management group 4.

Ruston loamy fine sand, sloping (3 to 8 percent slopes) (Re).—This sandy soil differs from Ruston loamy fine sand, gently sloping phase, in having stronger slopes and in having the sandy clay subsoil at depths of 15 to 30 inches. This soil also has slightly thinner layers than the gently sloping phase and has low to moderate natural fertility. Gradients range up to 10 percent in a few small areas.

Drainage: Runoff is medium to rapid.

Erosion: Moderately susceptible if cultivated; particularly susceptible to gullying if runoff is allowed to concentrate; careful management, which includes stripcropping and the planting of erosion resistant crops, is effective in controlling runoff. Usually terraces are not feasible because they are difficult to maintain on these deep sandy soils.

Utilization: About half the acreage is used for crops similar to those grown on the gently sloping phase of Ruston loamy fine sand; the rest is about equally divided between pasture and forest.

Suitability: Suitable for many kinds of crops if well managed and erosion is controlled and fertility is maintained. Management group 6.

Ruston and Bowie loamy fine sands, strongly sloping (8 to 15 percent slopes) (Rf).—This undifferentiated soil group consists chiefly of Ruston and Bowie loamy fine sands. Also included are small areas of Lakeland, Independence, and Eustis loamy fine sands. The soils in this group have profiles that are essentially like those of the sloping phases of Ruston and Bowie loamy fine sands. Slopes of a few small areas on the sand mountains have gradients ranging up to 25 percent or more, but these make up only a minor part of the total.

Native Vegetation: Mixed pine and hardwood forest, now largely second-growth post, blackjack, and red oaks, and shortleaf pine.

Utilization: None of this soil is cultivated, and the small acreage once cleared for farms has been abandoned.

Suitability: Well suited to forestry. The sandy hilly areas and abandoned fields should be reforested to

pines and protected from fire. Management group 19.

Susquehanna series

The Susquehanna series consists of light-colored very slowly drained acid soils that have mottled heavy clay subsoils. Susquehanna soils have developed on nearly level to sloping uplands from acid clays or clay shales. They are droughty, have low fertility, and are of little value for crops. They are associated with Boswell soils, from which they differ mainly in having less reddish but more mottled subsoils.

Susquehanna fine sandy loam, gently sloping (1 to 3 percent slopes) (Sd).—This soil is droughty and rather difficult to work. It has low natural fertility, but productivity can be improved by good management. This soil probably cannot be improved enough to produce high yields of crops, and late-maturing field crops may never produce more than moderate yields.

Representative profile (1 mile south of Wells):

0 to 4 inches, grayish-brown fine sandy loam; very friable; slightly acid.
4 to 10 inches, light-gray or very pale brown fine sandy loam; nearly loose when dry; strongly acid.
10 to 20 inches, mottled red, light-gray, and yellow compact heavy clay; very sticky and plastic when wet, extremely hard when dry; strongly acid.
20 to 40 inches, light-gray, heavy, dense clay mottled with red and light yellow; strongly acid.
40 to 60 inches +, light-gray dense clay or clay shale with thin lenses of yellowish sandy clay; strongly acid.
VARIATIONS: In places, depth to the heavy mottled clay subsoil ranges from 6 to 14 inches. Included are areas of Sawyer fine sandy loam that are too small to be mapped separately. Sawyer soils are not mapped in Cherokee County but do occur in some of the adjoining counties. In a few small included areas the upper subsoil is a yellowish-brown friable clay, 3 to 6 inches thick over the heavy clay. In some nearly level areas there are a few sandy mounds that have the heavy clay subsoil at depths of 18 to 24 inches.

Parent Material: Light-gray clay or clay shale that contains thin lenses of yellow sandy clay or clay; strongly acid.
Drainage: Runoff is slow to medium; internal drainage is very slow.
Erosion: Slighty to moderately susceptible if cultivated; soil is not appreciably damaged by erosion, as only a few small areas are cultivated.
Native Vegetation: Mixed pine and hardwood forest, mainly post oak and shortleaf pine.
Location: Small areas scattered throughout the county.
Utilization: A few small areas used for corn and cotton; remaining area in forest or pasture.
Suitability: Of low value for crops; moderately well suited to forestry or improved pasture. Management group 9.

Susquehanna fine sandy loam, sloping (3 to 8 percent slopes) (Se).—This soil has stronger gradients than the gently sloping phase of Susquehanna fine sandy loam, and the surface soil is slightly thinner. It is difficult to work, of low fertility, and droughty. Boswell fine sandy loam and the gently sloping phase of Susquehanna fine sandy loam are associated with this soil. A few areas have gradients up to 10 percent.
Inclusions: A few areas too small to map separately have a friable sandy clay upper subsoil. Some of these included areas are cultivated. These inclusions are similar to the Sawyer soils, which are not found in this county.
Erosion: Highly susceptible.
Utilization: One-sixth in cultivation; the rest is about equally divided between pasture or forest.
Suitability: Not suited to crops; better suited to forestry or pasture. Cleared areas can be used more profitably for pasture than for crops. Management group 18.

Susquehanna fine sandy loam, sloping, eroded (3 to 8 percent slopes) (Sf).—Erosion has removed about half the surface soil and formed many shallow gullies and rills in this mapping unit. The surface soil is only about 4 to 7 inches thick. The mottled subsoil is exposed in spots or is brought to the surface during tillage. This infertile soil is very droughty because the surface soil is thin and the subsoil is a heavy dense clay.
Drainage: Runoff is rapid from cleared areas.
Erosion: Very susceptible.
Native Vegetation: Mixed pine and hardwood forest. Abandoned fields support a thin cover of annual weeds, grasses, and scattered trees of pine, oak, and gum.
Utilization: More than a fifth in cultivation; most of the areas are in old-field pasture; a small percentage is in forest.
Suitability: Not suited to crops and of low value for pasture. Best use is forestry; all areas should be reforested either by natural reseeding or by planting seedlings. Management group 18.

Susquehanna clay loam, gently sloping (1 to 3 percent slopes) (Sb).—This is one of the tightest and most crusty soils in the county. It is infertile and droughty. Seedbeds are difficult to prepare and good stands of crops hard to obtain because the soil crusts on drying. This soil can be worked only within a narrow range of moisture content. These undesirable characteristics limit the kinds of crops that can be grown and lower the value of this soil for crops.

Representative profile (1¼ miles northwest of Wells):

0 to 4 inches, grayish-brown clay loam; moderately crumbly and friable when moist, sticky and plastic when wet, very hard and crusty when dry; strongly acid.
4 to 26 inches, light-gray or light olive-gray clay, mottled with red and light yellow; very compact; very sticky and stiff when wet; strongly acid.
26 to 56 inches, light olive-brown or yellowish-brown clay with slight gray and yellow mottling that fades as depth increases; very sticky and stiff; medium acid in upper part, slightly acid in low part.
56 to 72 inches +, light brownish-gray or pale-olive shale or clay shale; thin lenses of olive-yellow clay shale; about neutral to alkaline.
VARIATIONS: Surface soil ranges from dark yellowish brown to grayish brown and from 3 to 7 inches thick; subsoil ranges from slightly mottled light gray to mottled red, yellow, and gray; clay and shale parent material 36 to 70 inches below the surface.

A few small areas of similar soils are included that are too small to map separately.

Parent Material: Light brownish-gray or pale-olive clay or clay shale; slightly acid to alkaline.
Drainage: Runoff is slow to medium; internal drainage is very slow.
Erosion: Slightly susceptible if cultivated; special practices to control erosion not needed if soil is well managed.
Native Vegetation: Mixed pine and hardwood forest consisting mainly of gum and post oak and numerous haw bushes and shrubs.
Location: Southern part of county.
Utilization: The few areas in cultivation are used mainly for cotton, corn, and sorghum; remaining area principally in forest, but some in abandoned pasture.
Suitability: Limited suitability for most crops except cotton, corn, and sorghum; well suited to forestry and pasture. Management group 14.

Susquehanna clay loam, sloping (3 to 6 percent slopes) (Sc).—This soil differs from the gently sloping phase of Susquehanna clay loam in having stronger slopes, more rapid runoff, and greater susceptibility to erosion. It is infertile, very droughty, and hard to work.
Inclusion: A few small included areas have a friable sandy clay loam upper subsoil and are poor for crops.
Erosion: Very susceptible; active in areas where cover has been removed.
Location: Occurs in the southern part of county in association with other soils of the Susquehanna series.
Utilization: Nearly all in old-field pasture and forest; a few acres used mainly for corn and cotton.
Suitability: Best suited to pasture or forestry. Old-field pastures have a low carrying capacity but can be developed into fair pasture or reforested with moderate success. Management group 18.

Susquehanna clay, nearly level (0 to 2 percent slopes) (Sa).—This clay soil is associated with other members of the Susquehanna series and Boswell series. It is less dark and more reddish than Susquehanna clay loam, gently sloping, and has a more clayey surface soil than Boswell sandy clay loam, strongly sloping, severely eroded.

Representative profile (2 miles northeast of Wells):

0 to 7 inches, reddish-brown clay slightly mottled with reddish yellow; very sticky and plastic when wet, exteremely hard when dry; strongly acid.
7 to 14 inches, mottled red and light-gray clay; very sticky and plastic when wet, very compact when moist; strongly acid.
14 to 30 inches, same as layer above but is less red as depth increases.
30 to 60 inches +, light-gray or white clay; 20 percent of soil mottled light red; laminated or shaly in lower part; strongly acid.

VARIATION: Surface soil ranges from brown to reddish brown or red, with faint to distinct mottling of other shades of red and brown. In places the 1- to 3-inch surface soil is a grayish-brown clay loam; white slightly mottled clay in 30- to 60-inch layer ranges from 20 to 40 inches below the surface. The surface of most areas is made up of shallow depressions (hog wallows) and low microknolls.

Parent Material: Light-gray or white clay or clay shale, more or less streaked with pale yellow and light red; strongly acid.
Drainage: Runoff is slow; internal drainage is very slow.
Erosion: Not susceptible under a forest cover; cleared areas are slightly susceptible.
Native Vegetation: Mixed pine and hardwood forest; most of the pine has been removed.
Location: In the southern part of the county.
Utilization: Nearly all in forest; a few small areas formerly cultivated are now in pasture or are reverting to forest.
Suitability: Well suited to forestry; not suited to crops; low suitability for pasture. Management group 18.

Use and Management of Soils

Prevailing Management

The soil management currently practiced in Cherokee County essentially consists of tillage for seedbed preparation, the plowing under of legumes to a limited extent, and the use of barnyard manure for home gardens and, on some farms, for truck crops. The farmers alternate their crops, but no definite system is followed. The soils are low in essential plant nutrients (*4*), and prevailing management does not maintain soil fertility. Larger amounts of fertilizer are used each year to increase crop yields.

CROPS

Corn and cotton are the most important crops and occupy the largest acreages. Other crops are cowpeas, peanuts, yams, sorghum, and vegetables. The productive bottom lands and the most productive of the upland soils are used for corn and cotton. Otherwise, crops are not selected for the soils to which they are best suited.

Winter legumes such as vetch or Austrian Winter peas are used on some farms for green manure. However, they are not grown regularly on most farms and in general have contributed little in the way of soil improvement. The preparation of the land for the main spring and summer crops begins in January or February, and this does not allow the winter legumes to make enough growth to be worthwhile.

Summer legumes are also grown, but not in rotations with other crops. As green manure they are not so effective as winter legumes, because part of the nitrogen they supply is lost before a crop is planted the following spring.

CROP ROTATIONS, FERTILIZERS, AND LIME

Systematic crop rotations are not followed, but the same crop is seldom grown 2 years in succession on the same land. Corn and cotton usually follow each other, or are alternated with special crops and with vegetables. Because of insects and diseases, the special crops are grown only once in 3 to 5 years on the same soil.

The main crops are clean tilled, and most of the land is left bare in winter. The sloping or very sandy soils occasionally lie idle or grow up in weeds for a year or more before another crop is planted. This practice improves yields the first year, but it does not maintain productivity, nor is it economically practical.

The soils in Cherokee County are medium to strongly acid. They need lime (*6*), nitrogen, phosphorus, and potassium. The quantities of lime and plant nutrients applied per acre vary according to the kinds of crops grown. Barnyard manure is used for gardens and truck crops. Although fertilizers are used, soil fertility is not increased because the soils are continuously cropped, leached, and eroded. Nevertheless, productivity can be maintained by good soil management, including the use of fertilizers each year.

PASTURE AND MEADOW

Pastures on the uplands are mainly in abandoned fields where the soils are badly depleted of plant nutrients and seriously eroded. The sparse cover of needlegrass, partridgepea, and broomsedge furnishes forage of low nutritive value. Carrying capacities are low, and little is done to improve them. Weeds and brush are not controlled.

Pastures on the bottom land are on soils that cannot be cropped profitably because of the flood hazard. These pastures usually have a good cover of lespedeza, carpetgrass, bermudagrass, and some dallisgrass; they furnish moderate amounts of forage. Late in summer the nutritive values of the forage become low (*5*). Some pastures in the bottom lands have received additions of lime and phosphate, which have greatly increased their value.

Meadows can be developed on uplands or bottom lands, but very few have been established. The average farm needs meadows.

CONTROL OF EROSION AND DRAINAGE

Slight to moderate erosion occurs on all cultivated fields except those on the level or nearly level soils. Moderate to severe erosion occurs on the more sloping soils. A few farms are contour-cultivated but most of these also need other measures for control of erosion.

Most of the wet soils are cropped without being drained. About 50 acres of vegetables are irrigated from wells, creeks, or farm ponds.

Improved Management

Farmers in the county are showing an increasing interest in improving the fertility of their soils and thereby increasing crop yields. Efforts are being made to control erosion as well as plant diseases and insect pests. Commercial fertilizers are used more generally. With the increase in dairy farms, some manure is available for crops. Other practices being used are contour cultivation, terracing, and the plowing under of legumes for green manure.

CROPS

Tomatoes, peppers, cowpeas, peanuts, watermelons, and yams are suited to the loamy fine sands. The more fertile fine sandy loams and clay loams are good for corn, cotton, grain sorghum, and oats. Crop residues should be left on the land to increase the supply of organic matter in the soil. Crops not following legumes should receive mixed fertilizers.

CROP ROTATIONS, FERTILIZERS, AND LIME

A system of rotation should be planned so that different crops are grown in successive years. More legumes should be planted to increase the amount of nitrogen and organic matter in the soil. The use of power equipment for planting and harvesting field crops allows winter legumes more time for growth in fall and spring. Hairy vetch plowed under in spring increases crop yields and reduces erosion (*12*). Other winter legumes, as Williamette vetch, Austrian Winter peas, or Singletary peas (roughpea or Caly-pea), are also grown. Experiments at the Tyler Substation (*10*) show that hairy vetch is the most satisfactory legume. Inoculated vetch seed should be planted early in fall.

Cotton does not need additional fertilizer if it is planted on land that has been fertilized for vetch. If corn then follows the cotton, corn yields are increased by the residual effects of the fertilizer that was applied to the vetch.

Experiments were conducted at Tyler (*9*) on Nacogdoches and Boswell fine sandy loams. In these trials a 2-year rotation of cotton and corn followed vetch that had been fertilized with superphosphate and potash and turned under as green manure. The results show that the cotton following vetch produced 80 percent more lint than cotton grown without the vetch. Where corn followed cotton on land fertilized for vetch, the corn produced 27.7 bushels per acre, or twice the yield of corn grown on land without this rotation.

Summer legumes can be used to increase the content of nitrogen and the supply of organic matter, but they do not fit into rotations as well as winter legumes. Cowpeas, soybeans, crotalaria, and velvetbeans grow well in Cherokee County and can be interplanted with cash crops. These legumes may be seeded alone following the harvest of early spring vegetables and oats. In years when rains are abundant they will make satisfactory growth before frost.

Mixed fertilizers should be used for all crops that are grown without the beneficial effects of legumes. Lime should be applied according to needs shown by soil tests.

PASTURE AND MEADOW

Before pastures can be established, soil fertility must be improved. On most uplands it is advisable to apply phosphorus and potassium fertilizers and to grow inoculated legumes as green manure before the land is seeded or sodded to pasture plants. The amount of lime in the soils is probably adequate for grasses and lespedeza. If clovers are grown, however, lime should be added. Phosphate may be needed more than lime, and on many soils the beneficial effects of lime cannot be obtained unless phosphate is applied (*6*).

Soils of the bottom lands, though more fertile than soils of the uplands, also need phosphate, nitrogen,

potash, and lime. Pastures that consist of white clover, hop clover, or Persian clover mixed with grass can be developed if only phosphate is applied. The forage contains protein, phosphorus, and calcium in fair to large amounts. Cattle grazed on such pastures obtain ample nutrients and minerals (*1*).

Meadows can be developed on uplands and soils of the bottom lands. For well-drained uplands little bluestem, sericea lespedeza, and kudzu are well suited. On poorly drained soils of the uplands, dallisgrass, bermudagrass, and annual lespedeza are good. Meadows seeded on contour or field strips will help control erosion on sloping fields. The fertilizers used for pasture are also suitable for hay meadows.

Experiments at Tyler show that meadows of little bluestem can be developed on the more productive upland soils of east Texas (*11*). If the meadow is well established and properly fertilized, yields of 2.25 tons of hay per acre can be produced. Wild or narrowleaf vetch (*Vicia angustifolia*) and low hop clover (*Trifolium procumbens*) supply nitrogen for grass. These legumes increase the yields of hay and furnish winter and spring grazing.

CONTROL OF EROSION

Practically all cultivated soils of the uplands require some form of erosion control. Control can be achieved by using one or more of the following practices: Terraces, contour cultivation, winter cover crops, strip-cropping with terraces or strips of perennial grass (meadow) alternated with strips of cultivated crops.

Management suggestions by soil groups

Soils that will grow similar crops and that have similar management needs are placed in the same management group. There are 20 such groups in Cherokee County. The management of each group is discussed in the following pages. The management suggestions are based on results obtained on similar soils by the Texas Agricultural Experiment Station, on information supplied by the farmers in the county who get the best yields, and on observations made in adjacent areas. Additional information on crops, rotations, fertilizers, pasture and meadow plants, and forestry can be obtained from your County Agricultural Agent, the State Agricultural Experiment Station, and the Texas Forest Service. The Soil Conservation Service people at Rusk and at Nacogdoches (in Nacogdoches County) will assist farmers in planning programs for erosion control. The conservation districts should be consulted for additional and detailed information concerning specific farms or areas.

MANAGEMENT GROUPS 1, 2, 3, AND 4

The soils in management groups 1, 2, 3, and 4 are level to gently sloping. They are friable and moderately productive. Their internal drainage ranges from moderate to slow, and their moisture-supplying capacity is good. As a rule, the soils are well suited to most crops.

MANAGEMENT GROUP 1:

Amite fine sandy loam
Cahaba fine sandy loam
Bowie fine sandy loam, nearly level

These soils are among the most productive in the county. They are level to nearly level and are not susceptible to erosion. They can be used for row crops to produce most of the farm income. On most farms, the soils should be used mainly for corn, cotton, grain sorghum, sweet sorghum, oats, and cowpeas. Other adapted crops are soybeans, velvetbeans, hairy vetch, crotalaria, peanuts, yams, vegetables, fruits, pecans, sudangrass, and rye.

Any crop rotation is satisfactory that includes a winter legume for green manure at least once in 3 years. In addition, an inoculated summer legume, grown alone or interplanted with cash crops, should be grown as often as feasible or at least once in 3 or 4 years. A satisfactory 2-year rotation consists of corn, a winter cover of vetch to be plowed under in the spring, and cotton. Austrian Winter peas, Dixie Wonder peas, or Singletary peas may be substituted for the vetch. A grain sorghum can take the place of corn in the rotation.

A 3-year rotation consisting of corn, vetch, cotton, and oats is also satisfactory. Vegetables, melons, berries, cantaloups, or yams can replace the oats or corn in the 3-year rotation. Oats planted for grain require 100 to 200 pounds per acre of ammonium nitrate applied as a topdressing in February. Vetch needs little or no additional fertilizer if it follows truck or special crops that have been heavily fertilized.

The winter legumes best adapted to the area do not make sufficient growth to supply green manure if they are plowed under early in spring at the time the soil is prepared for vegetables or corn. The best results are obtained by growing cotton, grain sorghum, or other late-planted crops, after vetch.

Cowpeas can be planted alone for hay or as a cash crop. They may be grown for soil improvement if interplanted with corn, or planted as a catch crop following oats. Laredo, Mamloxi, or other small-stemmed varieties of soybeans can be harvested for hay. They can also be grown to improve the soil if the vines are left on the ground or turned under. Velvetbeans add nitrogen and organic matter to the soil. They give the best results if grown in alternate rows with corn. After the corn is harvested, the beans can be grazed by hogs or cattle and the residue plowed under or left on the ground.

Corn should be fertilized with about 150 to 200 pounds per acre of a 5-10-5 fertilizer before planting time if it follows cotton and vetch in the rotation. The corn should be sidedressed with at least 100 pounds per acre of ammonium nitrate, or 200 pounds per acre of nitrate of soda. If green manure was not turned under for cotton, the land should be fertilized with 200 to 300 pounds per acre of 5-10-5 or 6-10-4 fertilizer before corn is planted. The corn should be sidedressed with about 200 pounds per acre of ammonium nitrate. Mixed fertilizers should be applied at the rate of 200 pounds per acre before sorghum is planted; they should

be applied to all crops not preceded by green manure in the rotation.

Pasture plants adapted to these soils are dallisgrass, bermudagrass, rescuegrass, ryegrass, lespedeza, and hop, Persian, and white clovers. Lime and phosphate disked into the soils before seeding help to establish new pastures and to improve old ones. The control of weeds, brush, and grazing is needed. No information is available on whether rescuegrass and ryegrass will reseed in this rainfall belt.

Meadows should be fertilized with phosphate and potash. The fertilizers should be disked in, and the land seeded to sericea lespedeza, little bluestem, dallisgrass, or kudzu.

Land retired to forestry should be planted to pine, locust, catalpa, or mulberry. The existing stands should be harvested selectively and cleared of undesirable trees. The forests should be protected from fire and excessive grazing. Some burning is beneficial if used as a tool in management. Stand densities can be improved by planting the bare areas.

MANAGEMENT GROUP 2:

Magnolia fine sandy loam, gently sloping
Nacogdoches fine sandy loam, gently sloping
Ruston fine sandy loam, gently sloping
Nacogdoches clay loam, gently sloping
Bowie fine sandy loam, gently sloping

Soils in management group 2 are slightly susceptible to erosion. They have nearly the same productivity and crop adaptations as those in group 1. Fertilizers, crop rotations, and uses suggested for group 1 can be followed on these soils. Crop rotations should be practiced on all cropland. In addition, stripcropping and contour cultivation should be used to reduce runoff and to control erosion. Terraces may be necessary where slopes are strong and more than about 400 feet long. On most areas that do not receive water from adjacent soils, erosion can be controlled by stripcropping, contour farming, and improving fertility. Fertilizers and green manure crops increase vegetative growth, which retards runoff and reduces erosion.

Pastures, meadows, and forests are established and managed by the same methods as described for soils in management group 1 (fig. 8).

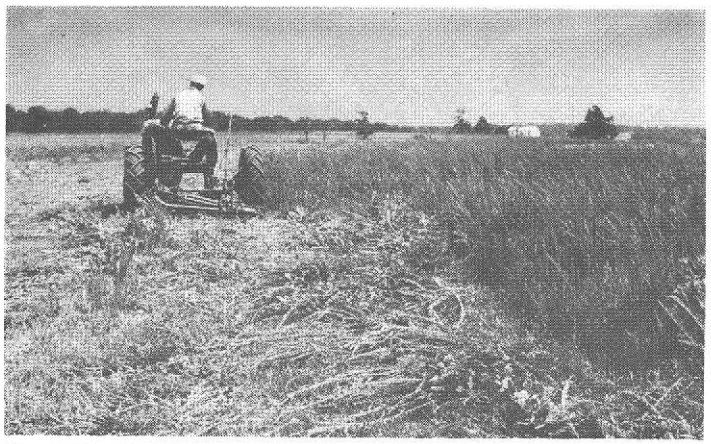


Figure 8.—**Sericea lespedeza grown for hay on Ruston fine sandy loam, gently sloping.**

MANAGEMENT GROUP 3:

Alto clay loam
Alto loam

The soils in group 3 are level, moderately heavy, and friable. Surface and internal drainage are slow. They are good for most field crops, pasture, or meadow, but only fair to poor for most truck crops and forestry.

Corn, cotton, and sorghum are well suited to these soils. Soybeans, vetch, cowpeas, rye, sudangrass, velvetbeans, and crotalaria are also adapted. Although the soils are moderately fertile, productivity can be increased by using shallow drains, legumes, and fertilizers. A 3-year rotation of corn followed by vetch, cotton, and sorghum, or a 2-year rotation of corn followed by vetch, and cotton is satisfactory. Fertilizers and legumes suggested for soils of management group 1 are also suitable for these soils.

Pastures or meadows of high carrying capacity and good quality can be developed if the soils are fertilized with 300 to 400 pounds per acre of 0-14-7 fertilizer or 20-percent phosphate. Their management and the plants suitable for each are the same as those suggested for soils of management group 1. Bermudagrass and Kobe lespedeza are also suited to the meadowland in group 3.

Erosion is not a problem on these nearly level slowly drained soils. Diversion terraces should be constructed where needed to intercept runoff water from adjacent slopes. Shallow drainage ditches may be dug in wet areas.

The management of existing forests is the same as that suggested for forests in management group 1. New forest plantings are not suggested.

MANAGEMENT GROUP 4:

Ruston loamy fine sand, gently sloping
Bowie loamy fine sand, gently sloping

These soils are slightly susceptible to erosion. They respond to management, although they are low in fertility. They are well suited to vegetables, moderately well suited to field crops if heavily fertilized, poorly suited to pasture, and well suited to forestry.

The gently sloping loamy fine sands of group 4 should be used mainly for berries, peaches, pears, cantaloups, and vegetables. If well managed these soils will produce moderate yields of corn, sorghum, and cotton. Other adapted crops are peas, peanuts, yams, vetch, Austrian Winter peas, crotalaria, melons, and rye.

The soils in group 4 are more susceptible to leaching than those in management group 1, and, consequently, require larger quantities of nitrogen fertilizers each year. In addition, mixed fertilizers and winter legumes for green manure are needed. The fertilizers and manure crops suggested for soils in management group 1 are satisfactory. The necessary plant nutrients can be supplied by turning under inoculated hairy vetch that has been fertilized with phosphate, or by applying a chemical fertilizer high in nitrogen. Corn that is grown on land so treated should be planted in widely spaced rows or in alternate rows with summer legumes. Winter legumes should be grown for green manure at least 1 year in 3, and summer legumes as

often as possible. Fibrous rooted crops such as oats, sorghum, or sudangrass, planted in contour strips or field strips, should cover at least one-fourth the area of these soils each year to reduce runoff and erosion. Mixed fertilizer should be applied to all crops that do not follow a green-manure crop.

Pasture management on these soils is about the same as for group 1, except that white and Persian clovers are not suitable for these soils. Bluestem and weeping lovegrass should be seeded on existing pasture where the cover is thin or the soil is bare.

Establishment and management of meadows on these soils require the same practices as suggested for meadows in management group 1.

Runoff and erosion are not serious problems and usually can be reduced or controlled by stripcropping and contour cultivation. As a rule, terraces are not recommended because maintenance of structures and control of outlets are difficult. Diversion terraces may be needed to intercept runoff from adjacent slopes.

Forests require the management suggested in management group 1.

MANAGEMENT GROUPS 5 AND 6

The soils in management groups 5 and 6 are level to sloping, friable, and moderately productive. They are moderately susceptible to erosion and require careful management for good crop yields. As a rule, the soils are good for most field crops.

MANAGEMENT GROUP 5:

Magnolia fine sandy loam, sloping
Nacogdoches fine sandy loam, sloping
Ruston fine sandy loam, sloping
Bowie fine sandy loam, sloping

Soils in management group 5 are adapted to the same crops as those in group 2. They are slightly less productive, however, and more susceptible to erosion.

This group of sloping soils can absorb water at a moderate rate, but runoff is high during heavy rains, especially if the surface soil becomes saturated. Intensive management is required to maintain productivity and to control runoff and erosion.

A complete terrace system should be used on practically all cultivated soils. Strips of thick-growing crops with fibrous root systems should be grown each year. The strips should be placed just above the terrace channels and ought to cover about one-fourth of the cultivated area. Sorghum and oats, cowpeas, or soybeans, broadcast or planted in alternate rows about 18 inches apart, are satisfactory crops in erosion control strips. The rotations and winter legumes that are suggested for soils in management group 2 are also suitable for the soils in management group 5.

The quantity of fertilizer suggested for the soils in management group 1 should be increased by 25 percent for soils in this group.

Pastures, meadows, and forests are established and managed by the same methods as described for soils in management group 1. In addition, gullies in pastures should be sloped and seeded or sodded to erosion-resistant plants. Deep active gullies should be planted to locust or catalpa. Runoff should be diverted from gullied areas.

MANAGEMENT GROUP 6:

Ruston loamy fine sand, sloping
Bowie loamy fine sand, sloping

Soils in management group 6 are good for peanuts, peas, yams, and vegetables, but they are only fair for common field crops. They are good for forestry, poor for pasture, and not suited to meadow. Crop adaptations and fertilizer requirements are about the same as for the soils of management group 4.

These soils differ from those in group 4 mainly in having stronger slopes, slightly thinner soil horizons, and a greater susceptibility to erosion. For these reasons more intensive management is needed to reduce runoff and erosion.

Erosion-resistant crops should be grown each year on at least a third of the cultivated area in management group 6. The protective crops may be grown in contour or field strips, or in wide strips just above terrace channels. Terraces, however, are not generally desirable for soils in this group because of the difficulty in maintaining the structures and controlling the outlets. On land to be used for orchards, it may be advisable to plant trees on the terraces. Close-growing crops and legumes for winter cover should be planted between the terraces as often as possible. If necessary, diversion terraces should be used to lead runoff into stream channels or waterways.

Pasture management on these soils is about the same as for group 4, except that burclover and white, Persian, and hop clovers are not suitable in plant mixtures for these soils.

Forest management requires the same general practices as suggested in management group 1.

MANAGEMENT GROUPS 7 AND 8

The soils in management groups 7 and 8 are on moderately fertile bottom lands that have slow internal drainage. They are moderately productive and well suited to field crops. Yields, however, are uncertain because overflows are frequent. The soils are also well suited to pasture and are fair for forestry.

MANAGEMENT GROUP 7:

Hannahatchee fine sandy loam
Ochlockonee loamy fine sand
Iuka fine sandy loam

MANAGEMENT GROUP 8:

Hannahatchee clay loam
Iuka clay loam

The soils in groups 7 and 8 have similar crop adaptations and fertilizer requirements. The following practices apply to both groups:

Many areas are flooded too often for crops, but where cultivated, the soils should be used mainly for cotton, corn, sweet sorghum, and native hay. Other suitable crops are vetch, cowpeas, fall vegetables, sudangrass, soybeans, crotalaria, and pecans.

The available moisture-holding capacity of these soils is good, and crops seldom lack moisture in late summer. Consequently, management should be of the kind that will improve the fertility and productivity of these two groups of soils.

The soils respond to mixed fertilizers and to legu-

minous green-manure crops. Yields can be almost doubled if management is good. Land that is used for row crops should be planted to hairy vetch or other winter legume for green manure once in 3 years. The winter legume should be fertilized with about 200 pounds of 0-14-7 or 150 pounds of 20-percent phosphate per acre. Crops that do not follow a green-manure crop should receive 150 to 200 pounds per acre of 5-10-5 or 6-10-4 fertilizer.

Fall vegetables produce moderate to high yields if grown on the better drained soils in management group 7. Yields are uncertain, however, and the crops require moderately large quantities of mixed fertilizers. Only the high better drained soils, not subject to floods, should be used for truck crops.

In management groups 7 and 8, pastures of high carrying capacity can be developed in cleared areas that are often overflowed and too wet for crops. These areas are capable of producing excellent forage. Existing pastures, or soils on which new pastures are to be established, should be fertilized with about 300 pounds per acre of 0-14-7 fertilizer or 20-percent phosphate, which is disked in, and then seeded with a mixture of white, Persian, and hop clovers, lespedeza, dallisgrass, and bermudagrass (fig. 9). Weeds and grazing must be controlled.

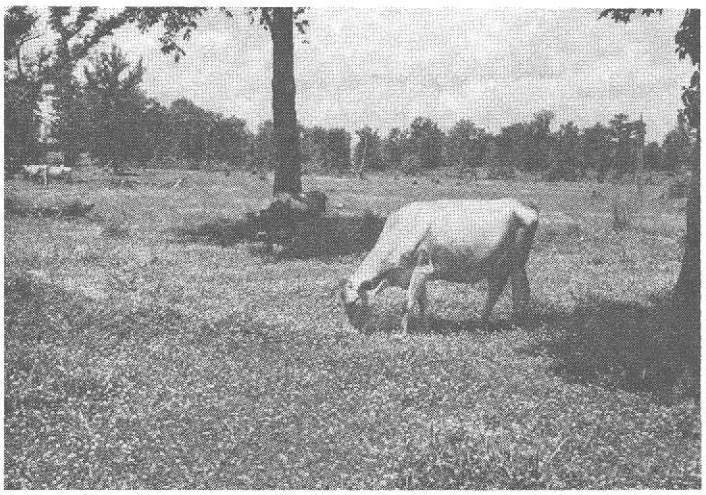


Figure 9.—**Lespedeza, dallisgrass, and white and hop clovers in an improved pasture on Hannahatchee clay loam.**

Meadows of annual lespedeza can be established that produce excellent hay if fertilized with phosphate and potash. Kobe lespedeza, with bermudagrass or dallisgrass, or both, makes a suitable hay meadow.

Forests can be established and managed by the methods described for soils in management group 1.

MANAGEMENT GROUPS 9, 10, AND 11

The soils in management groups 9, 10, and 11 are gently sloping to sloping and moderately susceptible to erosion. They are of low to moderate fertility, but they respond to management and are fairly productive of most field crops if heavily fertilized. Careful management is required to control erosion and maintain fertility. The soils are also very good for forestry and fair for pasture.

MANAGEMENT GROUP 9:

Boswell fine sandy loam, gently sloping
Susquehanna fine sandy loam, gently sloping

These soils in management group 9 have slowly permeable, heavy subsoils. They should be used mainly for cotton, corn, sorghum, oats, sudangrass, and legumes. Rye and fruits are also suited. A satisfactory 2-year rotation consists of corn, vetch, and cotton; a good 3-year rotation is corn, vetch, cotton, and sorghum or cowpeas. Hairy vetch, inoculated and fertilized with phosphate, should be turned under at least once in 3 years. Summer legumes should be grown as often as feasible. Mixed fertilizer should be applied to all crops that do not follow a green-manure crop. Fertilizers suggested for the soils in management group 1 can be applied to these soils. Although the soils in group 9 are less productive than those in group 2, they do not need heavier applications of fertilizer, because they are more droughty and yields are more uncertain in years when moisture is limited. Terraces and contour tillage should be used to reduce runoff and erosion.

Pasture plants adapted to these soils are dallisgrass, bermudagrass, rescuegrass, rye, lespedeza, burclover, and Persian, hop, and white clovers. Lime and phosphate should be disked in, and a legume grown before pasture plants are seeded. Control of weeds and grazing is needed.

Meadowland should be planted to legumes after phosphate has been disked into the soil. Sericea lespedeza or kudzu can then be seeded as meadow plants.

Forests can be established and managed according to practices described in management group 1.

MANAGEMENT GROUP 10:

Ruston fine sandy loam, sloping, eroded
Bowie fine sandy loam, sloping, eroded
Cuthbert and Ruston fine sandy loams, sloping

These soils are moderately sloping and moderately eroded and have friable subsoils. They are of low productivity but very responsive to management. If carefully managed, they are fair for crops. They are excellent for forestry but only fair for pasture. They are not suited to meadow.

Erosion and loss of plant nutrients have damaged the soils in group 10. Consequently, the first improvement should be the construction of complete, properly designed terrace systems that have well-sodded outlets.

Cotton, corn, sorghum, oats, rye, vetch, cowpeas, soybeans, peanuts, tree fruits, and berries are suited to these soils. At least a third of the cultivated acreage should be planted each year to erosion-resistant crops. Management should consist of cultivating on the contour, growing winter legumes for green manure at least once in 3 years, and growing of summer legumes as often as feasible. The crops should be rotated. All crops that do not follow a green-manure crop should receive mixed fertilizers.

Fertilizer requirements and crop adaptations for this group of soils are somewhat similar to those of management group 9. The soils in group 10, however, have been damaged more by erosion and should be carefully managed to maintain or improve productivity.

Pastures can be established and maintained by the same practices as those described for soils in management group 9. Gullies should be plowed and sodded. If the gullies are deep and active, they should be planted to species of trees that will become a future source of fence posts. The soils are not suitable for meadow.

Forestry should be practiced according to the suggestions in management group 1.

MANAGEMENT GROUP 11:

Nacogdoches fine sandy loam, sloping, eroded
Nacogdoches clay loam, sloping
Nacogdoches clay loam, sloping, eroded
Boswell fine sandy loam, sloping

These soils have heavy, moderately permeable to slowly permeable subsoils. They are very susceptible to erosion but are only moderately eroded. For most field crops, they are moderately productive if fertility is improved and erosion is controlled. The soils in management group 11 are very good for forestry, only fair for pasture, and not suited to meadow.

Crops suitable for this management group are cotton, sorghum, cowpeas, vetch, oats, corn, velvetbeans, crotalaria, sudangrass, and tree fruits. Management, crop adaptations, fertilizers, and terracing practices applicable to management group 11 are the same as described for group 10, except that up to one-half the cultivated area should be used each year for erosion-resistant crops. The soils of both groups are eroded and require intensive management to maintain or improve productivity.

Pastures are established and maintained by the same practices as those described for management group 9.

Forest management for this group is the same as that described under management group 1.

MANAGEMENT GROUPS 12, 13, AND 14

The soils of management groups 12, 13, and 14 are not fertile. If properly managed and heavily fertilized, they produce moderate yields of selected crops. Their best use is for forestry; they are poor for pasture and unsuited to meadow.

MANAGEMENT GROUP 12:

Eustis loamy fine sand, nearly level
Independence loamy fine sand, nearly level
Huckabee loamy fine sand
Lakeland loamy fine sand, nearly level

These deep, nearly level soils are of low fertility, but they are suited to a few special crops such as berries, yams, peanuts, melons, and vegetables if heavily fertilized. They are fair if used for pine trees, very poor for pasture, and unsuitable for meadow. They are not susceptible to erosion.

Crops adapted to the soils in group 12 are peanuts, cowpeas, yams, vetch, rye, crotalaria, vegetables, melons, corn, cotton, and sorghum. Management consists mainly of applying large amounts of mixed and nitrogenous fertilizers, adding organic matter, and growing mainly special crops and truck crops. Organic matter and considerable nitrogen can be supplied by planting crotalaria, cowpeas, hairy vetch, or Austrian Winter peas as green manure every other year. This practice will also reduce the leaching of the soils. Land on which winter legumes are to be grown should be fertilized with at least 300 pounds per acre of 0-14-7 fertilizer or 20-percent phosphate.

All vegetables and special crops produce moderate yields if large quantities of fertilizer are applied before planting time and later as a side dressing to the crops. Peanuts and cowpeas should get about 200 pounds per acre of 5-10-5 or 6-10-4 fertilizers; yams, cucumbers, and watermelons, 600 pounds per acre; and tomatoes (*15*) and peppers, 900 to 1,200 pounds per acre.

Common field crops are not well suited to the soils in management group 12. However, if field crops are grown in wide rows with plenty of space between hills, and are heavily fertilized, moderate yields can be obtained on soils that have received large quantities of fertilizer the previous year.

If cotton is grown, it should follow winter vetch that has been plowed under as green manure. Corn should be sidedressed with about 200 pounds per acre of ammonium nitrate. A method well suited to these soils is to grow corn in alternate rows with cowpeas, velvetbeans, or crotalaria. Rye used as a winter cover crop and well fertilized will furnish grazing. Large quantities of mixed fertilizer are required for all crops that follow rye.

The soils in group 12 are not susceptible to water erosion, and special measures for erosion control are not needed. However, wind causes erosion on fields from which peanuts and yams have been harvested. To prevent soil blowing and to restore organic matter, such land should be planted to winter legumes or legumes mixed with rye.

These soils are not suitable for pasture. If the farmer must use them for this purpose, the best plants are bermudagrass, rescuegrass, little bluestem, and common lespedeza. Phosphate fertilizer should be disked into the soil before seeding the pasture. The control of weeds and grazing is necessary.

Land to be set aside for forestry should be planted to slash pine or loblolly pine. Plantings of black locust or catalpa will be a future source for fence posts. Existing forests should be selectively harvested, thinned, and protected from fires and excessive grazing.

MANAGEMENT GROUP 13:

Eustis loamy fine sand, sloping
Independence loamy fine sand, sloping
Lakeland loamy fine sand, sloping

These moderately sloping, deep soils are low in fertility but are suited to a few special crops such as berries, peaches, pears, and vegetables if heavily fertilized. They are moderately susceptible to erosion.

Although these soils are less productive and more susceptible to erosion than those in management group 12, crop suitability and management are similar. These soils, however, need a heavier vegetative cover to reduce runoff and control erosion, because terraces are not satisfactory on these deep sandy soils. Erosion resistant crops, grown in field strips or contour strips, should occupy more than half the cultivated area each year. The strong slopes not suitable for contouring should be planted to pine trees and used for forestry. Diversion terraces should be constructed

to protect cultivated areas from runoff originating on adjacent slopes.

Pastures and forests can be established and maintained by using the practices outlined for management group 12.

MANAGEMENT GROUP 14:

Garner clay
Susquehanna clay loam, gently sloping

The soils in management group 14 are heavy, somewhat crusty, droughty, hard to till, and of low to moderate productivity. They must be worked within a narrow range of moisture conditions and are not adapted to many crops. They are fair to good for forestry.

Cotton and sorghum are best suited to these soils, but cowpeas, velvetbeans, crotalaria, and vetch make fair growth if moisture is favorable. Most other field crops grow poorly on these soils.

The soils require additional plant nutrients and organic matter to improve tilth and productivity. These elements can be supplied by plowing under, every third year, a crop of hairy vetch that has been fertilized with phosphate, or by applying mixed fertilizers. A satisfactory crop rotation consists of grain sorghum or sweet sorghum for hay, hairy vetch, and cotton. Summer legumes should be grown as often as feasible and may be used following sorghum. Summer legumes are not as effective as vetch in adding nitrogen to soils. Cowpeas or soybeans mixed with sorghum or sudangrass should produce good yields of hay. After the hay is harvested, vetch can be grown as a winter legume and the land used for cotton the following spring. Crops that do not follow vetch should be given about 200 pounds per acre of mixed fertilizers.

To reduce runoff and erosion on the stronger slopes in management group 14, terraces, contour cultivation, or stripcropping may be needed.

Pastures of very good quality can be developed in this way: First, 500 pounds per acre of 0-14-7 fertilizer or 20-percent phosphate and 1 ton of agricultural lime are disked or plowed into the soil; then a legume is grown and plowed under to provide green manure; and finally pasture grasses are seeded. Bermudagrass, dallisgrass, burclover, white clover, Persian clover, hop clover, and annual lespedeza do well in management group 13. Weeds and grazing should be controlled.

Meadows can be established by applying mixed fertilizers the first year and sowing dallisgrass, bermudagrass, and Kobe lespedeza. Thereafter, phosphate fertilizers should be applied.

Forests on these soils should be managed as described under management group 1. Land retired from cultivation should be planted to pine, locust, or mulberry.

MANAGEMENT GROUPS 15, 16, AND 17

Management groups 15, 16, and 17 consist of soils that should be drained and protected from overflows and erosion. The soils are of low productivity, need large quantities of fertilizer, and should not be used for crops if better land is available.

MANAGEMENT GROUP 15:

Bowie loamy fine sand, sloping, eroded
Eustis loamy fine sand, sloping, eroded
Lakeland loamy fine sand, sloping, eroded

If these soils are cultivated, it is difficult to control erosion and to maintain fertility. Under good management, low to moderate yields of crops can be obtained. The soils are not suited to meadow.

About half the acreage in management group 15 can be used each year for peanuts, peas, vetch, velvetbeans, sorghum, sudangrass, melons, corn, cotton, and vegetables. On the other half, erosion-resistant crops should be grown in contour strips or field strips at right angles to the slope. In places, wide strips of kudzu can be planted to control erosion. If well fertilized, the kudzu will produce some hay. Winter or summer legumes grown every other year, applications of large quantities of fertilizer, and the planting of field crops in widely spaced rows, or in alternate rows with summer legumes, are the suggested practices.

To develop pastures, phosphate fertilizers should be disked in and the soil seeded to common lespedeza, rye, rescuegrass, and little bluestem. Weeds and grazing must be controlled.

Terraces should be constructed to divert runoff from adjacent slopes into natural channels. Gullies can be gradually leveled or filled in by sloping the sides and seeding them to dallisgrass, bermudagrass, or kudzu. Seedlings of locust or mulberry planted in gullies reduce erosion and in time become a source of fence posts.

The stronger slopes and badly gullied areas should be planted to slash and loblolly pines, catalpa, and black locust. Selective cutting and thinning and the removal of weed trees would improve the quality and yield of existing forests. Fire and grazing should also be controlled in all forests.

MANAGEMENT GROUP 16:

Caddo fine sandy loam, level
Caddo fine sandy loam, sloping
Caddo very fine sandy loam, mound phase

These soils are poorly drained, of very low fertility, and well suited to pasture or forestry. If used for crops, they must be drained, heavily fertilized, and protected from runoff from surrounding areas. Shallow ditches and diversion terraces may be needed to drain off and intercept excessive water.

Cotton, sorghum for hay, cowpeas, velvetbeans, soybeans, sudangrass, sugarcane, and corn, in the order named, are probably the most suitable crops for the soils of management group 16. Land used for row crops should be supplemented with green manure in the form of winter legumes every third or fourth year, and with summer legumes as often as feasible. Crops that do not follow a green-manure crop should receive mixed fertilizers.

Pastures should receive 300 to 500 pounds per acre of 20-percent phosphate or a 0-14-7 fertilizer. A mixture of white, hop, or Persian clovers, dallisgrass, bermudagrass, and either Kobe or common lespedeza produces good pasture. The control of weeds and grazing is necessary.

Meadows of dallisgrass and bermudagrass or annual lespedeza, if fertilized with 300 to 500 pounds per acre of a 0-14-7 fertilizer or 20-percent phosphate, yield from 2 to 2.5 tons per acre of good-quality hay. New pastures should get mixed fertilizers the first year and phosphorus fertilizer thereafter.

Areas that are to be converted to forests should be planted to pines and protected from grazing and fires. The quality and yield of the growing stock in existing forests can be improved by selective harvesting, thinning, and the removal of weed trees. Stand densities can be improved by planting trees in the bare areas and openings.

MANAGEMENT GROUP 17:

Percilla soils
Bibb fine sandy loam
Bibb clay loam

The soils in management group 17 occur in depressions and on bottom lands. They are poorly drained. If the land is used for crops, drainage and protection from overflows are needed. The soils are good for pasture and forestry. Percilla soils are also good for meadow.

Soils in this management group should receive the same treatment as those in management group 16.

MANAGEMENT GROUPS 18, 19, AND 20

The soils in management groups 18, 19, and 20 are unsuitable for cultivation and of low value for pasture. Except for Marsh, a miscellaneous land type, they are moderately to highly valuable for forestry.

MANAGEMENT GROUP 18:

Boswell fine sandy loam, sloping, eroded
Boswell fine sandy loam, strongly sloping
Boswell fine sandy loam, strongly sloping, eroded
Boswell sandy clay loam, strongly sloping, severely eroded
Bub-Nacogdoches complex
Cuthbert and Ruston fine sandy loams, strongly sloping
Cuthbert and Ruston fine sandy loams, strongly sloping, eroded
Magnolia fine sandy loam, strongly sloping
Nacogdoches fine sandy loam, strongly sloping
Nacogdoches fine sandy loam, strongly sloping, eroded
Nacogdoches clay loam, strongly sloping, eroded
Susquehanna fine sandy loam, sloping
Susquehanna fine sandy loam, sloping, eroded
Susquehanna clay loam, sloping
Susquehanna clay, nearly level

The nonarable soils in management group 18 have heavy slowly permeable subsoils. They are generally under a cutover forest of shortleaf pine and various species of oak and gum. The only management required is the care of existing forests. This management would include selective cutting and thinning, removal of undesirable species, controlled burning, and the control of wildfire and grazing. Small areas may need pruning. Some soils, however, such as the sloping eroded phases of Boswell, Nacogdoches, and Susquehanna, should be planted to pine seedlings to hasten the reforestation. Additional information on forest management can be obtained from local representatives of the Texas Forest Service.

Pasture plants suited to soils of this group are dallisgrass, bermudagrass, rescuegrass, ryegrass, and lespedeza (fig. 10). Lime and phosphate, disked into the soil before seeding, benefit new pastures and improve old ones. The control of weeds, brush, and grazing is needed.

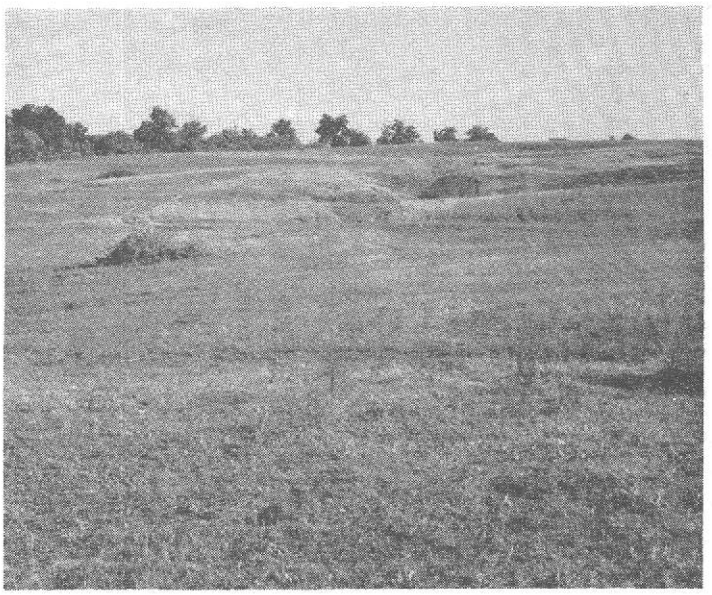


Figure 10.—**Bermudagrass and legumes in an improved pasture on Cuthbert and Ruston fine sandy loams, strongly sloping, eroded.**

Gullies should be sloped and planted to grass, kudzu, or trees. In addition, runoff should be diverted from gullies.

MANAGEMENT GROUP 19:

Eustis loamy fine sand, strongly sloping
Eustis loamy fine sand, strongly sloping, eroded
Independence loamy fine sand, strongly sloping
Lakeland loamy fine sand, strongly sloping
Ruston and Bowie loamy fine sands, strongly sloping

These deep soils have stronger gradients than those in management group 18. Consequently, they are not so productive or so desirable for forestry. The forestry practices described for the soils in group 18 are applicable to the soils in management group 19. This group is not suited to crops or meadow and is practically unsuitable for pasture.

MANAGEMENT GROUP 20:

This management group consists of wet lands that are classified as Marsh. It has little or no use except to provide a limited amount of grazing, particularly for wildlife. The marshy areas could be stocked with fish and frogs.

Estimated Yields

The estimated average acre yields that can be expected from the principal crops grown on the soils of Cherokee County under two levels of management are given in table 3. Listed in columns A are average yields that have been obtained over a period of years under prevailing management, or the ordinary management practiced at the time of the survey. Columns B show the yields to be expected under improved management, as described in this report.

TABLE 3.—*Estimated average acre yields of principal crops under two levels of management*

[Yields in columns A are those obtained under prevailing management; yields in columns B may be expected under improved management (see text). Blank spaces indicated that the crop is not commonly grown or the soil is not suited to it under the management specified]

Soil	Management group	Corn		Cotton		Peanuts		Tomatoes		Yams		Sorghum for hay		Oats		Pasture per animal unit[1]		Cowpeas (green peas)	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
		Bu.	*Bu.*	*Lb.*	*Lb.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Acres*	*Acres*	*Lb.*	*Lb.*
Alto clay loam	3	12	28	170	250	----	----	----	----	----	----	1½	3	----	----	5	2	1,500	2,400
Alto loam	3	12	28	160	250	----	----	----	----	----	----	1½	3	----	----	6	3	1,500	2,400
Amite fine sandy loam	1	20	35	160	250	25	40	240	260	90	160	1½	2¾	----	35	6	2	2,000	3,500
Bibb clay loam	17	----	18	----	160	----	----	----	----	----	----	----	2	----	----	5	2	----	----
Bibb fine sandy loam	17	----	18	----	160	----	----	----	----	----	----	----	2	----	----	7	3	----	----
Boswell fine sandy loam:																			
Gently sloping	9	8	20	100	175	15	30	110	125	60	100	1	1¾	----	27	10	6	1,200	2,000
Sloping	11	6	15	80	160	12	24	100	110	45	80	¾	1½	----	25	12	6	900	1,600
Sloping, eroded	18	4	----	50	----	----	----	----	----	----	----	1½	----	----	----	15	----	----	----
Strongly sloping	18	----	----	----	----	----	----	----	----	----	----	----	----	----	----	12	8	----	----
Strongly sloping, eroded	18	----	----	----	----	----	----	----	----	----	----	----	----	----	----	15	----	----	----
Boswell sandy clay loam, strongly sloping, severely eroded	18	----	----	----	----	----	----	----	----	----	----	----	----	----	----	18	----	----	----
Bowie fine sandy loam:																			
Nearly level	1	15	35	150	250	25	35	240	260	80	170	1½	2¾	----	30	8	4	2,000	3,500
Gently sloping	2	15	32	150	250	25	35	240	260	80	170	1½	2¾	----	30	8	4	2,000	3,500
Sloping	5	12	25	115	200	22	32	225	240	80	160	1½	2	----	32	8	5	1,700	3,000
Sloping, eroded	10	7	20	75	175	15	25	100	120	50	100	1	2	----	25	10	6	1,200	2,500
Bowie loamy fine sand:																			
Gently sloping	4	10	35	125	175	25	37	230	260	85	160	1	2	----	----	12	----	1,800	3,200
Sloping	6	6	22	90	175	18	30	180	200	80	150	¾	1¾	----	----	12	----	1,400	2,600
Sloping, eroded	15	4	15	----	140	----	25	90	100	----	120	¾	1½	----	----	15	----	100	1,900
Bub-Nacogdoches complex	18	----	----	----	----	----	----	----	----	----	----	----	----	----	----	18	----	----	----
Caddo fine sandy loam:																			
Level	16	----	12	----	110	----	----	----	----	----	----	----	1½	----	----	8	4	----	----
Sloping	16	----	10	----	100	----	----	----	----	----	----	----	1¼	----	----	8	5	----	----
Caddo very fine sandy loam, mound phase	16	----	12	----	125	----	----	----	----	----	----	----	1½	----	----	8	4	----	----
Cahaba fine sandy loam	1	18	35	160	250	25	40	230	260	90	175	1½	2¾	----	35	8	4	2,000	3,500
Cuthbert and Ruston fine sandy loams:																			
Sloping	10	7	15	60	160	----	----	90	100	----	----	1	1½	----	25	12	8	1,200	2,000
Strongly sloping	18	----	----	----	----	----	----	----	----	----	----	----	----	----	----	12	----	----	----
Strongly sloping, eroded	18	4	----	40	----	----	----	----	----	----	----	1½	----	----	----	18	----	----	----
Eustis loamy fine sand:																			
Nearly level	12	8	18	75	160	18	30	180	200	60	90	¾	1½	----	----	12	----	1,400	2,400
Sloping	13	6	15	----	150	18	30	150	160	55	75	¾	1¼	----	----	12	----	1,200	2,000
Sloping, eroded	15	5	12	----	125	----	22	80	90	----	65	½	1¼	----	----	15	----	800	1,400
Strongly sloping	19	5	----	50	----	----	----	----	----	----	----	½	----	----	----	15	----	----	----
Strongly sloping, eroded	19	4	----	30	----	----	----	----	----	----	----	¼	----	----	----	18	----	----	----
Garner clay	14	----	18	----	230	----	----	----	----	----	----	----	3	----	----	7	3	----	1,600
Hannahatchee clay loam	8	22	30	150	200	----	----	----	----	----	----	2	3	----	----	4	2	----	----
Hannahatchee fine sandy loam	7	18	30	150	200	----	----	----	----	----	----	2	3	----	----	4	2	1,200	1,600
Huckabee loamy fine sand	12	6	16	75	125	20	30	165	180	55	80	¾	1¼	----	----	15	----	1,200	2,000
Independence loamy fine sand:																			
Nearly level	12	10	18	75	160	22	32	180	200	70	90	¾	1½	----	----	12	----	1,500	2,600
Sloping	13	8	15	60	150	20	30	150	160	65	75	¾	1¼	----	----	12	----	1,300	2,000
Strongly sloping	19	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Iuka clay loam	8	20	30	140	200	----	----	----	----	----	----	2	3	----	----	4	2	----	----
Iuka fine sandy loam	7	20	30	140	200	----	----	----	----	----	----	2	3	----	----	4	2	1,200	1,600

[1] Carrying capacities are based on a grazing season extending from Feb. 1 to Oct. 31 for column A; and year long for column B.

TABLE 3.—*Estimated average acre yields of principal crops under two levels of management*—Continued

Soil	Management group	Corn		Cotton		Peanuts		Tomatoes		Yams		Sorghum for hay		Oats		Pasture per animal unit[1]		Cowpeas (green peas)	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
		Bu.	*Bu.*	*Lb.*	*Lb.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Acres*	*Acres*	*Lb.*	*Lb.*
Lakeland loamy fine sand:																			
Nearly level	12	6	15	75	125	20	30	165	180	60	80	¾	1½			15		1,200	2,000
Sloping	13	5	12	60	120	18	28	140	150	55	65	¾	1¼			15		1,000	1,800
Sloping, eroded	15	4	10		100		22	75	80		50	½	1¼			18		600	1,000
Strongly sloping	19															15			
Magnolia fine sandy loam:																			
Gently sloping	2	18	35	170	250	25	40	240	260	90	160	1½	2¾		40	8	4	2,000	3,500
Sloping	5	14	28	130	200	20	35	180	200	70	150	1	2		30	8	5	1,700	3,000
Strongly sloping	18															8			
Marsh	20																		
Nacogdoches fine sandy loam:																			
Gently sloping	2	14	30	170	250	25	35	180	200	80	160	1½	2¾		35	8	4	1,800	3,200
Sloping	5	10	25	125	200	18	30	160	180	65	160	1	2¼		30	8	5	1,500	2,800
Sloping, eroded	11	6	20	65	175							1	1¾		30	12	5	800	1,500
Strongly sloping	18															10			
Strongly sloping, eroded	18	6		50									¾			12			
Nacogdoches clay loam:																			
Gently sloping	2	10	25	170	250							1½	2¼		35	10	5	1,200	2,000
Sloping	11	8	18	125	170							1	2		32	8	5	900	1,600
Sloping, eroded	11	6	16	90	160							1	1½		30	12	6	600	1,200
Strongly sloping, eroded	18															15			
Ochlockonee loamy fine sand	7	18	30	130	190							2	3			5	3	1,800	3,200
Percilla soils	17	6	18	40	150							1	2			7	4		
Ruston fine sandy loam:																			
Gently sloping	2	15	35	150	250	25	37	240	260	90	175	1½	2¾		32	8	4	2,000	3,500
Sloping	5	12	27	120	200	22	32	180	200	80	160	1½	2		32	8	5	1,700	3,000
Sloping, eroded	10	7	20	80	175	15	25	110	125	60	100	1	1¾		25	10	5	1,200	2,500
Ruston loamy fine sand:																			
Gently sloping	4	10	35	130	200	25	35	230	260	90	165	1	2			10		1,800	3,200
Sloping	6	8	22	95	185	20	30	175	190	85	155	1	1¾			12		1,400	2,600
Ruston and Bowie loamy fine sands, strongly sloping	19															12			
Susquehanna fine sandy loam:																			
Gently sloping	9	6	15	80	160			90	100	60	100	1	1¾		25	10	6	900	1,600
Sloping	18	5		60								¾				12	6	600	
Sloping, eroded	18	4		40								½				18			
Susquehanna clay loam:																			
Gently sloping	14	8	16	140	220							1½				8	4	800	1,500
Sloping	18	6		100												15			
Susquehanna clay, nearly level	18															18			

[1] Carrying capacities are based on a grazing season extending from Feb. 1 to Oct. 31 for column A; and year long for column B.

Capability Grouping of Soils

Capability grouping is an arrangement of soils in eight general classes according to their relative suitability for cultivated crops, pasture, trees, or other agricultural uses. The eight classes are defined according to uses that can be made of the soil, the risks of erosion or other damage when it is used, and the kind or amount of management needed to protect the soil and obtain sustained yields of crops or other plants. Each class, shown by a Roman numeral from I to VIII, summarizes the degree of limitation of that soil for crops, grazing, woodland, or other plant-producing uses.

In a complete capability grouping, subclasses and units are defined within each of the eight general classes. The soils described in this report, however, have been grouped only in capability classes. The eight general classes are:

Class I.—Nearly level easily worked soils that have few limitations in use.

Class II.—Soils that have moderate limitations in use or moderate risks of damage if not protected.

Class III.—Soils suitable as cropland but have severe limitations in use or severe risks of damage if not protected.

Class IV.—Soils that have severe limitations in use or severe risks of damage if not protected; require special cropping systems or management if used for crops.

Class V.—Soils not suitable for cultivation but not subject to more than slight risks of damage in other uses, even if not protected.

Class VI.—Soils not suitable for cultivation and subject to moderate limitations or risks of damage in other uses.

Class VII.—Soils not suitable for cultivation and subject to severe limitations or risks of damage in other uses.

Class VIII (none in Cherokee County).—Soils not suitable for crops and of little value for grazing or forestry; may have some value as a wildlife habitat or recreation site.

The capability class of each soil in this county is as follows:

	Capability class
Alto clay loam (0 to 1 percent slopes) (Aa)	I.
Alto loam (0 to 1 percent slopes) (Ab)	I.
Amite fine sandy loam (0 to 1 percent slopes) (Ac)	I.
Bibb clay loam (0 to 1 percent slopes) (Ba)	V.
Bibb fine sandy loam (0 to 1 percent slopes) (Bb)	V.
Boswell fine sandy loam:	
Gently sloping (1 to 3 percent slopes) (Bc)	II.
Sloping (3 to 8 percent slopes) (Bd):	
For 3 to 5 percent slopes	III.
For 5 to 8 percent slopes	IV.
Sloping, eroded (3 to 8 percent slopes) (Be):	
For 3 to 5 percent slopes	III.
For 5 to 8 percent slopes	IV.
Strongly sloping (8 to 15 percent slopes) (Bf):	
For 8 to 12 percent slopes	VI.
For 12+ percent slopes	VII.
Strongly sloping, eroded (8 to 15 percent slopes) (Bg)	VII.
Boswell sandy clay loam, strongly sloping, severely eroded (8 to 15 percent slopes) (Bh)	VII.
Bowie fine sandy loam:	
Nearly level (0 to 1 percent slopes) (Bk)	I.
Gently sloping (1 to 3 percent slopes) (Bm)	II.
Sloping (3 to 8 percent slopes) (Bn)	III.
Sloping, eroded (3 to 8 percent slopes) (Bo)	III.
Bowie loamy fine sand:	
Gently sloping (1 to 3 percent slopes) (Bp)	II.
Sloping (3 to 8 percent slopes) (Br)	III.
Sloping, eroded (3 to 8 percent slopes) (Bs)	III.
Bub-Nacogdoches complex (8 to 40 percent slopes) (Bt):	
For 8 to 12 percent slopes	VI.
For 12+ percent slopes	VII.
Caddo fine sandy loam:	
Level (0 to 1 percent slopes) (Ca)	II.
Sloping (3 to 8 percent slopes) (Cb)	IV.
Caddo very fine sandy loam, mound phase (0 to 1 percent slopes) (Cc)	III.
Cahaba fine sandy loam (0 to 1 percent slopes) (Cd)	I.
Cuthbert and Ruston fine sandy loams:	
Sloping (5 to 8 percent slopes) (Ce)	IV.
Strongly sloping (8 to 15 percent slopes) (Cf):	
For 8 to 12 percent slopes	VI.
For 12+ percent slopes	VII.
Strongly sloping, eroded (8 to 15 percent slopes) (Cg)	VII.
Eustis loamy fine sand:	
Nearly level (0 to 3 percent slopes) (Ea)	III.
Sloping (3 to 8 percent slopes) (Eb):	
For 3 to 5 percent slopes	III.
For 5 to 8 percent slopes	IV.
Sloping, eroded (5 to 8 percent slopes) (Ec)	IV.
Strongly sloping (8 to 15 percent slopes) (Ed)	VII.
Strongly sloping, eroded (8 to 15 percent slopes) (Ee)	VII.
Garner clay (0 to 1 percent slopes) (Ga)	II.
Hannahatchee clay loam (0 to 1 percent slopes) (Ha):	
For soils not subject to frequent damaging overflows	I.
For soils subject to frequent damaging overflows	V.
Hannahatchee fine sandy loam (0 to 1 percent slopes) (Hb):	
For soils not subject to frequent damaging overflows	I.
For soils subject to frequent damaging overflows	V.
Huckabee loamy fine sand (0 to 1 percent slopes) (Hc)	III.
Independence loamy fine sand:	
Nearly level (1 to 3 percent slopes) (Ia)	III.
Sloping (3 to 8 percent slopes) (Ib):	
For 3 to 5 percent slopes	III.
For 5 to 8 percent slopes	IV.
Strongly sloping (8 to 15 percent slopes) (Ic)	VII.
Iuka clay loam (0 to 1 percent slopes) (Id):	
For soils not subject to frequent damaging overflows	I.
For soils subject to frequent damaging overflows	V.
Iuka fine sandy loam (0 to 1 percent slopes) (Ie):	
For soils not subject to frequent damaging overflows	I.
For soils subject to frequent damaging overflows	V.

	Capability class
Lakeland loamy fine sand:	
Nearly level (1 to 3 percent slopes) (La)	III.
Sloping (3 to 8 percent slopes) (Lb):	
For 3 to 5 percent slopes	III.
For 5 to 8 percent slopes	IV.
Sloping, eroded (5 to 12 percent slopes) (Lc):	
For 5 to 8 percent slopes	IV.
For 8+ percent slopes	VII.
Strongly sloping (8 to 15 percent slopes) (Ld)	VII.
Magnolia fine sandy loam:	
Gently sloping (1 to 3 percent slopes) (Ma)	II.
Sloping (3 to 8 percent slopes) (Mb)	III.
Strongly sloping (8 to 15 percent slopes) (Mc):	
For 8 to 12 percent slopes	VI.
For 12+ percent slopes	VII.
Marsh (Md)	V.
Nacogdoches clay loam:	
Gently sloping (1 to 3 percent slopes) (Na)	II.
Sloping (3 to 8 percent slopes) (Nb):	
For 1 to 5 percent slopes	III.
For 5 to 8 percent slopes	IV.
Sloping eroded (3 to 8 percent slopes) (Nc):	
For 1 to 5 percent slopes	III.
For 5 to 8 percent slopes	IV.
Strongly sloping, eroded (8 to 12 percent slopes) (Nd)	VI.
Nacogdoches fine sandy loam:	
Gently sloping (1 to 3 percent slopes) (Ne)	II.
Sloping (3 to 8 percent slopes) (Nf):	
For 1 to 5 percent slopes	III.
For 5 to 8 percent slopes	IV.
Sloping, eroded (3 to 8 percent slopes) (Ng):	
For 3 to 5 percent slopes	III.
For 5 to 8 percent slopes	IV.
Strongly sloping (8 to 15 percent slopes) (Nh):	
For 8 to 12 percent slopes	VI.
For 12+ percent slopes	VII.
Strongly sloping, eroded (8 to 15 percent slopes) (Nk):	
For 8 to 12 percent slopes	VI.
For 12+ percent slopes	VII.
Ochlockonee loamy fine sand (0 to 1 percent slopes) (Oa)	II.
Percilla soils (Pa)	IV.
Ruston fine sandy loam:	
Gently sloping (1 to 3 percent slopes) (Ra)	II.
Sloping (3 to 8 percent slopes) (Rb)	III.
Sloping, eroded (3 to 8 percent slopes) (Rc)	III.
Ruston loamy fine sand:	
Gently sloping (1 to 3 percent slopes) (Rd)	II.
Sloping (3 to 8 percent slopes) (Re)	III.
Ruston and Bowie loamy fine sands, strongly sloping (8 to 15 percent slopes) (Rf):	
For 8 to 12 percent slopes	IV.
For 12 to 15 percent slopes	VI.
Susquehanna clay, nearly level (0 to 2 percent slopes) (Sa)	III.
Susquehanna clay loam:	
Gently sloping (1 to 3 percent slopes) (Sb)	III.
Sloping (3 to 6 percent slopes) (Sc)	IV.
Susquehanna fine sandy loam:	
Gently sloping (1 to 3 percent slopes) (Sd)	III.
Sloping (3 to 8 percent slopes) (Se):	
For 3 to 5 percent slopes	IV.
For 5 to 8 percent slopes	VI.
Sloping, eroded (3 to 8 percent slopes) (Sf):	
For 3 to 5 percent slopes	IV.
For 5 to 8 percent slopes	VII.

Morphology, Genesis, and Classification of Soils

Soil is the product of forces of weathering and soil development acting on materials deposited or accumulated by geologic agencies. The characteristics of a soil depend upon (1) the climate under which the soil material has accumulated and existed; (2) the physical and mineralogical composition of the parent material; (3) the plant and animal life in and on the soil; (4) the relief, or lay of the land; and (5) the length of time these forces have acted on the soil material. The influence of climate on soil and plants is modified by the physical characteristics of the soil or soil material and by relief, which, in turn, strongly influences drainage, aeration, runoff, erosion, and exposure to sun and wind.

Factors of Soil Formation in Cherokee County

East-central Texas is in the forested Gulf Coastal Plain, which extends eastward across the States of Louisiana, Mississippi, and Alabama into Georgia. This broad belt is dominated by Red-Yellow Podzolic soils and associated azonal and intrazonal groups (*13*, *14*).

Climate.—The climate is of the humid, warm-temperate continental type. This prevails generally over the Gulf Coastal Plain. Rainfall distribution and average temperature by months for Cherokee County are given in table 1 (p. 4). Because climate is uniform over the county, differences among the soils are due to the factors of parent materials, plants and animals, relief, and time.

The effects of climate have been impressed to some degree on all soils of Cherokee County. The impact is greatest where the regolith is intermediate in its chemical composition and physical constitution. Such regoliths consist of a wide variety of minerals and are intermediate in texture. Soils of the zonal groups are derived from regoliths of this type. Regions with humid, warm-temperate climates commonly have strongly weathered, leached, and acid soils of low fertility. The principal well-drained soils of such regions are the Red-Yellow Podzolic and Latosol groups. Both of these groups are represented in Cherokee County, the former being the more extensive. Both groups occur on well-drained land surfaces that have been stable for long periods.

Parent material.—The rock formations, from which the parent materials of the soils of Cherokee County have weathered, are mainly unconsolidated or weakly consolidated marine and terrestial sediments containing a large amount of sand. They are slightly to strongly acidic, but some formations are weakly calcareous. The region is part of the Gulf Coastal Plain

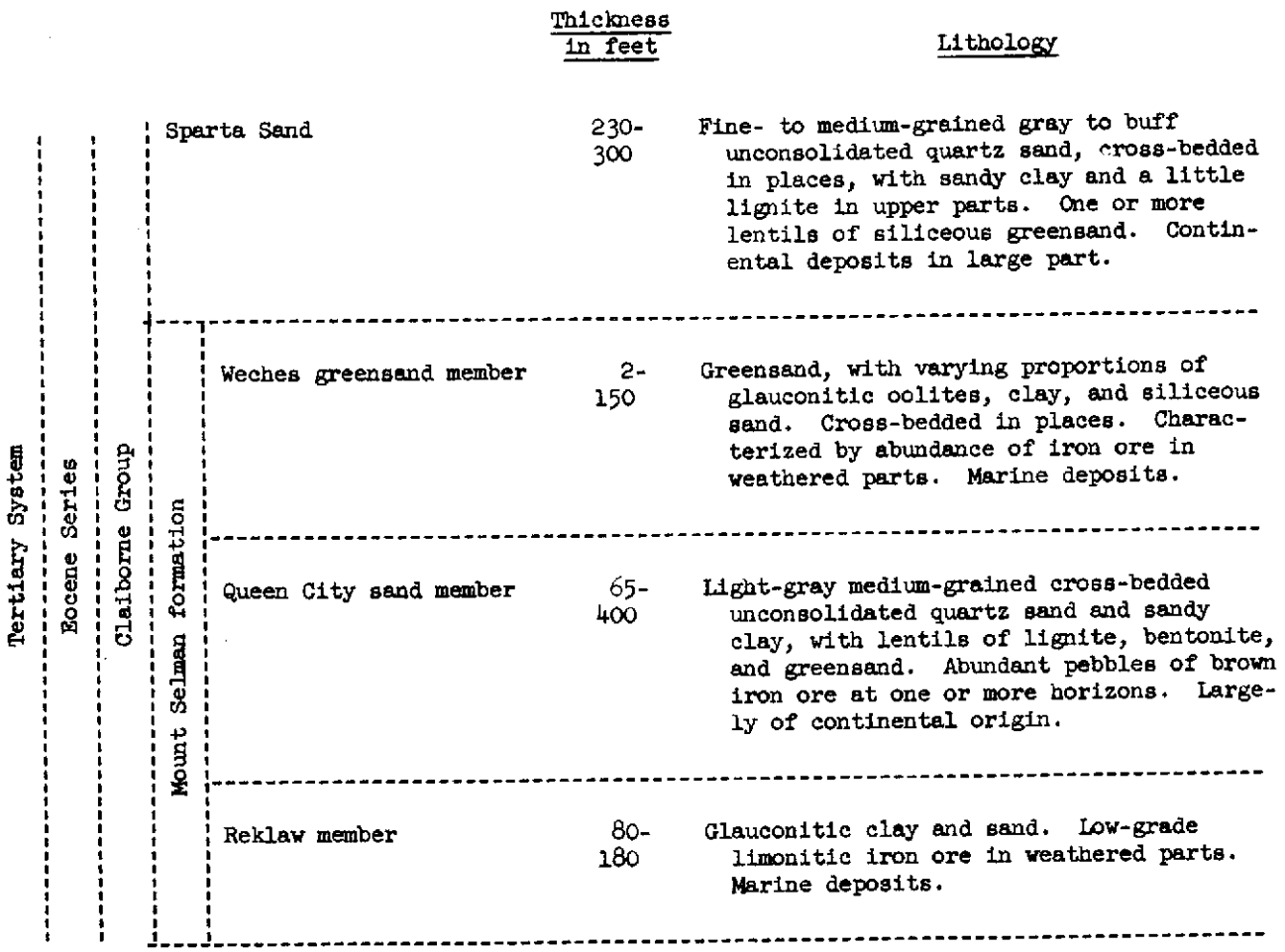
(*2*) which is composed of sediments laid down in the Gulf of Mexico embayment in which deposition began at the beginning of the Cretaceous period. The rates of deposition fluctuated along with the intermittent recession of waters of the gulf embayment. Deposition continued intermittently through the Tertiary age to the present, with but few interruptions of major importance. For the most part, the sediments forming the plain in eastern Texas are in beds of rather loosely compacted materials of Tertiary age that dip gently toward the gulf. As the waters slowly receded, the various formations were gradually sculptured into their present topographic forms. Practically all the elevations are remnants of the Coastal Plain. Minor faulting and folding have had little direct effect on the present surface of the region.

The principal geologic formations of the area as outlined by Eckel (*3*) are of the Claiborne group, which includes the Sparta sand and the Mount Selman formation (fig. 11). In addition, small areas consist of Pleistocene deposits and recent alluvium. The Mount Selman formation consists of brown sands, blue clays, greensands, glauconitic sandstone, and nodular and laminated iron ores.

Stratigraphically, the formations in Cherokee County occur from top to bottom in the following order: Sparta sand, Weches greensand, Queen City sand, and the Reklaw member. The last three are members of the Mount Selman formation.

The Sparta formation consists dominantly of gray sand, with a considerable amount of sandy shale or clay and small amounts of glauconitic sand, limonite, and lignite. It is laminated nearly everywhere and in some places is definitely crossbedded. In most places, it is unconsolidated and erodes easily to form rounded uneven slopes. Lakeland loamy fine sand is a representative soil type developed from this formation.

The Weches member is essentially a section of glauconite and glauconitic clay that weathers into beds of black and brown iron ore. The resistant ferruginous beds cap hills and escarpments throughout most of the area of its outcrop in east Texas and produce a rugged topography of steep, high, flat-topped hills dissected by deep V-shaped valleys. The Weches formation consists of two divisions: (1) an upper concretionary ferruginous stratum in which the glauconite has weathered and altered to iron ore, and (2) a lower bed that contains more or less pure or clayey fossiliferous glauconite free of quartz sand, but it is interstratified with clay or marl. The Nacogdoches series is the



	Thickness in feet	Lithology
Sparta Sand	230-300	Fine- to medium-grained gray to buff unconsolidated quartz sand, cross-bedded in places, with sandy clay and a little lignite in upper parts. One or more lentils of siliceous greensand. Continental deposits in large part.
Weches greensand member	2-150	Greensand, with varying proportions of glauconitic oolites, clay, and siliceous sand. Cross-bedded in places. Characterized by abundance of iron ore in weathered parts. Marine deposits.
Queen City sand member	65-400	Light-gray medium-grained cross-bedded unconsolidated quartz sand and sandy clay, with lentils of lignite, bentonite, and greensand. Abundant pebbles of brown iron ore at one or more horizons. Largely of continental origin.
Reklaw member	80-180	Glauconitic clay and sand. Low-grade limonitic iron ore in weathered parts. Marine deposits.

Figure 11.—Partial outline of Eocene stratigraphy in northeastern Texas.

most prominent of the soils that developed from the Weches formation.

The Queen City member consists mainly of sand and sandy or silty shale but includes small amounts of lignite, bentonite, glauconite, and some ironstone pebbles. The sand is light gray and crossbedded. It is composed mainly of medium grained to very fine grained quartz but contains a small quantity of other minerals. Most of the glauconite is confined to the lower third of the formation. The Bowie series is probably the most extensive of the soils that developed from this formation.

The Reklaw member consists mainly of glauconitic clay but contains a small percentage of glauconitic sand and a very small percentage of impure lignite. The section consists essentially of stratified clay made up of thin beds of glauconite, black sandy clay, green glauconitic clay, and gray and yellow gypsiferous clay. The formation is marine in the embayment areas and partly nonmarine in the intervening areas. The Boswell series is the most extensive of the soils that developed from the Reklaw formation.

The Pleistocene deposits include the second bottoms or terraces along rivers and streams. They consist of sands, silts, and clays containing gravel. The layer of gravel is usually at the base of the deposit. Second bottoms or terraces, as a rule, are easily distinguished from the first bottoms by their elevation above stream levels, but, in most cases, they merge with the upland and are almost indistinguishable. Soils on second bottoms that developed from these deposits are mostly brown or reddish colored.

The recent alluvium is on present flood plains of the streams of the area. The alluvium consists of slightly altered sandy and clayey soil materials that range from light gray to grayish brown or reddish brown in color.

The soil series developed from the different parent materials are as follows:

Parent materials and geologic formations:	*Soil series*
Unconsolidated sands and sandy clay (Sparta sand)	Eustis. Lakeland.
Glauconitic clays and slightly sandy clays (Weches greensand)	Alto. Nacogdoches. Bub. Magnolia. Percilla.
Sands and sandy clays (Queen City)	Bowie. Caddo. Cuthbert. Ruston. Percilla.
Stratified or laminated clay and clay shale (Reklaw)	Boswell. Garner. Susquehanna.
Sands, silts, and clays more or less stratified (Pleistocene)	Amite. Cahaba. Huckabee. Independence.
Sandy and clayey deposits (recent alluvium)	Bibb. Hannahatchee. Iuka. Ochlockonee. Marsh.

The character of geological formations in Cherokee County is strongly reflected in the nature and distribution of soils. Principal distinctions among the soils due to original differences in parent materials are the proportions of sand and clay in the profiles, permeability to moisture, acidity, reserves of weatherable minerals, and distinctness of horizons. Deep sandy soils, such as the Lakeland, have been formed on the sandiest parent materials in the area. Those with friable subsoils, such as the Ruston and Cahaba, have been formed from somewhat less sandy sediments. Soils with dense clay subsoils, such as the Boswell and Garner, were derived from heavy clays and shales. Soils formed from glauconitic clays are less acid on the whole than those formed from sands and sandy clays. The foregoing illustrates the kinds of differences among soils of the county without listing all the differences that result from the character of the parent materials.

Parent materials of mixed mineralogic composition that tend to be highly siliceous commonly give rise to Red-Yellow Podzolic soils. Examples of this great soil group in the county are the Ruston, Cahaba, and Boswell series. Such soils are not formed in regoliths that are not siliceous, nor are they derived from extremely siliceous materials such as quartz sands. The formation of Red-Yellow Podzolic soils requires good drainage and appreciable proportions of quartz or its equivalent in the parent materials.

The glauconitic clays and sandy clays of the Weches greensand formation are more basic and less siliceous than other soil parent materials in the county. Under conditions of good drainage, these glauconitic materials have given rise to lateritic soils, primarily Reddish-Brown Lateritic soils. This group is represented by the Nacogdoches series—soils with brown to reddish-brown A_1 horizons, lacking distinct A_2 horizons, and having darker red B horizons than Red-Yellow Podzolic soils. Nacogdoches clay loam is morphologically similar to the Matanzas series of Cuba and Puerto Rico, the Davidson series of Georgia, and the Aiken series of northern California.

Iron oxide concretions are commonly present in the profiles of soils formed from the glauconitic deposits. These concretions may occur throughout the profile or may be concentrated in some one horizon. Numbers and sizes of concretions cover a wide range. In some soils, a few small concretions are present in one horizon. In other soils, one or more horizons have many fairly large concretions.

A second form of segregation of iron oxides occurs as a hard layer in the lower subsoil or upper substratum of some of the soils. This hard layer is comparable to the laterite found in many tropical regions. The laterite is widely prevalent in the Bub, Nacogdoches, and Alto soils, all of which were derived from parent materials relatively high in iron. Laterite may be found occasionally in the deeper profiles of the Magnolia, Cuthbert, and Boswell soils. The general characteristics and distribution of these layers of iron oxide segregation suggest that the mode of origin of the laterite parallels that of the laterite of tropical regions.

Plant and animal life.—Many species of plants and animals influence the direction and rate of soil genesis. These species include higher plants and micro-organisms as well as the insects and larger animals that live in soils. Plants and animals largely determine the kinds of organic matter added to soil and the way in which it is incorporated with the soil. They transfer nutrient elements from one horizon to another. They may also shift soil materials from one horizon to another. Gains and losses in organic matter and nitrogen in soils, gains and losses of plant nutrients, changes in porosity, and changes in structure may be due to activities of plants and animals. Although these general effects are well known, the specific influences of the various species or groups of related species in the formation of any one soil are not.

More is known about the relationships between vegetation and soil genesis than about the relationships of micro-organisms and larger animals to soil formation. Little is known about the specific bacteria, fungi, and other micro-organisms and about the insects and larger animals living in the soils of Cherokee County. These kinds of plants and animals have doubtless affected genesis of the soils, but what those effects may have been is not known. More information is at hand about native vegetation than about other plants and animals important in soil development.

The native vegetation was dominantly mixed pine and oak forest, which seems to have been fairly uniform over the uplands. As a general rule, acid soil conditions are associated with native vegetation consisting of pine or mixed pine and oak stands. Acid conditions favor the growth of fungi over bacteria. Fungi commonly produce acid-intermediate products in the decomposition of organic matter, and these in turn encourage podzolization of soils. A mixed pine and oak forest and the associated micro-organisms encourage leaching and eluviation, which are clearly reflected in distinct A_2 horizons and in the accumulations of sesquioxides in the B_2 horizons of many soils in the county.

Relief.—Relief, or the lay of the land, is one control among several on the quantities of water that move over and through the soil. Other things being equal, a higher proportion of the rainfall runs off steep slopes than gentle ones. Less water is available, therefore, for development of horizons in soils on steeper slopes. More erosion may also follow. Conversely, level slopes will absorb more of the rainfall and thus have more water for development of horizons. There is also likely to be less erosion. In depressed or concave positions in the landscape, extra water over and above rainfall will be added as runoff from adjacent slopes. These depressed or concave positions may be wet for long intervals. This wetness affects the direction and rate of horizon development. Through its general influences on runoff and drainage, relief inhibits some processes of horizon differentiation and favors others. Unlike profiles, therefore, are formed from the same kinds of parent materials but in different positions within the same landscape.

Relief in Cherokee County ranges from level to hilly. Level areas consist of flood plains, undissected terraces, and occasional upland divides. Hilly areas are comprised of the more dissected parts of the uplands. Areas with level and hilly relief are far less extensive than those with undulating to gently rolling relief. Most of the county is undulating to gently rolling, a smaller but significant part is level, and a relatively small part is hilly.

The distinctness of horizons and the total thickness of solum are closely related to relief in the county. Soils with distinct horizons and thick solums occur on gentle slopes. Where slope gradients are larger but still not in the steep range, the soils have less distinct horizons and thinner solums. Very shallow soils with faint horizons occur on the steep slopes. By way of contrast, the soils of level or nearly level areas generally are dense, slowly permeable, and poorly drained. Some exceptions are the moderately sandy, freely permeable sediments that occur in some stream terraces and in occasional patches of upland. These areas are well drained even though level or nearly level.

Relief is commonly a local rather than regional factor in soil genesis. Thus, relief is more often reflected in differences among soils within a given landscape than among the soils of different regions.

Time.—There is little evidence that age has greatly altered the characteristics of the soils that have developed normally in this environment. In general, the soils that developed from transported materials on second bottoms or terraces exhibit more characteristics of the normal soils of the uplands. This probably can be attributed to the character of the parent material and underlying strata, which are relatively sandy, strongly weathered, and very permeable to air and water. Possibly the parent materials of soils of the uplands have not been exposed to soil-forming processes for a much longer time than the terrace alluvium.

The Alluvial soils of the flood plains are forming from soil materials that have been in place for a very short time and are so youthful that they have developed very little genetic horizonation. The strongly sloping soils represent the opposite condition. Their parent rocks have been in place for a long time, but runoff and geological erosion were rapid and have almost kept pace with rock weathering and soil formation. As a consequence, the soils of such areas have thin solums or in extreme cases have developed no genetic horizons. An example is the Bub-Nacogdoches complex, strongly sloping to steep.

Classification of Soils

The units described in the text and shown on the map of a soil survey are established on the basis of soil characteristics as found in the field. Soils in a type have essentially the same drainage, relief, and color. On the basis of common characteristics, local soil types and series may be grouped successively into families, great soil groups, suborders, and finally into three orders: (1) Zonal, (2) intrazonal, and (3) azonal.

The soils of Cherokee County are classified in table 4 according to soil orders and great soil groups; some of the factors that have contributed to differences in soil

TABLE 4.—*The soil series classified according to order, great soil group, and associated characteristics*

Great soil group and series	Parent materials	Relief	Drainage
ZONAL SOILS			
Red-Yellow Podzolic:			
Amite	Sandy and clayey alluvium	Level	Well drained.
Boswell	Clays and sandy clays	Level to sloping	Moderately good.
Bowie	Loamy sands and sandy clays	Level to sloping	Moderately good.
Cahaba	Sandy alluvium	Level	Well drained.
Cuthbert	Loamy sands and sandy clays	Sloping	Moderately good.
Magnolia	Glauconitic clay or impure greensand and sandy clays	Gently sloping to strongly sloping	Well drained.
Ruston	Sandy marine sediments	Gently sloping to strongly sloping	Well drained.
Reddish-Brown Lateritic:			
Nacogdoches	Glauconitic clay or impure greensand and sandy clays	Gently sloping to strongly sloping	Well drained.
INTRAZONAL SOILS			
Low-Humic Gley[1]:			
Alto	Glauconitic clays	Level	Imperfect.
Caddo	Sandy loam and clay loam	Level to sloping	Imperfect.
Percilla	Sandy clays and clays containing glauconitic materials	Depressed	Very poor.
Grumusol:			
Garner	Shale or clay of marine or alluvial origin	Level	Imperfect.
Planosol:			
Susquehanna	Clay or clay shale, lenses of sandy clay or clay	Nearly level to sloping	Imperfect.
AZONAL SOILS			
Alluvial:			
Bibb	Sandy and clayey alluvium	Level	Poor.
Hannahatchee	Sandy and clayey alluvium	Level	Imperfect.
Iuka	Sandy and clayey alluvium	Level	Imperfect.
Ochlockonee	Sandy alluvium	Level	Well drained.
Lithosol:			
Bub	Glauconitic clay with seams of ironstone	Strongly sloping to steep	Well drained.
Regosol:			
Eustis	Sands and sandy clays	Level to strongly sloping	Excessive.
Huckabee	Sandy alluvium	Level	Excessive.
Independence	Sandy alluvium	Nearly level to strongly sloping	Excessive.
Lakeland	Sandy clay loam to loamy sand of marine origin	Nearly level to strongly sloping	Excessive.

[1] The name "Low-Humic Gley" has not been universally accepted for this great soil group.

morphology are given. Study of this table will help the reader to understand the genetic relationships (*8*) of the soils of the area.

Zonal soils

Zonal soils (*14*) are those soils having well-developed soil characteristics that reflect the influence of the active forces of soil genesis—climate and living organisms (chiefly vegetation). Soils having these characteristics are developed best on gently undulating uplands that have good drainage. In addition they are developed from parent materials that are not extreme in texture or chemical composition but have been in place long enough for biological forces to have expressed their full influence.

Zonal soils in Cherokee County are the strongly acid Red-Yellow Podzolic and Reddish-Brown Lateritic great soil groups.

The Red-Yellow Podzolic soils have thin organic-mineral A horizons over light-colored, leached A_2 horizons, which are underlain by subsoils that range from sandy clay loam to clay in texture and from yellow, red, reddish brown, or mottled red, yellow, and gray in color. Surface soils are mainly sandy, low in organic matter and mineral nutrients, and low to moderate in inherent fertility. They are easily tilled, very responsive to management, and adapted to many kinds of field crops, fruits, and vegetables.

The associated Reddish-Brown Lateritic soils have reddish-brown surface soils with considerable organic material in the upper 2 or 3 inches. They are underlain by red, granular, crumbly clay or clay loam. The substratum grades into yellowish-red, weathered glauconitic sand or clay at depths of 3 feet or more.

RED-YELLOW PODZOLIC SOILS

Members of the Red-Yellow Podzolic great soil group in Cherokee County are the Amite, Boswell, Bowie, Cahaba, Cuthbert, Magnolia, and Ruston series. A profile of Magnolia fine sandy loam was taken from a well-drained site about 6 miles southwest of Jacksonville. It developed under a natural cover of mixed pine and hardwood forest on a gently sloping gradient of 3 percent. This profile shows the general features of the Red-Yellow Podzolic soils of the county:

A_1 0 to 6 inches, brown (7.5YR 5/3; dark-brown, 7.5YR 4/3, moist) fine sandy loam; weakly granular; friable; the surface 2 inches is slightly darker, contains considerable coarse organic matter, and grades to horizons below; slightly acid.

A_2 6 to 14 inches, pink (7.5YR 7/4; 6/4, moist) light fine sandy loam; structureless; very friable; grades through a 2- to 4-inch transition to horizon below; slightly acid.

B_1 14 to 24 inches, red (2.5YR 4/6; 3/6, moist) sandy clay loam; massive; permeable; friable; slightly sticky when wet; strongly acid.

B_2 24 to 40 inches, red (10R 4/8; same moist) clay; weakly blocky; permeable; crumbly and friable when moist, sticky and moderately plastic when wet; strongly acid.

B_3 40 to 55 inches, same as above horizon but with few splotches or mottlings of yellow.

C_1 55 to 70 inches, red (2.5YR 4/6) friable sandy clay with splotches of yellow and small fragments of soft partly weathered brownish-yellow sandstone; slightly acid.

C 70 to 100 inches +, yellowish-red (5YR 5/6) sandy clay with thin seams of brownish-yellow soft sandstone and glauconitic clay; slightly acid.

Small rounded concretions and fragments of ironstone are common in all horizons. In areas transitional toward Nacogdoches soils, the substratum consists of brownish-yellow glauconitic clay with seams or lentils of soft sandstone and ironstone (laterite).

The other Red-Yellow Podzolic soils of the county differ from the representative profile somewhat according to the character of the parent material and the conditions of relief and drainage under which they developed. The Bowie soils developed from more sandy, less reddish parent materials, have slightly more sandy horizons, and are yellowish in the upper subsoil layer and more mottled in the lower. The Ruston soils are less reddish throughout than the Magnolia soils, have friable sandy clay loam upper and lower subsoils, and have developed from more sandy parent materials containing no glauconite. Cuthbert soils have lighter colored surface soils and less reddish thin sandy clay subsoils that overlie laminated sandy clay and sand parent materials. Amite and Cahaba soils closely resemble Magnolia and Ruston soils, respectively, in the upper soil layers, but they have developed on nearly level surfaces and are underlain by moderately sandy more or less stratified old alluvium at depths of 5 to 8 feet below the surface. The Boswell soils have developed from more clayey materials and have a distinct sandy A horizon over a heavy clay B horizon. The B horizon is red in the upper part and red, mottled with brownish yellow and light gray, in the lower part.

REDDISH-BROWN LATERITIC SOILS

The Nacogdoches is the only member of the Reddish-Brown Lateritic great soil group in the county. In comparison with the representative zonal soil in the county, the Nacogdoches soils are somewhat darker reddish brown, have heavier more clayey subsoils, and have developed from more clayey parent materials that are high in glauconite.

Intrazonal soils

Intrazonal soils have more or less well-developed soil characteristics that reflect the dominating influence of some local factor of relief or parent material over the normal effect of climate and vegetation. In Cherokee County the intrazonal soils differ from zonal soils mainly in having slower internal drainage, which is caused by a temporarily high water table, or by heavy genetic horizons that contain almost impermeable clay parent materials combined with very slow internal drainage. The surface layers range from fine sandy loams to heavy clays, and the subsoils, from friable sandy clay loams to heavy clays. The soils with sandy clay loam or sandy clay subsoils have high water tables during the cool moist season and, for maximum productivity, require artificial drainage. Intrazonal soils are less productive and less desirable for crops than zonal soils.

The intrazonal soils of Cherokee County are subdivided into three distinct groups—the Low-Humic Gley, Planosol, and Grumusol great soil groups. Soils in the Low-Humic Gley group are those in which relief and drainage were dominant during the soil-forming process; soils of the Planosol and Grumusol groups are those in which parent material was dominant over climate and vegetation during the period of soil development. Members of the first group are soils of the Alto, Caddo, and Percilla series. Soils of the Susquehanna series belong to the Planosol great soil group. The Garner represents the Grumusol great soil group, although it is more acid throughout than representative members of the group.

LOW-HUMIC GLEY SOILS

Alto and Percilla soils developed under restricted drainage from parent materials that, under more favorable relief and drainage, weathered to form normal soils, probably Nacogdoches and Magnolia soils. A representative profile of Alto clay loam was taken from a nearly level area about ½ mile southwest of Alto. The cover is native savannah of post, willow, and pin oaks, elm, and coarse grasses. Surface drainage is slow, and internal drainage is slow to very slow. The ground water table rises into the solum during wet seasons and is at or near the surface during extended wet periods.

A typical profile of Alto clay loam:

A 0 to 10 inches, dark-brown (10YR 3/3; very dark-brown, 10YR 2/3, moist) gritty clay loam; strong medium granular; friable; contains numerous small, hard, shotlike ferruginous concretions; medium acid.

B_2 10 to 22 inches, yellowish-brown (10YR 5/4; 4/4, moist) gritty clay containing 20 to 30 percent by volume of the ferruginous concretions; massive; porous; crumbly and moderately friable; extremely hard and apparently cemented when dry; strongly acid.

B_3 22 to 42 inches, yellowish-brown (10YR 5/8; 4/8, moist) gritty clay or heavy clay loam similar to above but slightly less hard and less cemented than horizon above.

C_1 42 to 60 inches, mottled yellowish-brown (10YR 5/4) and pale-yellow (2.5YR 8/4) clay loam; contains a few large ferruginous concretions and thin seams of yellowish-brown soft sandstone; strongly acid.

C 60 to 80 inches +, residuum of glauconitic earth with thin strata of light-olive or yellowish-brown laterite; neutral to alkaline.

A profile of Percilla clay loam observed about 3 miles east of Rusk shows the general features of the series. The site is a slightly depressed area, with little or no surface drainage, under a native cover of willow and pin oaks, elm, and haw bushes:

A 0 to 18 inches, light-gray (10YR 7/2; grayish-brown, 10YR 5/2, moist) clay loam mottled with about 5 percent of brown; massive; slowly permeable; friable when moist, very hard when dry; strongly acid.

B_2 18 to 32 inches, light brownish-gray (10YR 6/2; 5/2, moist) sandy clay mottled with 3 to 5 percent of yellowish-brown (10YR 5/8); weakly blocky; slowly permeable; firm; extremely hard when dry; strongly acid.

B_3 32 to 40 inches, mottled light brownish-gray (10YR 6/2) and brownish-yellow (10 YR 6/8) sandy clay; weakly to firmly cemented with iron oxide when dry; very firm when moist; strongly acid.

C 40 to 50 inches +, mottled light-gray (10YR 7/2) and brownish-yellow (10YR 6/8) sandy clay or sandy clay loam; massive; porous; firm; contains thin lenses of laterite; strongly acid; underlain at variable depths by greensand marl.

The other intrazonal soil in this group, the Caddo, is about intermediate in drainage between the Percilla and Alto. It has developed from more sandy parent materials; is more sandy throughout; and, if drainage were improved, might develop a profile like that of the Bowie series.

PLANOSOLS

The second group of intrazonal soils, the Planosols, were formed under the dominating influence of heavy parent materials, and, to some extent, of low relief and impeded drainage. Planosols developed from nearly impervious clays and shales, on nearly level to sloping surfaces, and under climatic and vegetative conditions like those for associated normal soils derived from more sandy parent materials. The Susquehanna fine sandy loam, as mapped in this area, is not everywhere a well-developed Planosol because a 2- to 4-inch A_3 or B_1 horizon of clay loam occurs frequently between the fine sandy loam surface soil and the heavy clay subsoil. However, in general, it has characteristics more closely resembling Planosols than normal soils. Susquehanna clay and clay loams have well-developed claypan subsoils and are the representative Planosols in the county.

GRUMUSOLS

Grumusols are soils of very weak development; they are without a texture profile and overlie heavy clays or shales. Garner clay, a microasssociation of dark and lighter colored soil profiles that commonly occur in the heavy clay soils of Texas and adjoining States, is classed as a Grumusol. Profiles of Garner clay were observed in the bottom of a microdepression and on top of a microknoll about 2.3 miles northwest of Wells. The site is level but has shallow enclosed microdepressions, known as gilgai or hog wallows, alternating with slightly higher microknolls about 25 feet in diameter. Surface drainage is very slow or lacking, and internal drainage is very slow and probably absent in the lower subsoil. The vegetation is mixed pine and oak forest with a thin stand of coarse grasses under the trees. This is a soil complex in the true morphological sense, but because neither profile occurs separately nor is known to occur in separate mappable areas, it is one soil unit for practical purposes and is classed here as a soil series.

Representative profile of Garner clay in the bottom of a microdepression:

A_0 ½ to 0 inch, dark grayish-brown (10YR 4/2; very dark grayish-brown (10YR 3/2, moist) mull; very strong granular; consists of about equal proportions of fine earth and humus; pH 6.4.

A_{11} 0 to 5 inches, dark grayish-brown (10YR 4/2; very dark grayish-brown, 3/2, moist) heavy clay; strong medium granular; crumbly; very plastic; pH 6.0.

A_{12} 5 to 10 inches, gray (10YR 5/1; dark-gray, 4/1, moist) heavy clay faintly mottled with brown; moderate medium granular; very plastic; very firm; pH 5.0.

A_{13} 10 to 20 inches, mottled light-gray (10YR 7/1; 6/1, moist) and brownish-yellow (10YR 6/8; yellowish-brown, 5/8, moist) heavy clay; very firm and very plastic; pH 5.5.

AC_1 20 to 36 inches, light-gray (10YR 7/1; gray, 6/1, moist) heavy clay strongly splotched or coarsely mottled with yellowish brown (10YR 5/4); very plastic and very firm; pH 6.0.

AC_2 36 to 56 inches, gray (10YR 5/1; dark-gray, 4/1, moist) heavy clay with streaks of yellowish brown (10YR 5/8); distinctly darker than overlying horizon; pH 6.0.

C_1 56 to 62 inches, gray (10YR 6/1) clay streaked with 10 percent of red (2.5YR 4/6); pH 5.5.

C_2 62 to 74 inches, brownish-yellow (10YR 6/8) clay mottled or streaked with some 25 percent of light gray (2.5Y 7/2); contains crystals of gypsum; pH 5.5.

C_3 74 to 84 inches +, light-gray and pale-yellow noncalcareous shale or shaly clay with lenses of limonite and occasional thin seams of greensand; pH 6.5.

The dark color of horizon AC_2 may suggest that the soil is a degraded former Wiesenboden or Humic Gley.

Representative profile of Garner clay on crest of microknoll:

A_0 ½ to 0 inch, brown (10YR 5/3) mull; pH 6.0.

A_{11} 0 to 3 inches, yellow (10YR 7/6; brownish-yellow, 6/6, moist) clay faintly streaked with strong brown; coarse subangular blocky; pH 5.5.

A_{12} 3 to 38 inches, mottled light-gray (10YR 7/2) and light yellowish-brown (10YR 6/4) heavy clay; very firm; very plastic; pH 5.5.

AC 38 to 66 inches, gray (10YR 6/1) clay streaked or spotted with some 10 percent of red (2.5YR 4/6); very firm; very plastic; pH 6.0.

C 66 to 78 inches, alternating layers of light-gray (10YR 7/2), yellowish-red (5YR 5/8), and light yellowish-brown (10YR 6/4) clay; contains gypsum crystals; pH 6.5.

D 78 to 84 inches +, pale-yellow (2.5Y 8/4) noncalcareous shale containing crystals of gypsum.

The peculiar microrelief, commonly called hog wallows, of heavy soils in Texas is believed to have been caused by the following sequence of events repeated over many years: (1) As drying soil shrinks, great deep cracks are formed in polygonal patterns; (2) loose dry soil from upper horizons falls to the bottoms of the cracks; (3) wet soil expands and the cracks close; (4) expansion pressure at bottom of closed crack forces adjacent soil outward and upward, thus forming the microknolls.

Azonal soils

The azonal soils in Cherokee County consist of three distinct and radically different great soil groups: Lithosols (very shallow and stony soils), Regosols (deep sands), and Alluvial soils. These soils lack well-developed profiles because of the relief and rapid geologic erosion, character of parent material, and youth.

LITHOSOLS

In Cherokee County the Lithosols are represented by only one member, the Bub series. It is a strongly sloping to steep skeletal soil over glauconitic clay or glauconite similar to that underlying the Nacogdoches and Alto soils. The strongly sloping surface has gradients of about 15 percent, and the vegetation is dominantly deciduous, a native mixed stand of post oak, hickory, and shortleaf pine.

Typical profile of Bub stony clay about 4.8 miles north of Jacksonville on the escarpment of Mount Selman:

A 0 to 5 inches, dark reddish-brown (2.5YR 3/3; 2.5YR 2.5/4, moist) clay; contains numerous fragments of ironstone 2 to 10 inches in diameter and comprising 15 to 50 percent of the mass; strong medium granular; friable; slightly acid.

C 5 to 15 inches, red (2.5YR 5/6; same color, moist) clay; contains fragments of ironstone that make up to 50 percent, by volume, of the soil mass; very strong coarse granular; some granules have yellowish-brown interiors that appear to be weathered glauconite; friable; moderately plastic; acid to weakly alkaline.

D 15 to 200 inches +, yellowish-brown (10YR 5/6) clay and partly weathered glauconite containing ledges of ironstone; alkaline to calcareous.

Surface soil ranges from fine sandy loam to clay; the solum ranges from about 3 to 24 inches deep; horizon 2 is absent where the soil is very shallow; the substrata range from partly weathered glauconite to glauconitic clay, and lenses or strata of soft or indurated ironstone may or may not be present. The Bub series occurs only in a complex with Nacogdoches soils in Cherokee County.

REGOSOLS

The Regosols, or deep sands, are the loamy sands that overlie sandy marine or alluvial sediments. These are important and extensive soils that occupy level to strongly sloping small and large areas throughout the county. The most extensive, nearly level areas occur on terraces of the Angelina and Neches Rivers and on the flat-topped mesas. In this county, the Regosols are members of the Eustis, Huckabee, Independence, and Lakeland series. A profile of Huckabee loamy fine sand, level—observed about 5½ miles south of the northwest corner of the county on a terrace of the Neches River—is typical. The area is nearly level and under a native forest of blackjack, sand jack, and post oaks, and shortleaf pine.

A_0 ½ to 0 inch, dark grayish-brown (10YR 4/2; 3/2, moist) mull consisting of about equal parts of coarse organic matter and mineral soil; slightly acid.

A_1 0 to 7 inches, grayish-brown (10YR 5/2; 4/2, moist) loamy fine sand; structureless; very friable; loose when dry; slightly acid.

A_2 7 to 28 inches, very pale brown (10YR 7/3; 6/3, moist) loamy fine sand; structureless; nearly loose when moist; loose when dry; medium acid.

AB 28 to 54 inches, brownish-yellow (10YR 6/6; 5/6, moist) loamy fine sand, faintly mottled with coarse splotches of reddish yellow or strong brown; structureless; very friable when moist, soft when dry; medium to strongly acid.

C 54 to 100 inches +, very pale brown (10YR 7/4; 6/4, moist) loamy fine sand, faintly mottled with pale yellow and light yellowish brown; strongly acid; this is old alluvium.

The following profile of Independence loamy fine sand represents the series as observed in the county. The site is a nearly level, low stream terrace of Striker Creek in the northeastern corner of the county. The vegetation is a moderately dense native cover of blackjack, sand jack, and post oaks, and scattered shortleaf pines.

A_0 ½ to 0 inch, dark grayish-brown (10YR 4/2; 3/2, moist) mull consisting of coarse organic matter and fine earth; slightly acid.

A_1 0 to 7 inches, brown (10YR 5/3; 4.5/3, moist) loamy fine sand; structureless; very friable; loose when dry; slightly acid.

A_2 7 to 28 inches, yellowish-brown (10YR 5/4; 4/4, moist) loamy fine sand; structureless; nearly loose when dry; strongly acid.

A_3 28 to 54 inches, strong brown (7.5YR 5/7; 4/7, moist) loamy fine sand; structureless; very friable; slightly more loamy than above; strongly acid.

C 54 to 80 inches +, very pale brown (10YR 7/3; 6/3, moist) loamy fine sand of old alluvium; strongly acid.

Soils of the Lakeland and Eustis series, in the upper horizons, are similar to Huckabee and Independence soils, respectively, but are underlain by marine sediments of sandy clay loam at depths of 40 to 60 inches below the surface.

The two Regosols heretofore described show distinct evidence of weakly developed B horizons (horizon 4). Perhaps they might be classified as Red-Yellow Podzolic soils that have developed a minimal profile for this group. Opinions among soil scientists are divided on this point.

ALLUVIAL SOILS

The Alluvial soils in the county, for the most part, are members of series that are very extensive throughout the Coastal Plain. The Bibb, Ochlockonee, and Iuka series have characteristics similar to those recognized for Alluvial soils in other areas. The Hanna-

hatchee series is not extensive and is probably relatively insignificant outside the redlands section of east Texas. Except for color, which is reddish brown to light reddish brown, its characteristics are similar to those of the Iuka series. Hannahatchee soils consist of alluvial sediments that originated mainly in areas of Bub, Nacogdoches, Magnolia, and associated soils and have been little altered during transportation and deposition.

Agriculture

The early settlers cultivated the more fertile red soils and grew cotton, corn, wheat, and vegetables on small patches of cleared land. Agriculture was not extensive, however, until after the railroads were built through the county in 1873. From then on, farming developed rapidly and reached its peak in 1930. For many years cotton was the chief cash crop, but its production has been drastically reduced by acreage allotments, insect ravages, and labor shortages. In recent years, tomatoes have been the main cash crop. Except for an increased use of fertilizers, little improvement has been made in soil management. The usual practice is to cultivate the land until crops are unprofitable and then retire it to pasture.

Land Use and Types of Farming

According to the 1954 Census of Agriculture, 69.8 percent of the land in the county was in farms. Improved farmland totaled 24.5 percent. Since about 1930, many farmers have changed from the growing of cotton to the growing of crops such as vegetables, mainly tomatoes, fruits, melons, and seedling tomato and pepper plants for sale to commercial truck farmers. The cotton acreage reached a peak in 1929 but has greatly declined since then. Cotton farmers have increased their acreages of other crops to some extent, but many acres are left idle. Some areas are used for livestock grazing.

Farmlands are concentrated in the northern third of the county where the land is smoother and the best marketing facilities are located. Forest reservations and large acreages of privately owned timberlands occur in the south-central and western parts of the county. The central part is more rolling and hilly than the northern part and is not well suited to farming. Land not in cultivation is almost entirely in forests or is reverting from abandoned fields to forests.

Table 5 shows trends in farm acreage and number of farms in the period 1929-54.

TABLE 5.—*Farmland acreages and number of farms in specified years*

Use	1929	1939	1949	1954
	Acres	*Acres*	*Acres*	*Acres*
Land in farms	1414,715	442,091	494,629	466,037
Average size of farms	62.0	86.1	119.3	151.5
Cropland in farms	238,307	262,744	176,751	165,424
Cropland per farm	35.6	51.3	42.6	53.8
	Number	*Number*	*Number*	*Number*
Total farms	6,693	5,134	4,147	3,076

The greatest change in farming took place in the soil association that consists of sandy soils with friable subsoils. This association is occupied mainly by Bowie, Lakeland, and Eustis soils and is the least productive of the two main farming sections in the county. The area of cropland was reduced also by farmers who changed from staple crops to truck crops and who put more land into pasture for livestock production. For additional information on land uses by soil types see table 2. The farms of the county are classified according to size in table 6.

TABLE 6.—*Farms classified according to size*

Size of farms	1930	1940	1950	1954
	Number	*Number*	*Number*	*Number*
Under 3 acres	41	4	41	22
3 to 9	323	326	350	269
10 to 49	3,543	2,020	1,436	984
50 to 99	1,800	1,408	1,093	742
100 to 259	860	1,156	908	727
260 to 499	89	150	205	201
500 to 999	25	53	77	74
1,000 acres and over	12	17	37	57

Farm and Home Improvements and Community Facilities

Grade schools and churches are located at convenient places throughout the county. High schools are located in towns and large community centers. Many small rural schools have been consolidated, but in sparsely settled communities many small elementary schools remain. Most high school students live within 10 miles of a school and are transported by bus. Lon Morris College and Jacksonville Baptist College are located in Jacksonville. One of the most modern hospitals in east Texas is located in Jacksonville; another hospital is in Rusk.

Rural mail routes serve all parts of the county. According to the 1954 census, 710 farms had telephones.

A Rural Electrification Cooperative was organized in the county in 1938. By 1954, 2,578 farms had electricity. Many farm homes have modern improvements, but a large number of tenant homes, especially in the sparsely settled parts of the county, lack such conveniences.

Farm homes occupied by their owners are mostly well kept and equipped with modern conveniences. Most tenant houses are poorly constructed and in poor repair. Very few farms have buildings to house farm machinery. The common practice is to leave implements under trees when not in use. Most fences need repair. Fence posts are of untreated native woods that rot in a few years, and operators are negligent in replacing them.

Farm Tenure

In 1930 nearly 70 percent of farms were operated by tenants. Since then a gradual change to farm oper-

ation by owner has taken place. According to the 1954 census, 59.7 percent of farms were operated by full owners, and 20.2 percent by part owners. The rest were operated by tenants and managers.

The prevailing system of renting farms is sharecropping on a year-to-year basis. Two types of sharecropping are used. In one type, known as the third-and-fourth system, the owner furnishes the land and buildings, the tenant supplies labor, equipment, feed or fuel, and seed. As rent, the owner receives a third of the feed crops and a fourth of the cash crops. The other method of sharecropping is known as the half-and-half system. The owner furnishes the land, buildings, equipment, feed or fuel, and seed; the tenant furnishes the labor. In return the owner receives half the crops as rent. Under either system, the owner furnishes fertilizer in the same proportion as the share of crops he receives in rent. Under any system of renting, many landowners fail to maintain farm improvements. Consequently, farm buildings and fences are usually in poor condition.

The cash tenant pays the landowner a specified rental per acre or per farm and owns all the crops. Part owners are those who own part of the land they farm and rent the rest.

Farm Crops

The main crops are corn, cotton, and vegetables. Acreages of most of the crops grown in Cherokee County are listed in table 7.

TABLE 7.—*Acreages of principal crops and number of bearing fruit trees and grapevines in stated years*

Crop	1929	1939	1949	1954
	Acres	*Acres*	*Acres*	*Acres*
Corn:				
Harvested for grain	43,338	44,375	24,115	16,627
For all purposes	43,882	44,798	24,240	17,774
Sorghum:				
Harvested for grain or seed	61	201	302	210
Cut for silage or hogged or grazed or cut for dry forage or hay	1,164	3,163	1,555	1,410
Oats, threshed or combined	4	232	87	(1)
Annual legumes, for all purposes:				
Cowpeas, grown alone and harvested for dry peas	1,848	6,345	1,636	711
Peanuts, grown alone	776	4,858	1,518	900
Hay:				
Alfalfa	3	(1)	99	300
Clover or timothy	137	11	125	118
Lespedeza	961	(1)	2,631	431
Small grains	91	178	124	1,956
Wild	550	856	603	696
Other hay cut	590	2,684	927	1,743
Potatoes	525	629	176	93
Sweetpotatoes	876	2,122	1,319	533
Cotton harvested	113,698	43,075	26,440	12,968
Sugarcane or sorghum, harvested for sirup	288	688	100	30
Vegetables, harvested for sale	5,041	7,183	8,766	6,183
	Number [2]	*Number* [2]	*Number* [2]	*Number*
Fruit trees and vines:				
Apples	1,527	2,792	3,093	949
Peaches	79,727	127,118	78,599	65,922
Pears	2,435	8,776	5,901	1,957
Plums and prunes	2,225	4,531	8,807	42,144
Figs	522	755	837	(1)
Pecans, improved and wild	3,086	3,345	4,571	2,249
Grapes	436	1,849	759	92
Forest products sold:				
Firewood, cords	32,285	(1)	2,958	2,093
Fence posts	79,180	(1)	66,559	43,826
Pulpwood, cords	(1)	(1)	3,235	5,136

[1] Not reported.
[2] Number in the census year, which is 1 year later than the crop year given at the head of the column.

Corn

Corn is still the leading crop, although smaller acreages are now planted than in 1939.

Yields per acre of corn have changed but little in the county in the last 20 years. The average yield as a whole is less than 15 bushels per acre, but in recent years the farmers getting the best yields have averaged about 30 bushels per acre through the use of more fertilizer, better tillage, and hybrid seed. Higher yields are possible under better management on the more productive soils. Corn is grown on all types of soil, but the largest acreage and highest yields are obtained in the redlands section.

Despite the low yields, corn is an important crop, and may become more so in the future as the numbers of beef cattle increase. Higher yields can be obtained by the use of better tillage practices, improved soil management, and hybrid seed.

Cotton

Cotton was the most important cash crop grown in Cherokee County until about 1933. After that year, the cotton acreage decreased rapidly.

The average yield per acre of lint cotton is about 127 pounds, but it ranges from about 30 pounds on the less productive soils to about 160 pounds on the better soils. In recent years, a few farmers have produced about 250 pounds per acre, mainly through the use of winter legumes for green manure and improved varieties of cotton. All types of soil are used for cotton, but most of the crop is grown in the redlands section and in the section of sandy soils with friable subsoils.

Better soil management and the use of improved varieties of cotton will increase yields and make the crop more profitable. Cotton may continue to have a relatively important place in any system of farming suitable for this area because of the need for a cash crop that can be produced with inexpensive equipment and unskilled labor.

Cowpeas

For many years small acreages of cowpeas were

grown on most farms for human consumption and as a feed for livestock. It was a minor crop until a canning plant was established in Jacksonville in 1929. Since that time cowpeas have become an important source of cash income; most farms plant 2 to 4 acres of this crop. In places, cowpeas are grown for soil improvement.

As a rule cowpeas grown commercially yield about 2,200 pounds per acre of green peas or 500 to 600 pounds of dry peas. Yields for all purposes range from 100 to 3,500 pounds per acre of green peas. Cowpeas are grown on all soil types in the county, but the greatest acreage is grown in the section of sandy soils with friable subsoils that consists of Bowie, Lakeland, Eustis soils, and in the redlands section, where Nacogdoches, Magnolia, and Bub soils predominate.

Cowpeas are grown on practically all soils in the county, and yields are moderate to high if management is good. They readily fit into almost any crop rotation that is suitable for the area. Crops require little cultivation and can be grown to maturity in about 90 days. Cowpeas can be used for food or feed, soil improvement, or erosion control. It is probable they will assume greater agricultural importance in the future.

Peanuts

Peanuts were of minor importance in the county until the demand for vegetable oils increased. The acreage used for peanuts was highest in 1939, but has declined since then. On soils adapted to peanuts, the average yield is about 20 bushels per acre in years of normal rainfall. Most peanuts are grown on sandy soils that have friable subsoils, but a small acreage is grown in the redlands section. The deep loamy sands and fine sandy loams with friable subsoils are well suited to this crop.

Tomatoes

Tomatoes have become the principal cash crop. In addition, they are also the most heavily fertilized and intensively cultivated crop in the county. The seed is planted in hotbeds from late in January to the middle of February. Seedlings are transplanted to cold frames when about a month old and grow there for another month before being set in the field about April 1.

Tomatoes are transplanted to low beds, which are about 6 to 8 feet apart. A 5-10-5 fertilizer has been placed in the rows at the rate of 400 pounds per acre. The plants are set 18 inches apart in the row, and when 8 to 10 inches tall, are sidedressed every 2 or 3 weeks with 200 to 300 pounds per acre of fertilizer. The last side dressing is applied about a week before the harvest of "green-wraps" begins. The plants are cultivated with a sweep to control grass and weeds. Yields range from 100 bushels per acre from poor soils to 260 bushels from the better soils.

About 40 percent of the crop is harvested before the fruit has turned pink. These unripe tomatoes are wrapped in thin paper, packed into 24-pound lugs, and sold as green-wraps. The advantage of harvesting unripe or green-wrap tomatoes is that they can be picked 7 to 10 days earlier than pink tomatoes and shipped without refrigeration. The green-wrap harvest starts about the last week in May and generally ends about the first of July. Tomatoes are picked by hand and hauled to packing sheds. Here they are washed, culled, graded, sold to buyers, packed into lugs, loaded into ventilated refrigerator cars, and shipped without ice to St. Louis, Kansas City, Chicago, and other northern markets.

At the end of the green-wrap season, tomatoes still on vines are allowed to ripen and are sold to canneries. Most farm families can enough tomatoes for their own use.

The largest acreage of tomatoes and highest yields are grown on sandy to loamy soils less than 36 inches deep with friable subsoils. Soils of the redlands are not extensively used for tomatoes. The crop provides the farmer with cash early in summer before cotton, the other important cash crop, is harvested in fall. Tomatoes have an advantage over other crops in that they can be shipped before the crop is ripe or grown to maturity; they also can be sold to local canneries. Tomatoes provide a more certain return for the farmer than other crops that can be harvested only when mature.

Sorghum

Sorghum is used mainly as feed for beef and dairy cattle. It has a very extensive fibrous root system and can be broadcast or planted in rows, as contour strips or field strips, to reduce runoff and erosion.

Under good management, sweet sorghum generally yields 2 to 3 tons per acre of dry forage for hay, or 5 to 8 tons of silage. Grain sorghum produces about 10 to 30 bushels per acre. The crop grows well on all soils that are adopted to corn. Sorghum is more drought resistant than corn, the yields are more certain, and it probably produces more feed per acre when grown under similar management. It may be used more widely in the future as a feed crop and for reducing runoff and erosion.

Minor crops

Yams and watermelons have occupied from 2,000 to 4,000 acres and may be planted more often if the market expands. Peppers, eggplants, cucumbers, or potatoes are grown on small acreages as a cash crop. Yields are moderate to good. Peaches were formerly an important crop in the county, but the number of trees has been greatly reduced. Pears, plums, apples, and pecans are also grown, but to a lesser extent than peaches.

Hay, mainly grasses and lespedeza, was harvested from 5,244 acres in 1954. Kobe lespedeza is popular for improved meadows on soils of the bottom lands. Yields from 1½ to 2 tons per acre are not uncommon

if fertilizer is used. Other minor crops are oats for winter grazing or hay, vetch for green manure, and alfalfa for hay.

In recent years seedling cabbage, cauliflower, broccoli, tomato, and pepper plants have been grown in the vicinity of New Summerfield. The industry uses about 200 acres, and the young plants are shipped to vegetable growers in Oklahoma, Arkansas, Tennessee, and Missouri.

Livestock and Livestock Products

The eradication of the Texas fever tick about 1930 greatly favored livestock raising, but the possibilities for beef cattle were not fully recognized until about 10 years later. Cattle raising is concentrated in the northern two-thirds of the county because there is less timberland than in the southern part, where grazing is not as good. Commercial dairies, poultry farms, and the raising of market hogs are not important in the county. The number of livestock on farms of Cherokee County is shown in table 8.

TABLE 8.—*Number of livestock in stated years*

Livestock	1930	1940	1950	1954
Horses and colts	[1]3,568	[1]3,482	3,313	1,770
Mules and colts	[1]9,202	[1]6,032	2,685	1,252
Cattle and calves	23,685	[1]26,529	33,650	40,636
Sheep and lambs	166	[2]266	211	173
Goats and kids	312	[3]642	763	921
Swine	10,433	[3]9,604	6,245	5,307
Chickens	[1]150,568	[3]157,152	[3]112,589	[3]132,153
Turkeys	[4]1,326	[3]1,030	2,309	7,775

[1]Over 3 months old.
[2]Over 6 months old.
[3]Over 4 months old.
[4]In 1929.

Beef cattle

Cattle are grazed chiefly on soils of the bottom lands because those soils produce better forage over a longer time than the other groups of soils. In addition, their carrying capacity per acre is higher than that of any soils of the uplands.

Most cows in beef herds are crosses of the Jersey, Hereford, and Brahman breeds. Nearly all the cattlemen now use registered or good grade Hereford and Brahman bulls to improve their herds, and improved herds of these breeds are becoming more numerous. There are also several herds of Angus cattle. Cattle get most of their feed in summer by grazing but are fed cottonseed meal and cake in the winter. A few stockmen use sorghum or native hay as supplemental feed during winter. Unfinished grass-fed calves are sold on the local market when they are 9 to 12 months old. They are butchered locally or resold on the Houston and Fort Worth markets.

Dairy cattle

The 1954 census shows 61 farms were classed as dairy farms. Most dairy cattle are good grade Jersey cows, but there are several herds of Holsteins. Most dairymen grow corn and sorghum, but a large part of the cattle feed is bought locally. Milk is sold to local creameries. It is pasteurized and marketed mainly as whole milk.

Hogs

Hogs are one of the main sources of meat for farm families, but the number of hogs decreases nearly every year. Very few farmers provide supplemental pasture for their hogs. Duroc Jersey, Chester White, Poland China, Hampshire, and crosses of these breeds are most commonly raised. A large part of the feed for hogs is grown, but most farmers buy some protein supplement. From 50 to 75 percent of the hogs are butchered and consumed on the farms. The rest generally are sold within the county.

Poultry

In 1954, 167 farms were classified as poultry farms. The raising of poultry has never been an important commercial enterprise, but most farmers have a few chickens for home use.

Forests

About half the area of Cherokee County is in forests; the largest tree-covered area is in the southern part. In this area are the 2,400-acre Fairchild State Forest near Maydelle and an 8,000-acre forest owned by a lumber company. In 1954, according to the Federal Census of Agriculture, 1,867 farms in the county reported woodlands totaling 212,098 acres.

The pine-oak forest type, consisting mainly of shortleaf pine mixed with oaks and other species of hardwoods, is predominant. Shortleaf pine is the most important. It grows well on nearly all soils of the uplands and on the better drained bottom lands. In well-managed forests 75 to 85 percent of the trees are shortleaf pine. In most areas, which have not been managed so well, less than half of the stand is in shortleaf pine, and the other trees are mainly post, blackjack, and red oaks, elm, gum, and hickory.

Deep sandy soils are covered mainly by shortleaf pine, sand jack oak, and blackjack oak. The bottom lands are covered mainly by white, willow, and water oaks, red and black gums, elm, ironwood, pecan, ash, and birch.

Distribution

Forests and farm woodlands occur mainly on sloping to strongly sloping, irregular, and dissected areas that are not suited to agriculture. In some of the larger tracts, forested areas are on gently sloping lands.

By referring to the colored soil-association map in

the back of this report, one can better visualize the location of the four soil associations in the county. The kind of soil influences the vegetation that grows on it, and by noting the soils in each association, the reader can better understand the distribution of tree growth in each association.

Forests in the Bowie-Lakeland-Eustis soil association (sandy soils with friable subsoils) occur mainly on the strong slopes, but also to some extent on gentle slopes that are suitable for cultivation. In the Boswell-Susquehanna soil association (soils with compact subsoils), forested areas occupy the heavier soils of the Garner and Susquehanna series. Trees occupy 68 percent of this soil association, but the gently sloping phases of all other soils are used for crops.

In the Iuka-Bibb soil association (flood plains), the better drained soils are mostly cleared. Poorly drained or frequently overflowed soils, especially the wider stream bottoms, are still forested. In the Nacogdoches-Magnolia Bub soil association (the redlands), practically all soils suitable for crops have been cleared and are cultivated or in pasture.

Soils Suited to Forests

Practically all soils of the uplands are suitable for forestry. The deep loamy sands, though not well suited to forestry, should be used for this crop because trees are better suited to it than tilled crops or pasture. Pines grow best on the Boswell-Susquehanna soil association, particularly the Boswell soils (fig. 12). They

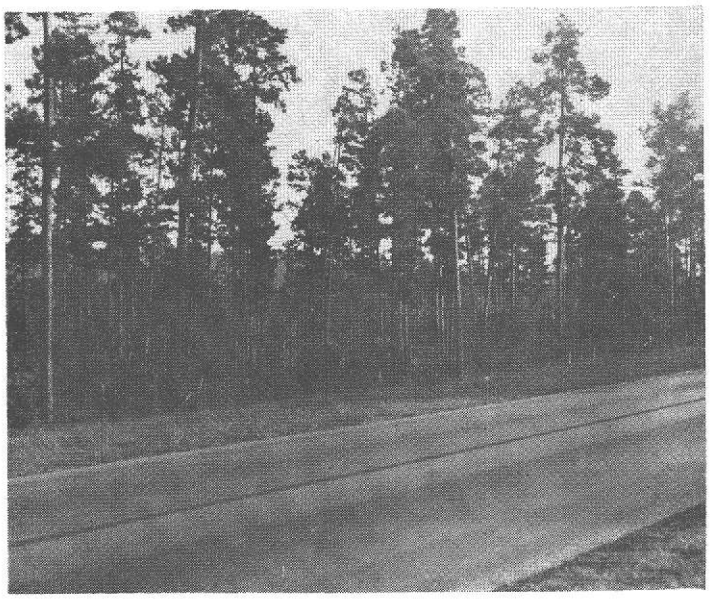


Figure 12.—**A fast-growing stand of shortleaf pine on Boswell fine sandy loam. The understory consists of worthless hardwood bushes and shrubs.**

grow moderately rapidly on the Garner and Susquehanna soils.

Members of the Bowie-Lakeland-Eustis and of the Nacogdoches-Magnolia-Bub soil associations, except the deep loamy sands, are about equally well suited to pine and oak forests. They are also suitable for growing catalpa, locust, and mulberry for fence posts. Strongly sloping or severely eroded areas should be used mainly for growing pine trees. Grasses and shrubs furnish a small amount of grazing.

Soils of the bottom lands are suited to hardwoods, but only the areas now in trees should be used for forestry. The bottom lands are also well suited to pasture.

Management

The U. S. Southern Forest Experiment Station at New Orleans estimates that the present rate of forest cutting is about double the rate of forest growth. It is obvious that management must improve if forestry is to occupy its rightful place in the economy of Cherokee County.

The income from land in forests can be substantially increased if the areas are properly managed. A stand of shortleaf pine, properly stocked and growing vigorously, will produce an estimated 300 to 500 board feet per acre per year. Cutover pine forests, however, produce only about 100 to 200 board feet a year because they usually contain low-grade hardwood trees mixed with the pines.

Some of the measures that can be taken to improve management are discussed below: (1) The prevention of fire, (2) thinning and harvesting, (3) reforestation, and (4) control of grazing. Information and help in carrying out these practices can be obtained from local representatives of the Soil Conservation Service, the Agricultural Extension Service, Texas Forest Service, or the Agricultural Experiment Station.

Fire prevention

Forests produce sawlogs, poles, crossties, and pulpwood. The usual custom is to cut all trees when their diameter is large enough to produce the desired product. Pine trees as small as 4 inches in diameter are cut for pulpwood or posts on many tracts. If fire follows the cutting, as it often does, the trees left growing are killed or injured. They are followed by a practically worthless stand of hardwood trees. Forests abused in this manner will produce little if any pine, unless the hardwood trees are killed and pines are planted on the damaged area. Destructive logging and careless burning are common. Selective cutting is being practiced in the State Forest and on some of the larger tracts owned by individuals and corporations. This practice has not been widely adopted by owners of farm woodlands, however.

The entire county has had fire protection from the Texas Forest Service for many years. Four lookout towers have been placed at strategic points. Fire-fighting equipment and several full-time employees provide fire protection to the entire county. In spite of the efforts by the Texas Forest Service, forest fires destroy or severely damage many acres of young pine each year.

Forest lands should not be burned, except on the advice of the Texas Forest Service or other agricultural agency regarding the time and method of burning. If burned under the wrong conditions, forests will be harmed more than benefited, and there is danger that fire will spread to neighboring lands.

Thinning and harvesting

Thinning should be done before the competition for growing space among trees becomes severe. Pines should be thinned to about 500 trees per acre when they are 5 to 6 inches in diameter. At this size the surplus trees can be sold as pulpwood. The cull and overage trees should be removed in the same thinning operation. Pruning may be desirable in small forests to improve the quality of trees and to encourage the growth of forage for grazing.

When growing in pine forests, hardwoods, except possibly red oak, are less profitable than the pine. They grow too slowly, and many are defective. In addition, they tolerate shade and will suppress the growth of pine seedlings. Hardwoods should be removed from pine forests, or they will eventually crowd out the pine trees.

Harvesting of trees may be performed by selecting individual trees or groups of trees, or by the shelterwood or the clear-cutting systems. These management systems can be explained by foresters who can be asked to plan the management of a specific forested area. The premature cutting of trees is one of the greatest mistakes made by most owners.

The forests on bottom lands should be cleared of undesirable species to allow the commercially valuable trees to grow.

Reforestation

New forests should be established on strongly sloping or severely eroded areas that are not suited to crops or pasture. Seedlings of shortleaf pine, loblolly pine, or slash pine are the species suggested. Locust, mulberry, or catalpa are good in plantations that are to be harvested for fence posts. On the better sites, pines should be spaced 6 x 8 feet apart. Advice on tree seedlings, planting, soil preparation, and other problems is available from the agencies previously mentioned.

Control of grazing

Proper grazing prevents invasion of tall grasses, hardwood sprouts, and undesirable plants that compete with small pine seedlings. Cattle also reduce the amount of flammable ground cover that is hazardous during the fire season. Overgrazing, however, results in damage to young trees and may prevent natural reproduction of desirable forest species.

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Summary of important

Management group	Soil	Map symbol	Slope	Representative Soil Profile		
				Surface soil	Subsoil	Parent material
			Percent			
3	Alto clay loam	Aa	0–1	Dark grayish-brown gritty clay loam; friable; granular; slightly acid.	Dark yellowish-brown gritty clay; massive; friable; strongly acid.	Residuum from glauconite or glauconitic earth of the Weches greensand member of the Mount Selman formation.
3	Alto loam	Ab	0–1	Brown to dark-brown loam; friable; medium acid.	Yellowish-brown gritty clay; massive; friable; strongly acid.	Residuum from glauconite or glauconitic earths.
1	Amite fine sandy loam.	Ac	0–1	Reddish-brown fine sandy loam; very friable; slightly acid.	Red sandy clay; massive; friable; permeable; strongly acid.	Sandy and clayey alluvial sediments washed from the redlands and the associated forested soils of east Texas; acid.
17	Bibb clay loam	Ba	0–1	Light-gray clay loam; massive; friable; permeable; medium to strongly acid.	Light-gray clay loam splotched with brown and pale yellow; massive; permeable; strongly acid.	Alluvial sediments from light-colored forested upland soils of the Bowie, Lakeland, Susquehanna, and associated series; acid.
17	Bibb fine sandy loam.	Bb	0–1	Light-gray fine sandy loam; massive; friable; strongly acid.	Light-gray sandy clay loam splotched with brownish yellow; friable but hard; strongly acid.	Sandy and clayey alluvial sediments from light-colored forested soils; acid.
	Boswell fine sandy loam:					
9	Gently sloping	Bc	1–3	Light-brown fine sandy loam; very friable; massive; medium acid.	Red heavy clay underlain by light-gray clay mottled with brownish yellow and gray in lower part; plastic; hard; strongly acid.	Light-gray clay or sandy clay; somewhat mottled or splotched with yellow; medium to strongly acid.
11	Sloping	Bd	3–8	Same	Same	Light-gray clay or sandy clay; somewhat mottled with yellow; interbedded thin strata or layers of iron-bearing sandstone; acid.
18	Sloping, eroded	Be	3–8	Same	Same	Light-gray clay or sandy clay; somewhat mottled or splotched with yellow; medium to strongly acid.
18	Strongly sloping.	Bf	8–15	Same	Same	Same
18	Strongly sloping, eroded.	Bg	8–15	Same	Same	Same
18	Boswell sandy clay loam, strongly sloping, severely eroded.	Bh	8–15	Reddish-brown sandy clay loam.	Same	Same
	Bowie fine sandy loam:					
1	Nearly level	Bk	0–1	Very pale brown fine sandy loam; friable; medium acid.	Yellow sandy clay loam over yellow sandy clay mottled with red and gray; friable; acid.	Moderately sandy Coastal Plain sediments consisting of thick- or thin-bedded pale-yellow and light-gray sandy clay, clay loam, and loamy sand.
2	Gently sloping	Bm	1–3	Same	Same	Same
5	Sloping	Bn	3–8	Same	Same	Moderately sandy pale-yellow and light-gray thick- or thin-bedded Coastal Plain sediment.
10	Sloping, eroded	Bo	3–8	Same	Same	Moderately sandy Coastal Plain sediments of thick- or thin-bedded pale-yellow or light-gray sandy clay, clay loam, and loamy sand.

characteristics of the soils

Soil depth	Erosion hazard (under cultivation)	Productivity under prevailing practices	Internal drainage	Native vegetation	Suitable uses
Moderately deep to deep.	None	Moderate to high	Slow to very slow; intermittent and high water table.	Savannah forest of willow, pin oak, and elm with coarse grasses.	Pasture and crops.
Same	None	Moderate	Very slow	Forest of oak, elm, and pine.	Crops, pasture, or meadow.
Deep	None	Moderate to high	Medium	Savannah forest with bunch grasses.	Crops, pasture, and forestry.
Deep	None; frequently overflowed.	Low	Slow to very slow; high water table in wet season.	Hardwood forest and coarse water grasses.	Pasture and forestry.
Deep	Same	Low	Slow to very slow	Same	Pasture and forestry.
Deep	Slight to moderate	Low to moderate	Slow to very slow	Mixed pine and hardwood forest.	Crops, pasture, and forestry.
Moderately deep to deep.	Moderate to high	Low	Slow	Same	Pasture and forestry.
Same	Moderate to high	Low	Slow	Same	Forestry.
Moderately deep	High	Low	Slow	Same	Forestry.
Moderately deep	High	Low	Slow	Same	Forestry.
Moderately deep to shallow.	Very high	Very low	Slow	Same	Forestry.
Deep	None	Moderate	Medium	Same	Crops, pasture, and forestry.
Deep	Slight	Moderate	Medium	Same	Crops, pasture, and forestry.
Deep	Slight to moderate	Moderate	Medium	Same	Crops, pasture, and forestry.
Deep	Moderate	Moderate to low	Medium	Same	Crops and forestry.

Summary of important characteristics

Management group	Soil	Map symbol	Slope	Representative Soil Profile		
				Surface soil	Subsoil	Parent material
			Percent			
	Bowie loamy fine sand:					
4	Gently sloping.	Bp	1- 3	Pale-brown loamy fine sand; medium acid.	Pale to brownish-yellow sandy clay loam; strongly acid; mottled with red and light gray.	Coastal Plain sediments of thin- or thick-bedded pale-yellow and light-gray loamy sands and sandy clays; acid.
6	Sloping	Br	3- 8	Same	Same	Same
15	Sloping, eroded	Bs	3- 8	Same	Same	Same
18	Bub-Nacogdoches complex.	Bt	8–40	Reddish-brown clay loam; friable; medium acid.	Red clay splotched with yellow; medium acid.	Yellowish or strong-brown glauconitic clay that contains thin strata or seams of ironstone; slightly acid to weakly calcareous.
	Caddo fine sandy loam:					
16	Level	Ca	0- 1	Gray fine sandy loam; very friable; strongly acid.	Mottled yellow and light-gray sandy clay loam; friable; strongly acid.	Light-gray or mottled light-gray and yellow sandy loam and clay loam; more or less thin bedded and stratified; acid.
16	Sloping	Cb	3- 8	Gray fine sandy loam; friable; strongly acid.	Mottled yellow and light-gray sandy clay loam; friable; acid.	Same
16	Caddo very fine sandy loam, mound phase.	Cc	0- 1	Light-gray very fine sandy loam; moundy; friable; acid.	Same	Same
1	Cahaba fine sandy loam.	Cd	0- 1	Reddish-yellow fine sandy loam; friable; acid.	Yellowish-red sandy clay loam; friable; medium acid.	Reddish sandy to sandy clay loam alluvial sediments; stratified or unstratified acid.
	Cuthbert and Ruston fine sandy loams:					
10	Sloping	Ce	5- 8	Light-brown fine sandy loam; very friable; strongly acid.	Yellowish-red sandy clay loam or sandy clay; strongly acid.	Reddish thin-bedded or thick-bedded sandy clay to loamy sand sediments; acid.
18	Strongly sloping.	Cf	8–15	Same	Same	Reddish sandy clays, clay loams, and loamy sands more or less interbedded or laminated with lentils of sandstone; acid.
18	Strongly sloping, eroded.	Cg	8–15	Same	Same	Reddish thin-bedded or thick-bedded sandy clay to loamy sand sediments; acid.
	Eustis loamy fine sand:					
12	Nearly level	Ea	0- 3	Pale-brown loamy fine sand; loose; strongly acid.	Reddish-yellow sandy clay loam; friable; strongly acid.	Thick beds of unconsolidated somewhat reddish sands, loamy sands, and clays; acid.
13	Sloping	Eb	3- 8	Same	Same	Same
15	Sloping, eroded	Ec	5- 8	Same	Same	Same
19	Strongly sloping.	Ed	8–15	Grayish-brown loamy fine sand; loose; medium acid.	Same	Beds of reddish unconsolidated sandy clays and sands; acid.
19	Strongly sloping, eroded.	Ee	8–15	Same	Same	Thick beds of unconsolidated somewhat reddish sands, loamy sands, and clay; acid.
14	Garner clay	Ga	0- 1	Dark grayish-brown clay; heavy; plastic; slightly to medium acid.	Mottled light-gray and brownish-yellow heavy clay; compact; medium acid.	Pale-yellow or light olive-gray shale or clay of marine or alluvial origin; acid to calcareous.
8	Hannahatchee clay loam.	Ha	0- 1	Light-brown or reddish-brown clay loam; friable; slightly acid.	Reddish-brown clay loam; mottled with strong brown and yellowish brown; friable; acid.	Recent stream sediments

of the soils—Continued

Soil depth	Erosion hazard (under cultivation)	Productivity under prevailing practices	Internal drainage	Native vegetation	Suitable uses
Deep	None to slight	Moderate to low	Medium	Mixed pine and hardwood forest.	Crops and forestry.
Deep	Slight	Low	Rapid	Same	Crops and forestry.
Moderately deep	Moderate	Low	Rapid	Same	Forestry.
Very shallow	Very high	Low	Slow	Same	Forestry.
Deep	None	Low	Slow; high water table in wet season.	Same	Pasture, forestry, and crops.
Deep	None	Very low	Same	Same	Pasture and forestry.
Deep	None	Low	Same	Same	Pasture, forestry, and crops.
Deep	None	Moderate	Medium	Same	Crops, pasture, and forestry.
Moderately deep	Moderate to high	Low	Medium	Same	Forestry.
Moderately deep	Very high	Low	Medium	Same	Forestry.
Moderately deep	Very high	Low	Medium	Same	Forestry.
Deep	None to very slight	Very low	Rapid	Mixed pine and oak forest.	Truck crops or forestry.
Deep	Slight to moderate	Very low	Rapid	Same	Crops or forestry.
Deep	Slight to moderate	Very low	Rapid	Same	Forestry.
Deep	Moderate to high	Very low	Rapid	Same	Forestry.
Deep	Moderate to high	Very low	Rapid	Same	Forestry.
Moderately deep	None	Low to moderate	Very slow	Pine and hardwood forest.	Pasture or forestry.
Deep	None; occasionally overflowed.	Moderate	Medium; high water table in wet season.	Mixed pine and hardwood forest.	Crops and pasture.

Summary of important characteristics

Management group	Soil	Map bol symbol	Slope	Representative Soil Profile		
				Surface soil	Subsoil	Parent material
			Percent			
7	Hannahatchee fine sandy loam.	Hb	0–1	Reddish-brown or strong-brown fine sandy loam; very friable; slightly acid.	Strong-brown fine sandy loam; slightly mottled pale brown; friable; slightly to medium acid.	Sandy alluvial deposits; acid
12	Huckabee loamy fine sand.	Hc	0–1	Gray-brown loamy fine sand; loose; slightly acid.	Very pale brown loamy fine sand; nearly loose; medium acid.	Sandy alluvial sediments washed from the light-colored forested soils.
	Independence loamy fine sand:					
12	Nearly level	Ia	1–3	Brown loamy fine sand; loose; slightly acid.	Reddish-yellow loamy fine sand; loose; strongly acid.	Reddish sandy alluvial sediments; acid.
13	Sloping	Ib	3–8	Brown loamy fine sand; loose; acid.	Reddish-yellow loamy fine sand; loose; acid.	Same
19	Strongly sloping.	Ic	8–15	Same	Same	Same
8	Iuka clay loam	Id	0–1	Grayish-brown clay loam; friable; medium to strongly acid.	Light yellowish-brown clay loam; mottled with yellowish brown and light gray; friable; strongly acid.	Sandy and clayey alluvial sediments washed from surrounding light colored soils.
7	Iuka fine sandy loam.	Ie	0–1	Light yellowish-brown fine sandy loam; friable; slightly to medium acid.	Light yellowish-brown fine sandy loam; mottled with yellowish brown and light brownish gray; friable; slightly to medium acid.	Sandy alluvial sediments from light-colored forested soils; acid.
	Lakeland loamy fine sand:					
12	Nearly level	La	1–3	Pale-brown loamy fine sand; loose; strongly acid.	Yellowish-brown sandy clay loam; friable; strongly acid.	Yellowish sandy clay loam to loamy sand of marine origin; acid.
13	Sloping	Lb	3–8	Same	Same	Same
15	Sloping, eroded	Lc	5–12	Same	Same	Same
19	Strongly sloping.	Ld	8–15	Same	Same	Same
	Magnolia fine sandy loam:					
2	Gently sloping.	Ma	1–3	Light-brown fine sandy loam; very friable; slightly acid.	Red sandy clay loam to clay; friable; acid.	Glauconitic clay or residuum from impure greensand or marl or from stratified greensand and reddish sandy clay; acid to alkaline.
5	Sloping	Mb	3–8	Same	Same	Same
18	Strongly sloping.	Mc	8–15	Same	Red sandy clay loam to clay; friable; slightly to strongly acid.	Yellowish or reddish sandy clay residuum from impure greensand containing lenses of laterite; acid.
20	Marsh	Md	0	Soil not classified		
	Nacogdoches fine sandy loam:					
2	Gently sloping.	Ne	1–3	Reddish-brown fine sandy loam; friable; slightly acid.	Red clay; friable; strongly acid.	Greensand marl or glauconitic sandy clay and clay; acid to calcareous reaction.
5	Sloping	Nf	3–8	Same	Same	Yellowish-red and reddish-yellow gritty sandy clay.
11	Sloping, eroded	Ng	3–8	Same	Same	Greensand marl on glauconitic sandy clay and clay; acid to calcareous.
18	Strongly sloping.	Nh	8–15	Same	Same	Reddish or yellowish-brown glauconitic clay and sandy clay; acid to alkaline.
18	Strongly sloping, eroded.	Nk	8–15	Reddish-brown fine sandy loam; friable; slightly acid.	Red clay; friable; strongly acid.	Reddish or yellowish-brown glauconitic clay and sandy clay; acid to alkaline.

of the soils—Continued

Soil depth	Erosion hazard (under cultivation)	Productivity under prevailing practices	Internal drainage	Native vegetation	Suitable uses
Deep	Same	Moderate	Same	Same	Crops and pasture.
Deep	None	Low	Rapid	Mixed pine and oak forest.	Vegetable crops and forestry.
Deep	None	Low	Rapid	Same	Crops and forestry.
Deep	Slight	Low	Rapid	Mixed pine and hardwood forest.	Crops and forestry.
Deep	Moderate	Low	Rapid	Same	Forestry.
Deep	None; occasional to frequent overflows.	Moderate	Medium; high water table in wet season.	Forest mainly of hardwoods; some pine.	Crops, pasture, and meadow.
Deep	Same	Moderate	Same	Mixed pine and hardwood forest.	Crops and pasture.
Deep	None	Very low	Rapid	Mixed pine and oak forest.	Truck crops and forestry.
Deep	Slight to moderate	Very low	Rapid	Same	Special crops and vegetables.
Deep	Slight to moderate	Very low	Rapid	Same	Forestry.
Deep	Moderate to high	Very low	Rapid	Same	Forestry.
Deep	Slight	Moderate to high	Medium	Mixed pine and oak forest; considerable red oak.	Crops, pasture, or forestry.
Deep	Moderate to high	Moderate	Medium	Same	Crops, pasture, or forestry.
Deep	High	Low	Medium	Mixed pine and hardwood forest.	Forestry.
			Soil under water	Grasses and sedges	Wildlife.
Deep	Slight	Moderate to high	Medium	Mixed pine and hardwood forest.	Crops, pasture, or forestry.
Deep	Moderate to high	Moderate to high	Medium	Same	Crops, orchards, or forestry.
Deep	Moderate to high	Moderate to low	Medium	Same	Crops, orchards, and forestry.
Moderately deep	Very high	Medium	Medium	Same	Forestry.
Moderately deep	Very high	Low	Medium	Mixed pine and hardwood forest.	Forestry.

Summary of important characteristics

Management group	Soil	Map symbol	Slope	Representative Soil Profile		
				Surface soil	Subsoil	Parent material
			Percent			
	Nacogdoches clay loam:					
2	Gently sloping	Na	1– 3	Dark-red or dark reddish-brown clay loam; friable; slightly to medium acid.	Same	Reddish and yellowish-brown glauconitic sandy clay or clay; acid to weakly alkaline.
11	Sloping	Nb	3– 8	Same	Same	Same
11	Sloping, eroded	Nc	3– 8	Reddish-brown clay loam; friable; medium acid.	Same	Same
18	Strongly sloping, eroded	Nd	8–12	Same	Same	Same
7	Ochlockonee loamy fine sand	Oa	0– 1	Grayish-brown loamy fine sand; very friable; medium acid.	Yellowish-brown loamy fine sand; very friable; medium to strongly acid.	Sandy alluvial sediments; acid.
17	Percilla soils	Pa	0	Light-gray clay loam; mottled brown; friable; strongly acid.	Light brownish-gray sandy clay mottled brown; iron concretion; firm; strongly acid.	Sandy clays and clays containing some glauconitic material; acid.
	Ruston fine sandy loam:					
2	Gently sloping	Ra	1– 3	Very pale brown fine sandy loam; very friable; medium to strongly acid.	Reddish-yellow sandy clay loam; friable; strongly acid.	Thick beds of light-yellow to reddish-yellow sandy sediments; acid.
5	Sloping	Rb	3– 8	Same	Same	Same
10	Sloping, eroded	Rc	3– 8	Same	Same	Same
	Ruston loamy fine sand:					
4	Gently sloping	Rd	1– 3	Very pale brown loamy fine sand; very friable; strongly acid.	Same	Thick beds of reddish or reddish-yellow sandy marine sediments; acid.
6	Sloping	Re	3– 8	Pale-brown loamy fine sand; loose; acid.	Reddish-yellow sandy clay loam; friable; acid.	Same
19	Ruston and Bowie loamy fine sands, strongly sloping.	Rf	8–15	Same	Reddish-yellow or mottled yellow and red sandy clay loam.	Same
	Susquehanna fine sandy loam:					
9	Gently sloping	Sd	1– 3	Grayish-brown fine sandy loam; very friable; slightly acid.	Mottled red, light gray, and yellow compact heavy clay; strongly acid.	Light-gray clay or clay shale with thin lenses or laminae of yellow sandy clay or clay; strongly acid.
18	Sloping	Se	3– 8	Same	Same	Same
18	Sloping, eroded	Sf	3– 8	Same	Same	Same
	Susquehanna clay loam:					
14	Gently sloping	Sb	1– 3	Grayish-brown clay loam; plastic; strongly acid.	Same	Light brownish-gray or pale-olive clay or clay shale; slightly acid to alkaline.
18	Sloping	Sc	3– 6	Same	Same	Same
18	Susquehanna clay, nearly level	Sa	0– 2	Reddish-brown clay; slightly mottled with reddish yellow; plastic; strongly acid.	Mottled red and light-gray clay; plastic; very compact; strongly acid.	Light gray or white clay or clay shale; more or less streaked with pale yellow and light red; strongly acid.

of the soils—Continued

Soil depth	Erosion hazard (under cultivation)	Productivity under prevailing practices	Internal drainage	Native vegetation	Suitable uses
Moderately deep	Slight to moderate	Moderate	Medium	Same	Crops, pasture, and forestry.
Moderately deep	High to very high	Moderate	Medium	Same	Crops, pasture, and forestry.
Moderately deep	High to very high	Moderate to low	Medium	Same	Crops, pasture, or forestry.
Moderately deep	Very high	Low	Medium	Same	Forestry.
Deep	None; occasional overflow.	Moderate to low	Medium	Pine and hardwood forest.	Crops and pasture.
Moderately deep	None	Low	Slow; water table at or near surface in wet season.	Hardwood forest; understory of hawthorn and other shrubs.	Pasture and meadow.
Deep	None to slight	Moderate	Medium	Mixed pine and hardwood forest; much red oak.	Crops, pasture, and forestry.
Deep	Slight to moderate	Moderate	Medium	Same	Crops, pasture, and forestry.
Deep	Slight to moderate	Moderate to low	Medium	Same	Crops, pasture, and forestry.
Deep	None to slight	Moderate to low	Medium	Mixed pine and hardwood forest.	Crops and forestry.
Deep	Moderate	Low	Medium	Mixed pine and oak forest; much red oak.	Crops and forestry.
Deep	Moderate	Low	Medium	Mixed pine and hardwood forest.	Forestry.
Moderately deep	Slight to moderate	Low	Very slow	Same	Pasture and forestry.
Moderately deep	High	Low	Very slow	Same	Pasture and forestry.
Moderately deep	High	Low	Very slow	Same	Forestry.
Moderately. deep	Slight to moderate	Low	Very slow	Same	Pasture and forestry.
Moderately deep	High	Low	Very slow	Same	Pasture and forestry.
Moderately deep	Slight to none	Low	Very slow	Same	Forestry.

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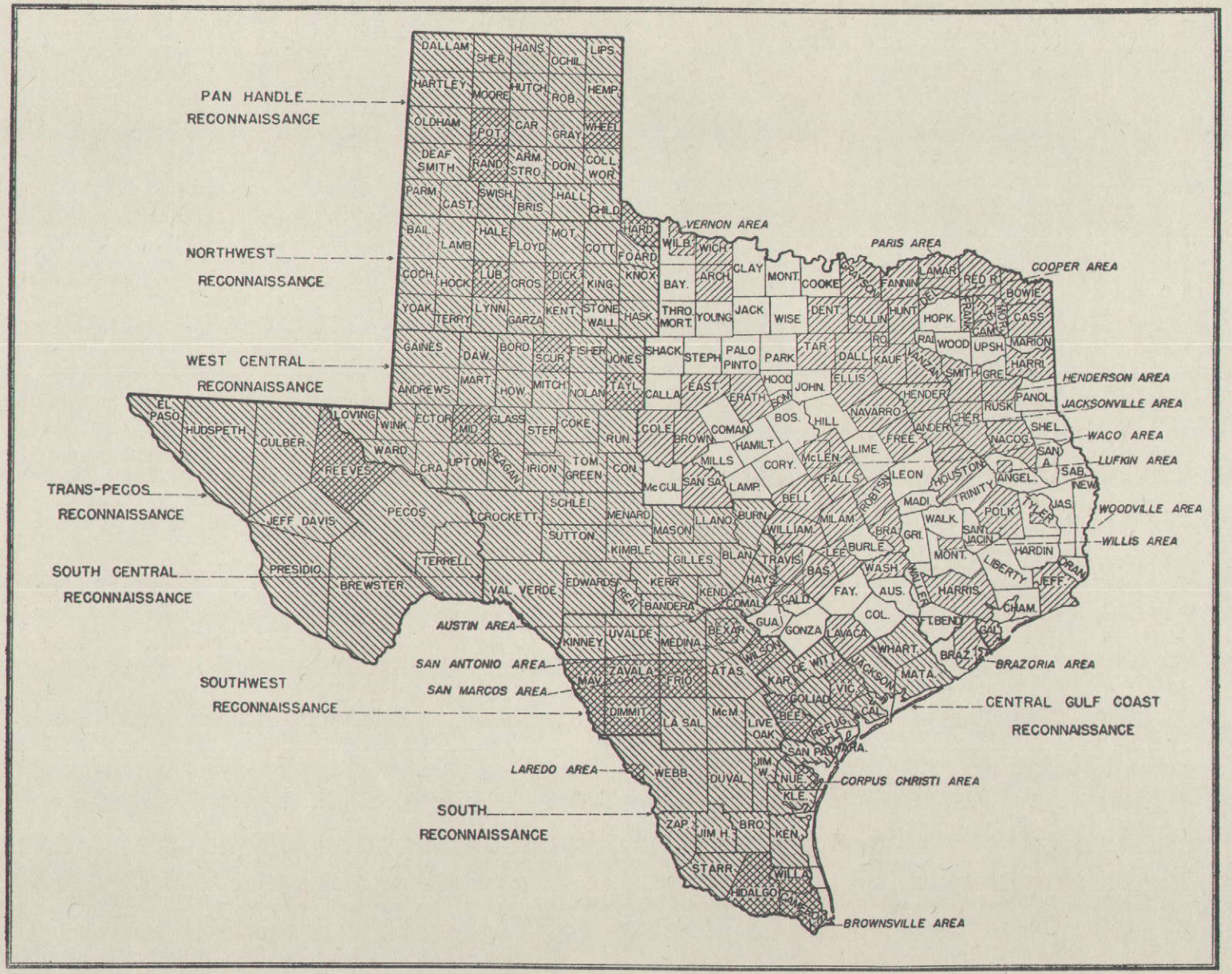

Areas surveyed in Texas shown by shading. Detailed surveys shown by northeast-southwest hatching; reconnaissance surveys by northwest-southeast hatching; crosshatching indicates areas covered both ways.