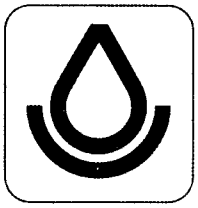
SOIL SURVEY OF

Lawrence County, Arkansas



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

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

Major fieldwork for this soil survey was completed in the period 1964–72. Soil names and descriptions were approved in 1973. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1973. This survey was made cooperatively by the Soil Conservation Service and the Arkansas Agricultural Experiment Station. It is part of the technical assistance furnished to the Lawrence County Conservation District.

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

HOW TO USE THIS SOIL SURVEY

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

Locating Soils

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

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

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification and woodland group of each. It also shows the page where each soil is described and the page for the pasture and hayland group and range site in which the soil has been placed.

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

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units, the pasture and hayland groups, the range sites, and the woodland groups.

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

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

Ranchers and others can find, under "Range," groupings of the soils according to their suitability for range, and also the names of many of the plants that grow on each range site.

Community planners and others can read about soil properties that affect the choice of sites for dwellings, industrial buildings and for recreation areas in the sections "Town and Country Planning" and "Recreation."

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

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

Newcomers in Lawrence County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given in the section "General Nature of the County," at the beginning of the publication.

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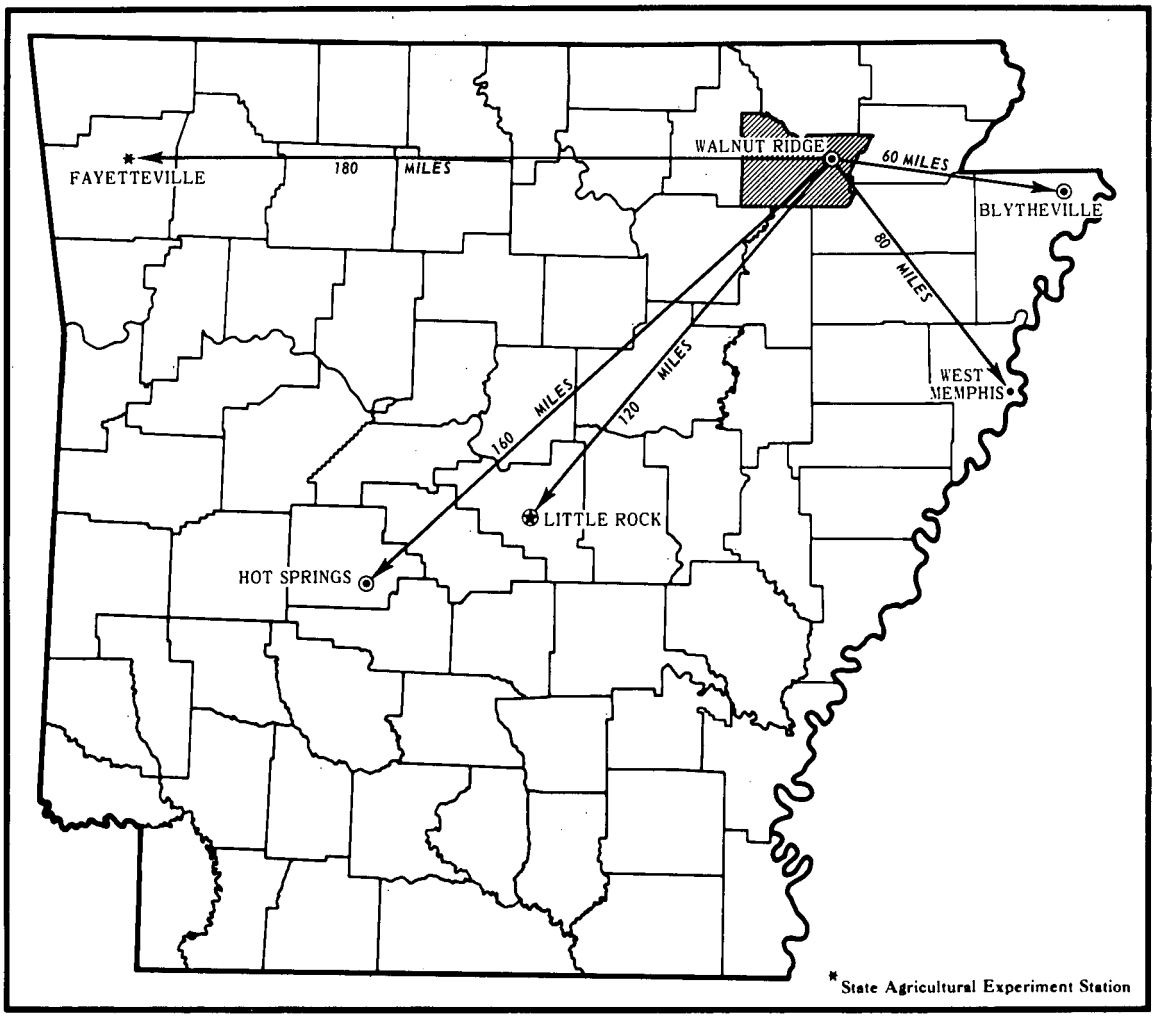

Location of Lawrence County in Arkansas.

Soil Survey of Lawrence County, Arkansas

BY WARREN A. GORE, JAMES H. BROWN, AND RICHARD T. FIELDER

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

LAWRENCE COUNTY is in northeast Arkansas (see facing page). It is irregular in shape, and ranges from about 26½ to 34 miles wide. The maximum length is about 25 miles. The county is bounded on the east by Greene and Craighead Counties, and on the south by Craighead, Jackson, and Independence Counties. Sharp County is on the west, and Sharp, Randolph, and Greene Counties bound it on the north. The Cache River forms the county boundary on the east side. Spring and Black Rivers form part of the county boundary on the north side. According to United States census reports, the approximate land area is 377,536 acres, or about 590 square miles.

In 1970, the population was about 16,320. Walnut Ridge, the county seat and main trading center, had a population of 3,718. Other smaller trade centers, where farm marketing facilities are available and small factories are located, are Hoxie, Sedgwick, Black Rock, and Imboden. Some of the manufacturing plants are located in an industrial area about 5 miles north of Walnut Ridge. Except for the small industries, sand-and-gravel dredging, and crushing limestone, most of the businesses provide farm services.

General Nature of the County

Information on the farming, physiography and drainage, and climate in Lawrence County is given on the pages that follow. Statistics on farming are from the 1969 Census of Agriculture.

A hilly area in the western part makes up about 40 percent of the county. Elevations range from about 250 feet where this area joins the Black River flood plain in the southern part of the county to about 780 feet near the Lawrence-Sharp county line about 4 miles south of the Spring River. About three-fourths of this hilly area is suitable for cultivation or improved pasture, but erosion is a moderate to very severe hazard and only a small acreage is cultivated. The rest is too steep or too stony for intensive use.

About 60 percent of the county is level and undulating lowlands. The lowland area extends from the flood plain of Black River eastward across the county. It includes areas of alluvial sediments, dunes of windblown sediments high in content of sands (*11*)[1], and flats of wind-blown sediments high in content of silt. Elevations in this area range from about 220 feet, where the Black River leaves the county, to about 275 feet atop natural levees near College City in the northern part of the county.

[1] Italic numbers in parentheses refer to Literature Cited, p. 76.

Farming

Farming in Lawrence County began on soils with good natural drainage on natural levees above the flood plains of the rivers and on the hills in the western part of the county. Cotton was the main cash crop. Unless too steep or too stony, most of the better drained soils were cleared for cotton production. The steep, stony, or wetter soils were left in woodland.

Farming is still the principal means of livelihood, but cropping systems have become more diversified. Since acreage allotments were placed on cotton, its importance has declined. As machinery has replaced livestock as a source of power, corn and other feed crops have also declined in importance within the bottom-land area.

In the hilly area, forage crops of pasture and hay have replaced cotton. Beef cattle, dairy cattle, swine, chickens, and timber now provide most of the farm income. Some livestock farmers grow truck crops for supplemental income.

Most of the soils in the bottom-land area contain moderate to high amounts of plant nutrients, and some are among the most productive soils in the county. A small acreage along the Black River and Cache River is subject to flooding in winter and spring, but this normally does not prevent growing or choice of warm-season crops. With the exception of a high, undulating, nearly continuous band of natural levees and dunes of windblown sediments high in content of sands that extends from north to south through the county, most of the soils in this area are level. Water drains away slowly or is ponded in the level part of the area, and surface drainage is the main limitation.

In the lowlands, flood control, improved drainage outlets, improved crop varieties, and other technology have induced rapid expansion of cropland to wetter areas and an equivalent reduction in woodland. With the exception of about 10,000 acres in the Shirey Bay-Rainey Brake game management area, most of the lowland has been cleared. On most farms the natural drainage has been improved for more reliable crop production.

On lowland farms, the main crops are soybeans, cotton, and rice. Grain sorghum and winter small grain are other important crops, and some farms produce truck crops. A few farms have herds of beef or dairy cattle. Fish farming and swine production are other enterprises on some predominantly row crop farms.

According to the U.S. Census of Agriculture, the acreages of principal crops and pasture in 1964 and 1969 were as follows:

Crop:	*1964*	*1969*
Soybeans (harvested for beans)	105,075	136,889
Cotton	18,481	17,336
Corn	5,274	1,281
Wheat	5,824	6,600
Grain sorghum	58	2,550
Other small grain (includes rice)	8,580	11,000
Hay	7,611	7,114
Pasture (all types)	56,524	55,390

Also according to the U.S. Census of Agriculture, the number of livestock in 1964 and 1969 was as follows:

Livestock:	*1964*	*1969*
All cattle and calves	14,511	13,059
Milk cows	650	274
Hogs and pigs	4,166	3,702
Chickens (3 months old or older)	39,685	20,354

According to the 1969 census, about 80 percent of the county was in farms. The rest consisted of wooded tracts, cities and builtup areas, and transportation facilities.

Farms in Lawrence County are decreasing in number and increasing in size. Between 1964 and 1969, the number of farms decreased from 1,213 to 1,063, but the average size increased from 243 acres to 282 acres.

Farms of less than 260 acres decreased from 851 in 1964 to 654 in 1969, and the number of farms in each size class decreased, except for farms of less than 10 acres. Farms of 260 acres or more increased from 362 in 1964 to 409 in 1969 and the number of farms in each size class increased, except for farms of 2,000 acres or more. The average size of individual farms in all size classes from 10 to 1,000 acres was about the same in 1969 as in 1964.

Of the farm operators in the county in 1969, 511 were full owners, 340 were part owners, and 212 were tenants. Of these operators, 527 held jobs off the farm and 315 worked off the farm 100 days or more.

Livestock in the county are generally of good grade. The number of livestock in the county has been decreasing for several years.

Farm-related industrial enterprises in the county are varied. They include cotton gins, compresses and warehouses, grain and soybean elevators and dryers, saw mills, limestone crushers, and farm equipment and supply companies.

On most farms, the family does most of the work and outside labor is hired during peak seasons. The larger farms are operated by laborers who are supervised by the owner, manager, or tenant. Tenants pay a fixed rent or percentage of the crop for use of the land. Most of the land is farmed by operators who have sufficient modern equipment to farm efficiently. Most farmers fertilize according to the needs of the crop, and many use chemicals for weed control.

Physiography and Drainage

The Black River is a graded stream with a well defined channel, flowing southward near the center of the county. It is intermittently navigable and used locally by sand and gravel barges. The flood plain of this river is the approximate boundary between the Ozark Highland to the west and the Southern Mississippi Valley Alluvium to the east. From the Ozark Highlands, the channels of the Spring River and Strawberry River meander across this flood plain before discharging into the Black River.

The Black, Spring, and Strawberry Rivers provide recreational facilities for fishing, boating, and waterfowl hunting. The Black River yields sand and gravel, fish, and mussel shells in commercial quantities. The many brakes, creeks, lakes, and sloughs in the flood plain also provide excellent fishing and hunting and are important sources of wood crops.

The flood plain along the Black River is generally flat except for a few undulating areas in the river bends. Slopes seldom exceed 1 percent except on the sides of low ridges and escarpments where they are as much as 3 percent. Local differences in elevations are minor, except where insular areas of materials, normally in deposits farther eastward, rise 10 to 20 feet above the flood plain.

The surface water drains from the area through artificial drains and the natural drains that follow the course of abandoned river channels. There is a good supply of ground water for irrigation.

The alluvial sediment on the Black River flood plain is 50 or more feet thick and becomes thicker eastward throughout the county (*8*). It is a mixture of minerals from throughout the Mississippi River Basin. It is derived from many kinds of soils, weathered rock materials, and unconsolidated sediments that came from more than 24 states. Amagon, Dundee, and Sharkey soils are the major soils that formed in these sediments on the Black River flood plain.

The foot slopes of the Ozark Highlands are long, undulating to gently rolling hills with rounded crests. Parts of the area are mantled by loess deposits that are thickest adjacent to the flood plain of the Black River. This material becomes thinner westward, or with gains in altitude, and merges with material weathered from cherty limestone, limestone, or sandstone country rock. The main soils in this area are Captina, Loring, and Portia soils.

The hillsides rise 50 to 100 feet from narrow bottom lands of intermittent streams to hillcrests. Slopes predominantly range from 3 to 12 percent except for a few steep limestone bluffs. Surface water collects in V-shaped draws that empty into intermittent streams. These streams discharge into the Spring River or Strawberry River or into the drainageways within the Black River flood plain. The discharge of some of the small streams is regulated by floodwater–retarding structures. Lake Charles, the largest body of water impounded by these structures, is used extensively for public recreational purposes. When needed, part of the impounded waters of some lakes is released through a diversion ditch into the Shirey Bay-Rainey Brake game management area, for the benefit of migratory waterfowl.

The Ozark Highland topography in the northwestern part of the county is characterized by deep hollows and high ridges. The broadest and highest of the ridges is the plateau divide between the Spring River and Strawberry River. Slope gradient on top of the divide ranges from 1 to 12 percent, and differences in local elevations are 10 to 50 feet. Most of this ridge is capped with silt deposits. Captina and Tonti are the main soils.

Away from the divide the ridges narrow and differences in local elevations are as much as 300 feet. Slopes on the

ridges predominantly range from 12 to 30 percent. Surface water falls as much as 500 feet before reaching the levels of the Spring and Strawberry Rivers by way of such streams as Cooper, Harding, Jeff, Machine, Stennitt, and Wells Creeks. Streams flowing through the uplands have steep gradients, particularly in their upper reaches, and runoff is rapid. Floodwaters rise and recede quickly on the flood plains along the creeks and rivers.

The country rock in this area is cherty limestone or limestone, in places interbedded with sandstone and siltstone (*3*). Soils in the area formed in material weathered from those rocks and locally perhaps from shale. Materials of highest chert content are mainly on the peaks and points of the higher ridges where Clarksville is the main soil. The Agnos, Boden, Gepp, and Ventris soils on hillsides and lower ridges formed in more easily weathered materials.

The alluvium in valleys of the Spring and Strawberry Rivers and the major tributaries came from Agnos, Boden, Gepp, Ventris, or other similar soils. The broader valleys are winding and, except for the flood plain, are alternating gentle slopes of alluvial material and steep slopes or limestone bluffs. The main soils on the flood plain are Healing and Hontas soils. Peridge soils formed in the older gently sloping alluvial deposits. Steeper soils along the valleys are mainly Gepp and Ventris soils. Rock outcrop is common along the valley walls.

Throughout the Ozark Highland, ground water is insufficient for large-scale irrigation. Domestic water supplies come mainly from dug wells, drilled wells, and ponds. Drilled wells furnish the most dependable supply of potable water. Most of the water is hard. Most wells in the area are less than 200 feet deep, but some are as much as 700 feet deep (*8*). Livestock water supplies are mainly from ponds and creeks.

Adjacent to the flood plains east of the Black River is an undulating natural levee dividing the flood plains from broad flats of older alluvium. This area extends throughout the county except where it is broken by drainageways. Except for a few low escarpments, slope gradient is less than 8 percent and local differences in elevation seldom exceed 15 feet. Surface water collects in low places and flows to the larger streams through a system of artificial channels, or the improved channels of natural drains that flow into the Black River or Village Creek. The main soils in this area of natural levees are Beulah, Bosket, Dubbs, Dundee, Patterson, and Tuckerman soils.

East of the high natural levee is a broad alluvial flat, and in places it is capped by windblown sediments high in content of silt. This area covers about a third of the county. The general slope is about 1 foot per mile in a southerly direction, but the predominantly level landscape is broken by old, abandoned river channels. Narrow escarpments 5 to 15 feet high mark the banks of these old channels. Calhoun, Crowley, Foley, Hillemann, Jackport, and Lafe soils are the main soils in this area.

Surface water drains from the area through a network of artificial drains and improved channels of natural drains that empty into the Cache River, Big Running Water Creek, and Village Creek, which follow the course of abandoned channels of large rivers. Unless improved, those channels are shallow and sluggish.

Throughout the alluvial areas there is a good supply of ground water. Adequately spaced wells of 12-inch diameter, drilled to a depth of 75 to 150 feet, yield about 2,000 gallons per minute of fair- to good-quality water for irrigation.

Climate

Lawrence County is in the northeast quadrant of Arkansas. Temperatures within the Ozark Highland average a few degrees cooler most of the year. The nearly treeless, predominantly cultivated plain provides little hindrance to windflow. Surface wind velocity may be somewhat greater than in the more rugged, wooded terrain.

The climate of Lawrence County, similar to all of Arkansas, is one of generally warm summers and mild winters, but the county can experience most types of continental weather. For more than half the year, the county is within storm tracks or is exposed to frontal varieties of weather.

Table 1 lists the average daily temperature and average monthly precipitation at Walnut Ridge, which is considered representative of the county.

Winter is the season of widest weather extremes. Winter storms and outbreaks of polar and even arctic weather are common, but these intense cold and snow fronts are of short duration. Considering the entire season, temperatures are mild and outdoor work can be done during much of the winter.

Spring is the season of the most abrupt and violent weather changes. Strong fronts are often accompanied by turbulent, even tornadic weather patterns, and high intensity rains are probable.

Summers are long and warm and frequently hot. High dewpoints and high humidity are brought inland from the Gulf of Mexico. Evaporation from the numerous streams, lakes, and flooded ricefields contributes to somewhat higher humidity in the lowland area. Relative humidity averages about 70 percent during the year. Uncomfortable warmth and humidity are likely from mid-May to mid-September, especially at the lower elevations.

In fall, days are warm and nights are cool. Fall is the driest season and commonly the most pleasant. Cold fronts and sharp drops in temperature occur late in October and in November, but are not usually characterized by significant turbulence as are those in spring.

Temperature extremes in Lawrence County reveal a wide range of weather conditions. Winter temperatures normally average above freezing. Minimum temperatures are consistently below freezing for the month of January. Nighttime temperatures are occasionally in the teens, and record

TABLE 1.—*Temperature and precipitation data*

[All data from Walnut Ridge for the period 1950–68]

Month	Average daily temperature	Average monthly precipitation
	°F	*Inches*
January	37.6	4.4
February	41.0	4.0
March	48.6	4.5
April	60.0	4.3
May	69.2	5.2
June	77.6	3.6
July	80.5	3.5
August	78.9	3.1
September	71.4	3.6
October	61.2	2.2
November	48.4	4.5
December	39.7	3.6
Year	59.5	46.5

extremes are below zero for the 3 winter months. In contrast, summers normally have 60 or more days with temperatures of 90° F. or higher, mainly in July and August. Summer temperatures can be expected to reach 100° or higher for a few days in some years, but such high temperatures are not expected every year. Minimum summer temperatures are usually in the 65° to 75° range. The average growing season is about 217 days. From late in May to early in September, only a few cold fronts reach the area, and rarely do they bring dry air masses into the county.

The precipitation, which averages a little more than 46 inches per year, is generally adequate for most crops. It is fairly evenly distributed throughout the year. March, April, and May are the wettest months, with a normal of about 13 inches of precipitation. August through October is the driest season, but even then about 9 inches of rainfall can be expected in a normal year. Warm frontal systems or those associated with wintery low pressure systems approaching from the southern plains or the Gulf of Mexico are the most reliable sources of moisture. A single storm can bring as much as 2 to 5 inches of precipitation. Snowfall averages about 4 to 6 inches per year and is a negligible source of moisture. Normally snow melts within a day or two. Frequently it melts within hours, and sometimes it melts as it falls. Sleet and freezing rain are infrequent, but can cause serious damage to evergreen trees and shrubs. Otherwise, ice is of little consequence except as it disrupts transportation and utility service.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Lawrence County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rock and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

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

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

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Agnos stony silt loam, 3 to 12 percent slopes, is one of several phases within the Agnos series.

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

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

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

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Foley-Calhoun complex, 0 to 1 percent slopes, is an example.

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

In most areas surveyed there are places where the soil material is so rocky, so shallow, so severely eroded, or so variable that it has not been classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Rock outcrop is an example.

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

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

soil material. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of soils for present and potential uses.

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

The boundaries of Lawrence County join those on the maps of the published soil surveys of Greene County and Jackson County. Soil names are commonly the same. Differences in soil names result from changes in the concept of soil classification that have occurred since publication.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in the survey area. A soil association is a landscape that has a distinctive pattern of soils in defined proportions. It typically consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association can occur in other associations, but in different patterns.

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

The soils in this survey have been grouped into five general kinds of landscapes for broad interpretative purposes. Each of the broad groups and the nine associations are described on the following pages.

Soils Formed in Residual Material on Uplands Characterized by Deep Hollows, Long Winding Hillcrests, and Ridges Within Dissected Hills

Associations 1 and 2 make up about 19 percent of the county. They are mainly in the higher parts of the Ozark Highlands in the northwestern part of the county. The well drained and moderately well drained soils have coarse fragments on and mixed in the loamy surface layer. The subsoil is clayey. The soils formed in material weathered from cherty limestone, limestone, siltstone, and shale.

These associations are used mainly for pasture, range, wildlife habitat, or woodland. Wooded areas are mainly cutover hardwoods.

1. Agnos-Gepp-Ventris association

Well drained and moderately well drained, gently sloping to moderately steep, deep and moderately deep, cherty and stony loamy soils

This association is in the extreme northwestern part of the county. It is on highly dissected, dominantly cherty limestone hills. It consists of narrow valleys and adjacent moderately steep to steep hillsides that have narrow, gently sloping to moderately sloping ridges. Agnos soils are on the ridges and upper parts of hillsides. Gepp soils are mainly on the hillsides. Ventris soils are on benches with Rock outcrop and are intermingled with Agnos and Gepp soils throughout the landscape.

This association makes up about 10 percent of the county. It is about 25 percent Agnos soils, 20 percent Gepp soils, 20 percent Ventris soils and Rock outcrop, and 35 percent Boden, Captina, Clarksville, Healing, and Tonti soils.

Agnos soils are well drained. The surface layer is brown cherty silt loam, and the subsurface layer is yellowish brown cherty silt loam. The upper part of the subsoil is yellowish brown clay; the next part is yellowish brown, mottled clay; and the lower part is mottled yellowish brown, light gray, and red clay. The underlying material is strong brown, mottled clay.

Gepp soils are well drained. The surface layer is dark grayish brown cherty silt loam, and the subsurface layer is brown cherty silt loam. The upper part of the subsoil is yellowish red cherty silty clay loam, the next part is red clay, and the lower part is red, mottled clay.

Ventris soils are moderately well drained. The surface layer is very dark grayish brown silty clay loam. The subsoil is light olive brown, mottled clay. Bedrock is at a depth of about 28 inches. Rock outcrop is intermingled with Ventris soils in this association.

This association is poorly suited to unsuited to cultivated crops. It is best suited to pasture, range, wildlife habitat, or woodland. Most areas are wooded. Agnos and Gepp soils are fairly well suited to wood crops, and in most areas support fair stands of oaks. In many areas Ventris soils support stands of eastern redcedar. Most farms are 40 to 800 acres in size and are operated by the owner. Beef-cattle production is the main enterprise. Pastures and the few farmsteads are along narrow creek bottom lands and adjacent foot slopes or on gently sloping or moderately sloping ridges. Many farmers have part-time jobs off the farm.

On most of this association, limitations are severe for residences, other buildings, highways, and other nonfarm uses because of the slope, coarse fragments in the surface layer, clayey subsoil, or depth to bedrock.

2. Boden-Agnos association

Well drained, gently sloping to moderately steep, deep, cherty, gravelly, and stony loamy soils

This association is near the center of the western part of the county where the Ozark Highlands fall toward the lowlands to the east. It is a gently sloping to moderately sloping area of hills and valleys, broken in a few spots by steeper hillsides near the larger streams. The soils are intermingled on the landscape, but Boden soils are dominant at the higher elevations.

This association makes up about 9 percent of the county. It is about 50 percent Boden soils, 20 percent Agnos soils, and

30 percent mainly Captina, Tonti, Portia, and Ventris soils and Rock outcrop.

Boden soils are well drained. The surface layer is brown gravelly sandy loam, and the subsurface layer is strong brown gravelly sandy loam. The upper part of the subsoil is yellowish red fine sandy loam; the next part is mottled red, yellowish red, and yellowish brown clay; and the lower part is red, yellowish brown, and light gray, mottled sandy clay. The underlying material is mottled red and yellowish brown sandy clay loam. Bedrock is at a depth of about 50 inches.

Agnos soils are well drained. The surface layer is brown cherty silt loam, and the subsurface layer is yellowish brown cherty silt loam. The upper part of the subsoil is yellowish brown clay; the next part is yellowish brown, mottled clay; and the lower part is mottled yellowish brown, light gray, and red clay. The underlying material is strong brown, mottled clay.

Most of this association is poorly suited to unsuited to cultivated crops. Some less sloping areas have been cleared and are used for pasture. Most of the area is woodland and has fair stands of oak trees. The farms are generally 40 to 400 acres in size and are operated by the owner. Beef-cattle production is the main enterprise. Many farmers have part-time jobs off the farm.

On most of this association, limitations are severe for residences, other buildings, highways, and other nonfarm uses because of the slope, coarse fragments in the surface layer, clayey subsoil, or depth to bedrock.

Soils Formed in Residual and Transported Material on Uplands Characterized by Low Hills, Valleys, Foot Slopes, and Broad Ridges

Association 3 makes up about 16 percent of the county. It is on the broader ridges and foot slopes of the Ozark Highlands. The moderately well drained and well drained loamy soils formed in material weathered from cherty limestone, siltstone, and sandstone bedrock and in loess deposits.

This association is used extensively for pasture. Most of the cattle farms in Lawrence County are on this association. Wooded areas are mainly cut-over hardwoods.

3. Captina-Portia-Loring association

Moderately well drained and well drained, nearly level to moderately sloping, deep loamy soils

This association is in the western part of the county adjacent to the Black River flood plain and along the divide between the Spring and Strawberry Rivers. It is on hillsides, rounded hillcrests, and valley sides. Generally, Captina soils are on the lower parts of hillsides and narrow valley sides, and Portia soils are on the upper parts of hillsides and the hillcrests. In the area where loess deposits are thickest, however, Loring soils are on the lower parts of hillsides and Captina soils are on upper parts and the hillcrests.

This association makes up about 16 percent of the county. It is about 40 percent Captina soils, 20 percent Portia soils, 10 percent Loring soils, and 30 percent mainly Boden, Hontas, Tonti, and Ventris soils and Rock outcrop.

Captina soils are moderately well drained. The surface layer is dark yellowish brown silt loam. The upper part of the subsoil is strong brown and yellowish brown silty clay loam. The lower part is a firm, brittle fragipan of mottled yellowish brown and strong brown silt loam and silty clay loam. Depth to the pan is about 22 inches.

Portia soils are well drained. The surface layer is brown fine sandy loam, and the subsurface layer is yellowish brown fine sandy loam. The upper part of the subsoil is strong brown fine sandy loam; the next part is strong brown and yellowish brown, mottled loam; and the lower part is red, mottled clay loam.

Loring soils are moderately well drained. The surface layer is dark yellowish brown silt loam. The upper part of the subsoil is strong brown and yellowish brown silt loam and silty clay loam. The lower part is a firm, brittle fragipan of strong brown and brown, mottled silty clay loam and silt loam. Depth to the pan is about 19 inches.

Most of this association is used for pasture and meadow. Such crops as grain sorghum, soybeans, winter small grain, and truck crops are suited and are grown in a few areas. Most farms are about 40 to 400 acres in size and are operated by the owner. Beef-cattle production is the main enterprise. Many farmers have part-time jobs off the farm.

Most of this association is suitable for residences. Limitations are slight to moderate for other buildings, highways, and other nonfarm uses. Limitations are severe for septic tank absorption fields because percolation is slow.

Soils Formed in Alluvial Sediments on Flood Plains Characterized by Stream Channels, Low Natural Levees, and Slack Water Areas

Associations 4 and 5 make up about 17 percent of the county. They are on flood plains of the Spring and Strawberry Rivers, their few small tributaries in the Ozark Highlands, and the Black River flood plain in the Southern Mississippi Valley Alluvium. These loamy and clayey soils formed in sediments deposited by these rivers or by larger rivers that once traversed this area.

These associations are used extensively for farming. The only large wooded tract is about 10,000 acres in the Shirey Bay-Rainey Brake game management area.

4. Healing-Hontas association

Well drained and moderately well drained, level, deep loamy soils on bottom land

This association is in the western part of the county along the Spring and Strawberry Rivers and their tributaries. It forms a long, narrow belt along the flood plain of these streams. Healing soils are generally near the streambed, and Hontas soils are generally near the hillsides or near the mouth of the streams.

This association makes up about 4 percent of the county. It is about 50 percent Healing soils, 30 percent Hontas soils, and 20 percent mainly Peridge soils and areas of water.

Healing soils are well drained. The surface layer is dark brown silt loam, and the subsurface layer is very dark grayish brown silt loam. The subsoil is brown silty clay loam.

Hontas soils are moderately well drained. The surface layer is brown silt loam. The subsoil is brown, mottled silt loam. The underlying material is grayish brown and gray, mottled silt loam and silty clay loam.

Most of this association is generally not suitable for cultivation because of frequent flooding. Most areas have been cleared and are used for pasture and other forage crops. Soils in this association are some of the most fertile in the county and produce abundant amounts of forage. Most farms are 40 to 400 acres in size, but few are entirely within

the association. Beef-cattle production is the main enterprise. Most farms are operated by the owner, many of which hold part-time jobs off the farm.

On most of this association, limitations are severe for residences, other buildings, highways, and other nonfarm uses because of flooding.

5. *Amagon-Dundee-Sharkey association*

Poorly drained and somewhat poorly drained, level and gently undulating, deep loamy and clayey soils on low natural levees

This association is near the center of the county along the flood plain of the Black River. Most of the area is level, and the rest is undulating. Generally, Dundee soils are adjacent to abandoned river channels, and Amagon soils are in flat areas more distant from the drainageways. Sharkey soils are in lower-lying, slack water areas.

This association makes up about 13 percent of the county. It is about 40 percent Amagon soils, 15 percent Dundee soils, 15 percent Sharkey soils, and 30 percent mainly Dubbs, Foley, and Hontas soils and areas of water.

Amagon soils are poorly drained. The surface layer is dark grayish brown silt loam, and the underlying layer is gray, mottled silt loam. The upper part of the subsoil is light brownish gray, mottled silt loam; the next part is light brownish gray, mottled silty clay loam; and the lower part is grayish brown, mottled loam. The underlying material is grayish brown, stratified silt loam and fine sandy loam.

Dundee soils are somewhat poorly drained. The surface layer is brown silt loam. The upper part of the subsoil is grayish brown, mottled silt loam; the next part is light brownish gray, mottled silt loam; and the lower part is light brownish gray, mottled fine sandy loam. The underlying material is gray, mottled silty clay loam.

Sharkey soils are poorly drained. The surface layer is dark grayish brown and dark gray, mottled silty clay. The upper part of the subsoil is gray, mottled clay; and the lower part is dark gray, mottled clay. The underlying material is dark gray, mottled silty clay.

Most of this association is suitable for cultivation. The main crops are soybeans and grain sorghum, but cotton and rice are also grown. Some areas are flooded occasionally, but floods are rare between June and January. Soils in this association need surface drainage for efficient management. Except for small patches of hardwood trees, most of the acreage under private ownership is cultivated. About 10,527 acres of this association is in a state-owned game management area that is dominantly woodland and areas of water. Most farms are about 80 to 800 acres in size, and about 80 percent are operated by tenants who dwell elsewhere.

Because of flooding during the winter and low bearing strength, limitations are severe for residences, other buildings, highways, and other nonfarm uses.

Soils Formed in Sediments on High Natural Levees Characterized by General Undulating Topography

Associations 6 and 7 make up about 16 percent of the county. They are on the high natural levee east of the Black River flood plain and small, scattered insular areas in the eastern part of the county; all of which are within the Southern Mississippi Valley Alluvium. These loamy soils formed in sediments deposited by the Mississippi River or its tributaries, during the period it flowed west of Crowley Ridge (*6*). Some of the sediments have been reworked by wind.

Almost all of this association is used for cultivated crops. Cotton is the main crop.

6. *Bosket-Beulah association*

Well drained and somewhat excessively drained, level and undulating loamy soils

This association borders the east side of the Black River flood plain. It consists of ridges and swales and intermingled level areas. Beulah soils are generally slightly higher than the adjacent Bosket soils.

This association makes up about 7 percent of the county. It is about 40 percent Bosket soils, 35 percent Beulah soils, and 25 percent mainly Dubbs, McCrory, Patterson, and Tuckerman soils.

Bosket soils are well drained. The surface layer is dark brown fine sandy loam, and the subsurface layer is brown fine sandy loam. The subsoil is brown loam and fine sandy loam. The underlying material is yellowish brown loamy sand.

Beulah soils are somewhat excessively drained. The surface layer is brown sandy loam. The subsoil is brown and yellowish brown fine sandy loam. The underlying material is yellowish brown loamy sand.

This association is generally well suited to cultivated crops, and a wide variety of crops can be grown. The main crops are cotton, soybeans, and winter small grain. Grain sorghum, peanuts, and watermelons are also grown. Other truck crops grown in the county are suited. Erosion is a hazard in the steeper parts of undulations. Most farms are 80 to 400 acres in size, and about half are operated by the owners.

Many farmsteads and dwellings are on this association. The association is suitable for residences. Limitations are slight to moderate for other buildings and for highways and other nonfarm uses.

7. *Dundee-Dubbs association*

Somewhat poorly drained and well drained, level and undulating loamy soils on older natural levees

This association is in the mideastern part of the county along abandoned river channels and the larger creeks and in small insular areas. It is an area of ridges and swales and intermingled level tracts. Generally, Dubbs soils are nearer the drainageways and on the tops and sides of ridges. Dundee soils are in lower-lying areas more distant from the drainageways.

The association makes up about 9 percent of the county. It is about 30 percent Dundee soils, 25 percent Dubbs soils, and 45 percent mainly Amagon, Bosket, Crowley, Hillemann, and Patterson soils and areas of water.

Dundee soils are somewhat poorly drained. The surface layer is brown silt loam. The upper part of the subsoil is grayish brown, mottled silt loam; the next part is light brownish gray, mottled silt loam; and the lower part is light brownish gray, mottled fine sandy loam. The underlying material is gray, mottled silty clay loam.

Dubbs soils are well drained. The surface layer is brown silt loam. The upper part of the subsoil is brown silt loam; the next part is brown silty clay loam; and the lower part is brown, mottled silt loam. The underlying material is light brownish gray, mottled very fine sandy loam.

This association is generally well suited to cultivated crops. The main crops are soybeans, grain sorghum, and cotton. Winter small grain and rice are also grown. Dundee soils need surface drainage for efficient management, and Dubbs soils are erodible on the steeper parts of the undulations. Most farms are 40 to 600 acres in size, and about 50 percent are operated by the owners.

Farmsteads and dwellings are scattered, but are mainly at the higher elevations. Limitations are moderate to severe on Dundee soils and slight to moderate on Dubbs soils for residences and other buildings, highways, and other nonfarm uses. Limitations are severe on Dundee soils for septic tank absorption fields because of the seasonal high water table and slow percolation rate.

Soils Formed in Eolian and Alluvial Sediments on Flood Plains, Natural Levees, and Slack Water Areas Characterized by Broad Flats and Low Terraces

Associations 8 and 9 make up about 32 percent of the county. They are on the flood plain along the Cache River and on higher natural levees along abandoned river channels and their back swamps and deposits. The soils are within the Southern Mississippi Valley Alluvium. They are poorly drained loamy and clayey soils that formed in sediments of the Mississippi River and its local tributaries or such sediments capped by windblown sediments high in content of silt. Natural drainageways are few. Surface water stands for long periods or is removed through improved drains.

This association is used extensively for cultivated crops, mainly rice, soybeans, and grain sorghum. Wooded tracts are few.

8. Jackport-Crowley association

Poorly drained, level, deep clayey and loamy soils having a clayey subsoil

This association is mainly in the eastern part of the county, but two small areas adjoin the Ozark Highlands west of the Black River. The association is on broad flats of high, abandoned, old clayey back swamps that have been partly mantled with a thin layer of silty sediments. Crowley soils are generally at slightly higher elevations than Jackport soils.

This association makes up about 16 percent of the county. It is about 55 percent Jackport soils, 35 percent Crowley soils, and 10 percent Calhoun, Foley, Hillemann, and Sharkey soils, and areas of water.

Jackport soils are poorly drained. They have a surface layer of dark grayish brown silty clay, and a subsurface layer of dark grayish brown, mottled silty clay. The upper part of the subsoil is dark grayish brown silty clay; the next part is grayish brown, mottled clay; and the lower part is grayish brown clay. The underlying material is olive gray silty clay, silty clay loam, and fine sandy loam that is mottled in the lower part.

Crowley soils also are poorly drained. They have a surface layer of dark grayish brown silt loam, and a subsurface layer of light brownish gray, mottled silt loam. The upper part of the subsoil is grayish brown, mottled silty clay; and the lower part is olive gray, mottled silty clay loam.

This association is suited to farming, and most of the acreage is cultivated. The main crops are rice and soybeans. Grain sorghum, cotton, and winter small grain are other important crops. The soils need surface drainage for efficient management. Farms are about 80 to 1,600 acres in size, and about 80 percent are operated by the owner.

Few dwellings are on this association. Because of the wetness, seasonal high water table, low bearing strength, and slow percolation rate, limitations are severe for residences and other buildings, highways, and other nonfarm uses.

9. Foley-Calhoun-McCrory association

Poorly drained, level, deep loamy soils having a high content of sodium and magnesium in the lower part of the subsoil

This association is in the eastern part of the county. It is on broad flats and low terraces along slowly flowing streams. Foley and Calhoun soils are complexly intermingled on the broad flats at slightly higher elevations. McCrory soils are somewhat intermingled with Foley soils on low terraces near Big Running Water Creek and Cache River. All are poorly drained.

This association makes up about 16 percent of the county. It is about 30 percent Foley soils, 20 percent Calhoun soils, 15 percent McCrory soils, and 35 percent mainly Crowley, Jackport, Lafe, Patterson, and Tuckerman soils, and areas of water.

Foley soils have a surface layer of dark grayish brown silt loam, and a subsurface layer of grayish brown, mottled silt loam. The upper part of the subsoil is grayish brown silt loam; the next part is olive gray silty clay loam; and the lower part is olive gray, mottled silt loam.

Calhoun soils have a surface layer of dark grayish brown silt loam, and a subsurface layer of gray, mottled silt loam. The upper part of the subsoil is gray, mottled silt loam; the next part is grayish brown silty clay loam; and the lower part is grayish brown, mottled silty clay loam. The underlying material is gray, mottled silt loam.

McCrory soils have a surface layer of dark grayish brown fine sandy loam, and a subsurface layer of gray, mottled fine sandy loam. The upper part of the subsoil is dark gray, mottled fine sandy loam; the next part is dark gray loam; and the lower part is dark gray, mottled fine sandy loam. The underlying material is grayish brown loamy fine sand.

This association is suited to farming, and most of the acreage is cultivated. The main crops are soybeans and grain sorghum. Rice, cotton, and winter small grain are also grown. The soils need surface drainage for efficient management. Most farms are 120 to 800 acres in size, and about 60 percent are operated by the owner.

Although some farmsteads and dwellings are on the association, limitations are severe for residences and other buildings, highways, and other nonfarm uses because of the wetness, low bearing strength, seasonal high water table, and slow percolation rate.

Descriptions of the Soils

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

tion of the mapping unit and the description of the soil series to which it belongs.

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

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Rock outcrop, for example, does not belong to a soil series, but nevertheless is listed in alphabetic order along with the soil series.

Each mapping unit is identified by a soil symbol. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit, the range site, the woodland group, and the pasture and hayland group to which the mapping unit has been assigned. The range sites are described on pages 50 and 51; the pasture and hayland groups are described on page 40.

The acreage and proportionate extent of each mapping unit are shown in table 2. Many of the terms used in describing soils can be found in the Glossary at the end of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*13*).

Agnos Series

The Agnos series consists of well drained, gently sloping to steep soils on the tops and sides of ridges in the uplands. These soils formed in a thin layer of cherty loamy material and the underlying clayey material weathered from siltstone, cherty limestone, and shale. The native vegetation is hardwoods.

In a representative profile the surface layer is brown cherty silt loam about 4 inches thick. The subsurface layer is 4 inches of yellowish brown cherty silt loam. The upper 13 inches of the subsoil is yellowish brown clay; the next 15 inches is yellowish brown, mottled clay; and the lower part, which extends to a depth of about 50 inches, is about equally mottled yellowish brown, light gray, and red clay. The underlying material is strong brown, mottled clay to a depth of 72 inches or more.

Agnos soils are low in natural fertility. The surface layer is thin, and root penetration into the clayey subsoil is slow. Permeability is very slow, and the available water capacity is high. The response to fertilization is moderate.

Agnos soils are generally not suited to cultivated crops. They are best suited to pasture, range, wildlife habitat, and woodland. Most of the acreage is woodland. A small part has been cleared.

Representative profile of Agnos cherty silt loam, 3 to 8 percent slopes, in a moist wooded area in NE¼NW¼NW¼ sec. 5, T. 17 N., R. 3 W.

O1—½ inch to 0; leafy organic debris.
A1—0 to 4 inches; brown (10YR 4/3) cherty silt loam; weak fine granular structure; very friable; common fine roots; common worm holes and castings; about 15 percent, by volume, chert fragments ¼ inch to 3 inches in diameter; strongly acid; clear smooth boundary.
A2—4 to 8 inches; yellowish brown (10YR 5/4) cherty silt loam; few fine distinct strong brown mottles; weak fine subangular blocky structure; friable; common fine roots; few

TABLE 2.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent	Soil	Area	Extent
	Acres	*Percent*		*Acres*	*Percent*
Agnos cherty silt loam, 3 to 8 percent slopes	2,855	0.8	Foley-Calhoun complex, 0 to 1 percent slopes	40,814	10.8
Agnos cherty silt loam, 8 to 12 percent slopes	8,259	2.2	Gepp cherty silt loam, 8 to 12 percent slopes	5,375	1.4
Agnos stony silt loam, 3 to 12 percent slopes	3,066	.8	Gepp cherty silt loam, 12 to 20 percent slopes	4,419	1.2
Agnos soils, 12 to 25 percent slopes	7,685	2.0	Healing silt loam, frequently flooded	11,297	3.0
Amagon silt loam	21,340	5.7	Hillemann silt loam	6,588	1.7
Beulah sandy loam, undulating	10,271	2.7	Hontas soils, frequently flooded	12,606	3.3
Boden gravelly sandy loam, 3 to 8 percent slopes	7,182	1.9	Jackport silty clay	36,401	9.6
Boden gravelly sandy loam, 8 to 12 percent slopes	14,122	3.7	Lafe-Foley complex, 0 to 1 percent slopes	2,846	.8
Boden gravelly sandy loam, 12 to 20 percent slopes	1,196	.3	Loring silt loam, 3 to 8 percent slopes, eroded	3,310	.9
Bosket fine sandy loam, 0 to 1 percent slopes	779	.2	Loring silt loam, 8 to 12 percent slopes, eroded	3,418	.9
Bosket fine sandy loam, undulating	10,130	2.7	McCrory fine sandy loam	9,029	2.4
Captina silt loam, 1 to 3 percent slopes	1,804	.5	Patterson fine sandy loam	3,932	1.0
Captina silt loam, 3 to 8 percent slopes	20,118	5.3	Peridge silt loam, 3 to 8 percent slopes, eroded	4,652	1.2
Captina silt loam, 8 to 12 percent slopes	5,083	1.4	Portia fine sandy loam, 3 to 8 percent slopes	7,883	2.1
Clarksville cherty silt loam, 8 to 12 percent slopes	1,134	.3	Portia fine sandy loam, 8 to 12 percent slopes	6,794	1.8
Clarksville cherty silt loam, 12 to 20 percent slopes	5,622	1.5	Sharkey silty clay	10,106	2.7
Crowley silt loam, 0 to 1 percent slopes	29,758	7.9	Tonti cherty silt loam, 3 to 8 percent slopes	2,614	.7
Dubbs silt loam, 0 to 1 percent slopes	1,943	.5	Tonti cherty silt loam, 8 to 12 percent slopes	2,355	.6
Dubbs silt loam, 1 to 3 percent slopes	11,599	3.1	Tuckerman fine sandy loam	5,991	1.6
Dundee silt loam, 0 to 1 percent slopes	9,898	2.6	Ventris-Rock outcrop complex, 3 to 12 percent slopes	9,342	2.4
Dundee silt loam, gently undulating	9,607	2.6	Ventris-Rock outcrop complex, 12 to 30 percent slopes	960	.3
			Water	3,353	.9
			Total	377,536	100.0

worm holes and castings; about 15 percent, by volume, chert fragments ¼ inch to 3 inches in diameter; strongly acid; gradual wavy boundary.

B21t—8 to 21 inches; yellowish brown (10YR 5/6) clay; moderate medium subangular blocky structure; firm; continuous clay films on faces of peds and in pores; few medium and fine roots; few pores; few chert fragments; extremely acid; clear wavy boundary.

B22t—21 to 36 inches; yellowish brown (10YR 5/8) clay; common medium prominent yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure parting to weak fine angular blocky; firm; continuous clay films on faces of peds; few medium roots; few chert fragments; very strongly acid; gradual wavy boundary.

B3—36 to 50 inches; about equally mottled yellowish brown (10YR 5/8) light gray (10YR 7/2) and red (10R 4/8) clay; weak medium subangular blocky structure; firm; patchy clay films lining root channels and in vertical crevices; few medium roots; few chert fragments; very strongly acid; gradual wavy boundary.

C—50 to 72 inches; strong brown (7.5YR 5/8) clay; common medium distinct yellowish red (5YR 4/8) mottles; massive; very firm; very strongly acid.

The A1 horizon is very dark grayish brown, dark brown, or brown. The A2 horizon ranges from pale brown to brown. In places there is a 3- to 5-inch Ap horizon that is brown or dark yellowish brown cherty silt loam. Stones are on and in the A horizon in places. Chert content of the A horizon ranges from 15 to 25 percent by volume. The B horizon is at a depth of 6 to 12 inches. The B22t horizon is strong brown or yellowish brown clay or silty clay. The B3 horizon, which is lacking in places, is clay or silty clay and is mottled in shades of brown, gray, red, and yellow. The C horizon is at a depth of 30 to 60 inches.

The A horizon is medium acid or strongly acid. The B horizon is strongly acid to extremely acid.

Agnos soils are associated with Boden, Clarksville, Gepp, and Ventris soils. They have less sand throughout the A and B horizons than Boden soils and have fewer chert fragments and more clay in the B horizon than Clarksville soils. They have a thinner B2t horizon than Gepp soils. They have more chert fragments on the surface and are deeper over bedrock than Ventris soils.

AcC—Agnos cherty silt loam, 3 to 8 percent slopes. This gently sloping soil is on hillcrests and adjacent hillsides. Areas range from 20 to 100 acres in size. This soil has the profile described as representative of the series. Included in mapping are spots of Boden and Gepp soils and a soil that is similar to this Agnos soil but is only 36 to 48 inches deep over bedrock.

This soil is poorly suited to farming. It is difficult to till because the surface layer is cherty. Runoff is rapid, and the erosion hazard is very severe. If management is good and terraces and contour cultivation are used, sown crops that leave large amounts of residue can be safely grown year after year in the less sloping areas. More intensive management is needed as slope increases.

This soil is best suited to winter small grain. It is better suited to pasture, range, woodland, and wildlife habitat than to farming.

Most of the acreage is used for woodland but a few areas have been cleared and are used for pasture and range. Bahiagrass, bermudagrass, tall fescue, annual lespedeza, and sericea lespedeza are among the suitable pasture plants. Capability unit IVe-4; pasture and hayland group 8C; woodland group 4o7; range site Clay Break Limestone.

AcD—Agnos cherty silt loam, 8 to 12 percent slopes. This moderately sloping soil is on hillcrests and hillsides. Areas range from 20 to 200 acres in size. Included in mapping are spots of Boden, Gepp, and Ventris soils, and a soil that is similar to this Agnos soil but is only 38 to 48 inches deep over bedrock.

This soil is generally unsuitable for cultivation. It is best suited to woodland, wildlife habitat, range, or pasture. Runoff is rapid, and the erosion hazard is severe.

Most of the acreage is used for woodland. Only a few small tracts have been cleared and are used for pasture or range. Suitable pasture plants are bahiagrass, bermudagrass, tall fescue, annual lespedeza, and sericea lespedeza. Capability unit VIe-1; pasture and hayland group 8C; woodland group 4o7; range site Clay Break Limestone.

AgD—Agnos stony silt loam, 3 to 12 percent slopes. This gently sloping and moderately sloping soil is on hillcrests and hillsides. Areas range from 20 to 200 acres in size. The profile of this soil is similar to the one described as representative of the series, but the surface layer is stony. Angular chert fragments 6 to 36 inches in diameter are at intervals of 3 to 25 feet on the surface. Included in mapping were spots of Boden and Gepp soils and a soil that is similar to this Agnos soil but is only 36 to 48 inches deep over bedrock.

This soil is generally not suitable for cultivation. The surface stones restrict the use of farm equipment and make pasture management difficult. Runoff is rapid, and the erosion hazard is severe. The soil is best suited to woodland, wildlife habitat, or range.

Most of the acreage of this soil is woodland. A few small areas have been cleared and are used for range and pasture. Bahiagrass, bermudagrass, tall fescue, annual lespedeza, and sericea lespedeza are among the suitable pasture plants. Capability unit VIs-2; pasture and hayland group 8C; woodland group 4x8; range site Clay Break Limestone.

AnE—Agnos soils, 12 to 25 percent slopes. This moderately steep mapping unit is on sharp ridges and adjacent hillsides. It consists of Agnos soil; soils that are similar to the Agnos soil but have a thin, yellowish-red layer in the subsoil; and soils that are 50 to 60 inches deep over limestone and are less acid than the Agnos soil in the layer immediately above the limestone. The profile of the Agnos soil is similar to the one described as representative of the series, but the surface soil is stony. Angular chert fragments 6 to 36 inches in diameter are at intervals of 3 to 20 feet on the surface. Areas range from 20 to more than 400 acres in size. Included in mapping are a few spots of Boden, Clarksville, Gepp, and Ventris soils and soils similar to Agnos soils.

This mapping unit is not suited to cultivated crops and is poorly suited to pasture. The stones and slope severely restrict the use of farm equipment. Runoff is rapid, and the erosion hazard is very severe. The unit is best suited to woodland, wildlife habitat, and range.

Most of the acreage of this mapping unit is used for woodland. Bahiagrass, bermudagrass, tall fescue, annual lespedeza, and sericea lespedeza are suitable pasture plants. Capability unit VIIs-2; pasture and hayland group 8D; woodland group 4x8; range site Clay Break Limestone.

Amagon Series

The Amagon series consists of poorly drained, level soils on the lower parts of natural levees. These soils formed in beds of loamy alluvial sediments. The native vegetation is hardwood (fig. 1) forest, mainly water-tolerant oak.

In a representative profile the surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is gray, mottled silt loam 3 inches thick. The upper 11 inches of the subsoil is light brownish gray, mottled silt loam; the next 19 inches is light brownish gray, mottled silty clay loam; and the lower 10 inches is grayish brown, mottled loam. The

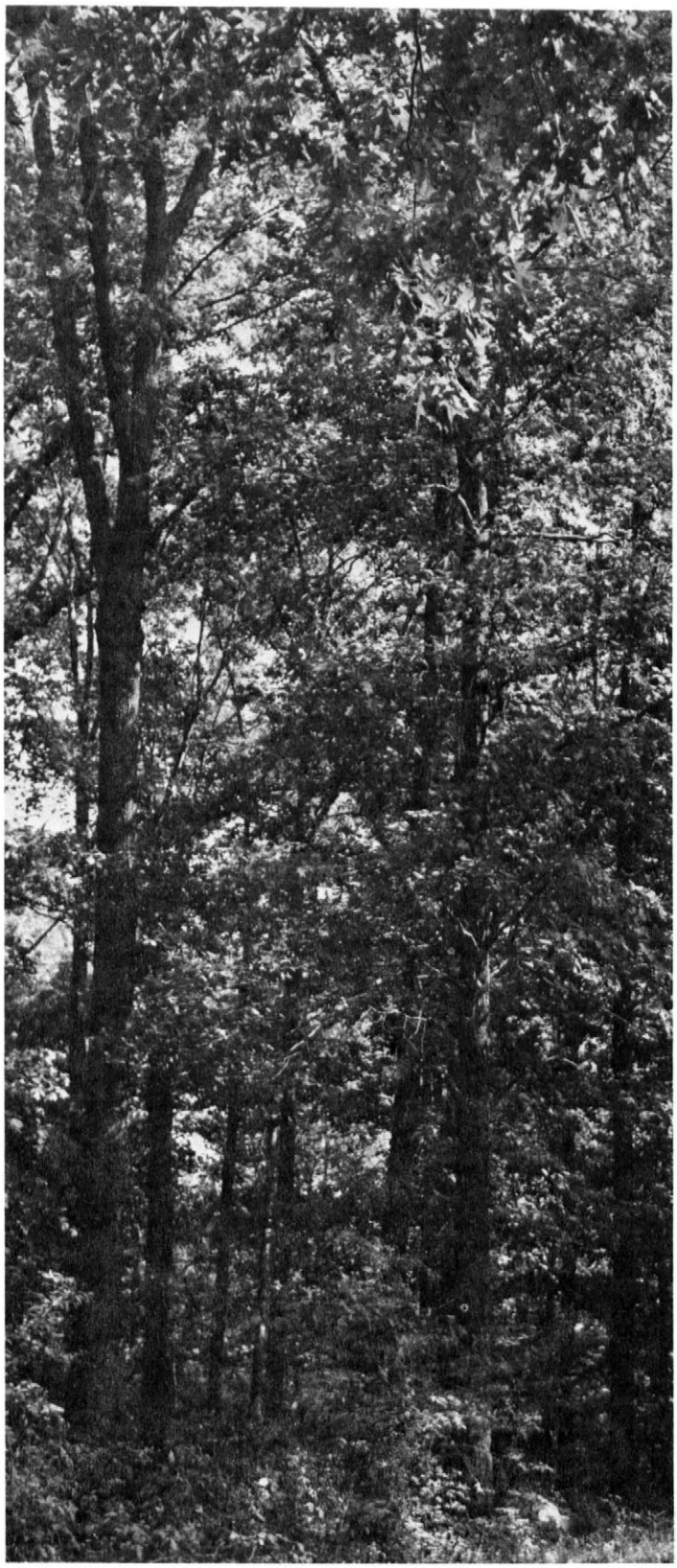

Figure 1.—**Excellent stand of bottom land hardwoods on Amagon silt loam.**

underlying material is grayish brown, stratified silt loam and fine sandy loam to a depth of 72 inches or more.

Amagon soils are moderate to high in natural fertility. Permeability is slow, and the available water capacity is high. The soils respond well to fertilization. They are easy to till, but the surface puddles and crusts over after rain.

If drained and well managed, these soils are suited to most crops grown in the county. Most of the acreage is cultivated.

Representative profile of Amagon silt loam in a moist cultivated area in SE¼SW¼SE¼ sec. 36, T. 16 N., R. 2 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; friable; common fine roots; common dark concretions; medium acid; abrupt smooth boundary.

A2g—7 to 10 inches; gray (10YR 6/1) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles and common fine distinct brown mottles; weak medium subangular blocky structure; very friable; few fine roots; few pores; few dark concretions; strongly acid; clear smooth boundary.

B1g—10 to 21 inches; light brownish gray (10YR 6/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; gray silt coatings on some peds; few fine roots; common pores; few dark concretions; very strongly acid; clear smooth boundary.

B2tg—21 to 40 inches; light brownish gray (10YR 6/2) silty clay loam; common fine faint gray and grayish brown mottles and common medium distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; firm; continuous distinct clay films on faces of peds; few fine roots; few pores; common dark concretions and accretions; very strongly acid; clear smooth boundary.

B3g—40 to 50 inches; grayish brown (10YR 5/2) loam; common medium and coarse dark yellowish brown (10YR 4/4) and strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm; thin patchy clay films; few root channels; few pores; common dark brown accretions; medium acid; gradual smooth boundary.

C—50 to 72 inches; grayish brown (10YR 5/2) silt loam stratified with a few lenses of fine sandy loam; common medium and coarse dark yellowish brown (10YR 4/4) mottles and stains; single grained; very friable; common dark brown accretions; neutral.

The Ap horizon is dark grayish brown or grayish brown. The A2g horizon is gray or light brownish gray, and in places it is mixed with the Ap horizon. In places the B1 horizon is lacking. The B2t horizon is gray or light brownish gray silt loam or silty clay loam. The B3 horizon is gray to dark grayish brown silt loam, loam, or silty clay loam. The C horizon is gray or grayish brown fine sandy loam to silty clay.

The A horizon and B2 horizon are medium acid to very strongly acid in unlimed areas. The B3 horizon and C horizon are medium acid to neutral.

Amagon soils are associated with Dubbs, Dundee, and Sharkey soils. In contrast with those soils, they have a gray A2g horizon. They are grayer in the upper part of the B horizon than Dubbs and Dundee soils. They have less clay in the A and B horizons than Sharkey soils.

Ao—Amagon silt loam. This level soil is on low parts of natural levees. Areas range from 20 to 400 acres in size. Included in mapping are a few spots of Dubbs, Dundee, and Sharkey soils and a few small tracts that are occasionally flooded.

This soil is suited to farming, but runoff is slow and excess water is a severe hazard. Fieldwork is delayed several days after a rain unless surface drains are installed. If management is good and drainage is adequate, crops that leave large amounts of residue can be safely grown year after year.

Soybeans is the main crop. Grain sorghum, cotton, and rice are other suitable crops. Winter small grain can be grown where surface drainage is adequate. Bermudagrass

tall fescue, and white clover are among the suitable pasture plants. Capability unit IIIw-1; pasture and hayland group 2B; woodland group 1w6; not in a range site.

Beulah Series

The Beulah series consists of somewhat excessively drained, undulating soils on the higher parts of older natural levees and on dunes of windblown sediments high in content of sand along creeks and abandoned river channels. These soils formed in stratified loamy and sandy sediments. The native vegetation is hardwoods and an understory of vines and canes.

In a representative profile the surface layer is brown sandy loam about 10 inches thick. The subsoil is brown and yellowish brown fine sandy loam 26 inches thick. The underlying material is yellowish brown loamy sand to a depth of 72 inches or more.

Beulah soils are moderate in natural fertility. Permeability is moderately rapid, and the available water capacity is medium to low. The soils respond well to fertilization. They are easy to till and can be cultivated within a wide range of moisture content. In places a plowpan has formed. This pan restricts root penetration and movement of water through the soil. The soils warm early in spring and can be planted early.

These soils are suited to most crops grown in the county. Most of the acreage is cultivated.

Representative profile of Beulah sandy loam, undulating, in a moist cultivated area in SE¼SW¼SE¼ sec. 30, T. 17 N., R. 1 E.

Ap—0 to 10 inches; brown (10YR 4/3) sandy loam; weak fine granular structure; very friable; common fine roots; medium acid; clear wavy boundary.

B21—10 to 26 inches; brown (7.5YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; few pores; strongly acid; clear smooth boundary.

B22—26 to 36 inches; yellowish brown (10YR 5/4) fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; few pores; very strongly acid; clear wavy boundary.

C—36 to 72 inches; yellowish brown (10YR 5/4) loamy sand; single grained; very friable; very strongly acid.

The B22 horizon is brown or yellowish brown. The soils range from medium acid to very strongly acid in unlimed areas.

Beulah soils are associated with Bosket, Dubbs, and Patterson soils. They have more sand in the B horizon than Bosket and Dubbs soils. They are browner throughout than Patterson soils.

BeB—Beulah sandy loam, undulating. This undulating soil is in alternating areas of long, narrow swales and wide ridges 2 to 10 feet above the swales. Slopes range from 0 to 8 percent. Areas range from 20 to 300 acres in size. Included in mapping are a few narrow escarpments and spots of Bosket, Dubbs, and Patterson soils.

This soil is suited to farming. The erosion hazard is moderate in the steeper areas. If the soil is bare in spring, the soil blowing hazard is moderate. Because the available water capacity is medium to low, droughtiness is a moderate limitation. If management is good, crops that leave large amounts of residue can be safely grown year after year.

Cotton and soybeans are the main crops. Grain sorghum, peanuts (fig. 2), corn, and winter small grain are other suitable crops. Okra, green beans, potatoes, sweet corn, tomatoes, and melons (fig. 3) are suitable truck crops. Bermudagrass and bahiagrass are suitable pasture plants. Capability unit IIs-1; pasture and hayland group 2A; woodland group 2o4; not in a range site.

Boden Series

The Boden series consists of well drained, gently sloping to moderately steep soils on hilltops and hillsides in the uplands. These soils formed in a thin layer of gravelly loamy material and the underlying clayey material weathered from shale, siltstone, and sandstone. The native vegetation is hardwoods.

In a representative profile the surface layer is brown gravelly sandy loam about 5 inches thick. The subsurface layer is strong brown gravelly sandy loam 2 inches thick. The upper 4 inches of the subsoil is yellowish red fine sandy loam; the next 12 inches is red clay; the next 9 inches is mottled red, yellowish red, and yellowish brown clay; and the lower 10 inches is red and yellowish brown sandy clay. The underlying material is mottled red and yellowish brown sandy clay loam that has streaks of light gray and yellowish brown. It is 8 inches thick. Bedrock is at a depth of 50 inches.

Boden soils are low in natural fertility. Permeability is moderately slow, and the available water capacity is medium. The soils respond well to fertilization. Because the surface layer is gravelly, it is somewhat difficult to till.

If erosion control is adequate, some areas are suitable for cultivation. Some are too steep and gravelly for cultivated crops and are used mainly for pasture, range, wildlife habitat, and woodland.

Representative profile of Boden gravelly sandy loam, 8 to 12 percent slopes, in a moist wooded area in NE¼NW¼NW¼ sec. 5, T. 15 N., R. 3 W.

O1—½ inch to 0; partly decomposed plant material.

A1—0 to 5 inches; brown (10YR 4/3) gravelly sandy loam that has flecks of yellowish brown (10YR 5/4); weak medium and fine subangular blocky structure; very friable; common fine roots; common wormholes; very strongly acid; clear wavy boundary.

A2—5 to 7 inches; strong brown (7.5YR 5/6) gravelly sandy loam; weak medium subangular blocky structure; very friable; common medium and fine roots; few pores; few wormholes and castings; strongly acid; clear wavy boundary.

B1—7 to 11 inches; yellowish red (5YR 5/8) fine sandy loam; weak medium subangular blocky structure; friable; common medium and fine roots; few pores; 5 percent gravel as much as 1 inch in diameter; strongly acid; clear wavy boundary.

B21t—11 to 23 inches; red (2.5YR 5/8) clay; moderate and strong medium angular blocky structure; firm; continuous distinct clay films on faces of peds; few medium and fine roots; few pores; few gravel as much as 1 inch in diameter; very strongly acid; clear wavy boundary.

B22t—23 to 32 inches; mottled yellowish red (5YR 5/8), red (2.5YR 4/8), and yellowish brown (10YR 5/8) clay; moderate medium angular and subangular blocky structure; firm; continuous distinct clay films on faces of peds; few fine and medium roots; few pores; about 5 percent partly decomposed sandstone fragments as much as ½ inch to 3 inches in diameter; very strongly acid; gradual wavy boundary.

B3t—32 to 42 inches; red (10R 4/6) and yellowish brown (10YR 5/8) sandy clay; few medium distinct light gray (10YR 7/2) sandstone fragments; moderate medium angular blocky structure; friable; broken distinct clay films on faces of peds; few medium roots; few pores; about 25 percent partly decomposed sandstone fragments 1 inch to 8 inches in diameter; very strongly acid; clear wavy boundary.

C—42 to 50 inches; mottled red (2.5YR 4/8) and yellowish brown (10YR 5/8) sandy clay loam; thin streaks of light gray (10YR 7/2) and yellowish brown (10YR 5/8) clayey material; relict rock structure; friable; very strongly acid; gradual wavy boundary intergrading to bedrock.

R—50 inches; hard sandstone bedrock.

The A1 horizon is dark grayish brown or brown. The A2 horizon is strong brown to light yellowish brown. In cultivated areas there

Figure 2.—**Peanuts is a relatively new crop to the county. Beulah sandy loam, undulating, is well suited to this crop.**

is a 4- to 7-inch, brown or dark yellowish brown Ap horizon. The B1 horizon, which is lacking in places, is yellowish red or strong brown fine sandy loam or sandy clay loam. The B2t horizon is red or yellowish red sandy clay or clay, and it is mottled with yellowish brown in the lower part. The B3t horizon is sandy clay loam or sandy clay, and it is dominantly the same color as the B2t horizon. The C horizon is sandy loam or sandy clay loam mottled in shades of red and brown.

The soils are mainly strongly acid or very strongly acid in unlimed areas. Bedrock is at a depth of 40 to 60 inches.

Boden soils are associated with Agnos, Captina, Gepp, and Portia soils. They have a redder B horizon than Agnos soils and a thinner B horizon than Gepp and Portia soils. They have more clay in the B horizon than Captina soils and do not have a fragipan.

BnC—Boden gravelly sandy loam, 3 to 8 percent slopes. This gently sloping soil is on rounded hilltops and adjacent hillsides at the higher elevations. Areas range from 20 to 200 acres in size. Included in mapping are spots of Agnos, Captina, Gepp, and Portia soils and a few small areas where stones are on the surface. Also included is a soil that is similar to the Boden soil, but the subsoil extends to a depth of more than 60 inches and the clay content does not decrease with depth.

This soil is suited to farming, but the gravelly surface makes cultivation of row crops somewhat difficult. Runoff is moderate, and the erosion hazard is severe. Under good management that includes terraces and contour cultivation, clean-tilled crops that leave large amounts of residue can be safely cultivated year after year in the less sloping areas. More intensive management is needed as slope increases.

Broadcast or drilled crops, such as winter small grain, are best suited, but such row crops as soybeans and sorghums are grown. Truck crops, such as okra, green beans, strawberries, cucumbers, and melons, are also suited. Fruit crops, such as apples, peaches, and pears, are grown. The soil is best suited to pasture, range, woodland, or wildlife habitat. Bahiagrass, bermudagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza are suitable pasture plants. Capability unit IIIe-3; pasture and hayland group 8A; woodland group 4o7; range site Loamy Upland.

BnD—Boden gravelly sandy loam, 8 to 12 percent slopes. This moderately sloping soil is on rounded hilltops and hillsides that are mostly at the higher elevations. Areas range from 20 to more than 300 acres in size. This soil has the profile described as representative of the series. Included in mapping are spots of Agnos, Gepp, and Portia soils; a few narrow creek valleys; and small areas where stones are on the surface. Also included were a few small areas of soils that are similar to this Boden soil, but the subsoil extends to a depth of more than 60 inches and the clay content does not decrease with depth.

This soil is poorly suited to cultivated crops. The slope and gravelly surface layer make tillage difficult. Runoff is rapid, and the erosion hazard is very severe. Under good

Figure 3.—**Watermelons is a truck crop suited to Beulah sandy loam, undulating.**

management that includes terraces and contour cultivation, clean-tilled crops that leave large amounts of residue can be safely grown in rotation with grasses and legumes part of the time.

Winter small grain is the best suited crop. The soil is best suited to pasture, range, woodland, or wildlife habitat. Bermudagrass, bahiagrass, orchardgrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza are suitable pasture plants. Capability unit IVe-3; pasture and hayland group 8A; woodland group 4o7; range site Loamy Upland.

BnE—Boden gravelly sandy loam, 12 to 20 percent slopes. This moderately steep soil is on sharp ridges and dissected hillsides. Areas range from 20 to more than 200 acres in size. Included in mapping are spots of Agnos and Gepp soils and a few small areas where stones are on the surface. Also included is a soil that is similar to this Boden soil, but the subsoil extends to a depth of more than 60 inches and the clay content does not decrease with depth.

This soil is not suited to cultivated crops and is poorly suited to pasture. The slope restricts the use of some farm equipment. Runoff is rapid, and the erosion hazard is very severe. The soil is best suited to woodland, range, and wildlife habitat.

Most of the acreage is woodland of red oak, white oak, hickory, and post oak. In open areas, the soil produces moderate amounts of forage from native grasses and forbs. Bermudagrass, bahiagrass, weeping lovegrass, annual lespedeza, and sericea lespedeza are suitable pasture plants. Capability unit VIe-2; pasture and hayland group 8B; woodland group 4o7; range site Loamy Upland.

Bosket Series

The Bosket series consists of well drained, level and undulating soils on older natural levees along creeks and abandoned river channels. These soils formed in stratified beds of dominantly loamy alluvial sediments and some windblown sediments high in content of sand. The native vegetation is mixed hardwoods and an understory of vines and canes.

In a representative profile the surface layer is about 8 inches of dark brown fine sandy loam over 6 inches of brown fine sandy loam. The upper 16 inches of the subsoil is brown loam, and the lower 7 inches is brown fine sandy loam. The underlying material is yellowish brown loamy sand to a depth of 72 inches or more.

Bosket soils are moderate in natural fertility. Permeability is moderate, and the available water capacity is medium. The soils respond well to fertilization. They are easy to till and can be cultivated throughout a wide range of moisture

content. In places a plowpan has formed. This pan restricts root penetration and movement of water through the soil.

These soils are well suited to most crops grown in the county. Most of the acreage is cultivated.

Representative profile of Bosket fine sandy loam, undulating, in a moist cultivated area in NE¼NW¼SE¼ sec. 27, T. 17 N., R. 1 W.

Ap—0 to 8 inches; dark brown (7.5YR 3/2) fine sandy loam; weak fine and medium subangular blocky structure; very friable; few fine roots; medium acid; abrupt smooth boundary.

A3—8 to 14 inches; brown (10YR 4/3) fine sandy loam; common fine faint dark brown mottles; weak medium subangular blocky structure; very friable; few fine roots; strongly acid; clear smooth boundary.

B21t—14 to 30 inches; brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; firm; continuous distinct clay films on faces of peds; clay bridges on sand grains; few fine roots; few pores; few black stains on faces of peds; strongly acid; gradual wavy boundary.

B22t—30 to 37 inches; brown (7.5YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; patchy distinct clay films on faces of some peds; clay bridges on sand grains; few black stains and specks; strongly acid; clear smooth boundary.

IIC—37 to 72 inches; yellowish brown (10YR 5/4) loamy sand that has uncoated sand grains and specks in shades of yellow and brown; single grained; very friable; strongly acid.

The A3 horizon, which is lacking in places, is brown to dark yellowish brown. The upper part of the B2t horizon ranges from loam to sandy clay loam, and the lower part ranges from fine sandy loam to sandy clay loam. The C horizon is brown or yellowish brown fine sandy to loamy sand. It is at a depth of 30 to 50 inches. The soils range from slightly acid to strongly acid.

Bosket soils are associated with Beulah, Dubbs, McCrory, and Tuckerman soils. They have more clay in the B horizon than Beulah soils, and they have more sand in the A and B horizons than Dubbs soils. They are browner throughout than McCrory and Tuckerman soils. In contrast with McCrory soils, they do not have a horizon that is high in content of sodium.

BoA—Bosket fine sandy loam, 0 to 1 percent slopes. This level soil is on the higher parts of natural levees along creeks and abandoned river channels. Areas range from 20 to 200 acres in size. Included in mapping are spots of Beulah, Dubbs, McCrory, and Tuckerman soils.

This soil is well suited to farming. It is easy to till and can be cultivated throughout a wide range of moisture content. It warms early in spring, and crops can be planted early. Under good management, clean-tilled crops that leave large amounts of residue can be safely grown year after year.

Cotton and soybeans are the main crops. Grain sorghum, winter small grain (fig. 4), corn, and peanuts are other suitable crops. Green beans, okra, sweet corn, strawberries, potatoes, tomatoes, and melons are suitable truck crops. Bermudagrass, bahiagrass, tall fescue, and white clover are suitable pasture plants. Capability unit I-1; pasture and hayland group 2A; woodland group 2o4; not in a range site.

Figure 4.—**Bosket fine sandy loam, 0 to 1 percent slopes, is well suited to wheat and a wide variety of other crops. It is also in demand for community expansion.**

BoB—Bosket fine sandy loam, undulating. This soil is in alternating areas of long, narrow swales and low ridges that rise 1 foot to 6 feet above the swales. It is generally on the tops and sides of natural levees. Slopes are 0 to 3 percent. Areas are irregular in shape and range from 20 to 300 acres in size. The profile of this soil is the one described as representative of the series. Included in mapping are a few narrow escarpments, small areas where slopes are more than 3 percent, and spots of Beulah, Dubbs, McCrory, and Tuckerman soils.

The soil is suited to farming. It is easy to till and can be cultivated throughout a wide range of moisture content. It warms early in spring, and crops can be planted early. The erosion hazard is moderate on the steeper parts of ridges. If the soil is bare in spring, the soil blowing hazard is moderate. Under good management, clean-tilled crops that leave large amounts of residue can be safely grown year after year.

Cotton and soybeans are the main crops. Grain sorghum, corn, peanuts, and winter small grain are other suitable crops. Okra, green beans, potatoes, tomatoes, sweet corn, melons, and strawberries are suitable truck crops. Bermudagrass, bahiagrass, tall fescue, and white clover are among the suitable pasture plants. Capability unit IIe-1; pasture and hayland group 2A; woodland group 2o4; not in a range site.

Calhoun Series

The Calhoun series consists of poorly drained, level soils on broad flats. These soils formed in windblown sediments high in content of silt or alluvium high in content of silt. The native vegetation is hardwoods and an understory of grass and forbs.

In a representative profile the surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is gray, mottled silt loam 6 inches thick. The upper 6 inches of the subsoil is gray, mottled silt loam that has tongues of gray silt loam extending from the subsurface layer. The next 14 inches is grayish brown silty clay loam. The lower 17 inches is grayish brown, mottled silty clay loam. The underlying material is gray, mottled silt loam to a depth of 72 inches or more.

Calhoun soils are moderate in natural fertility. The content of sodium and magnesium is high below a depth of about 3 feet. Permeability is slow, and the available water capacity is high. The soils respond well to fertilization. They are easy to till, but the surface puddles and crusts over after rain.

If drained and well managed, these soils are suited to most crops grown in the county. Most of the acreage is cultivated.

The Calhoun soils in this county are mapped with Foley soils.

Representative profile of Calhoun silt loam in a moist cultivated area of Foley-Calhoun complex, 0 to 1 percent slopes, in the NW¼NW¼SE¼ sec. 5, T. 16 N., R. 1 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; friable; common fine roots; common dark concretions; strongly acid; abrupt smooth boundary.

A2g—7 to 13 inches; gray (10YR 6/1) silt loam; common medium distinct brown (10YR 4/3) and yellowish brown (10YR 5/4) mottles and common medium faint grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable; common fine roots; few pores; few dark concretions; very strongly acid; clear irregular boundary.

B21tg—13 to 19 inches; gray (10YR 6/1) silt loam; few medium distinct brown (10YR 4/3) and yellowish brown (10YR 5/4) mottles and common medium faint grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; patchy faint clay films on faces of peds; tongues of A2 horizon, 1 inch to 2½ inches wide, are throughout the horizon at 10- to 15-inch intervals; few fine roots; few pores; few dark concretions and accretions; very strongly acid; gradual wavy boundary.

B22tg—19 to 33 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; continuous distinct clay films on faces of peds and in pores; light brownish gray (10YR 6/2) silt-filled cracks between vertical faces of some peds; few roots and red stained root channels; few pores; few dark concretions and accretions; very strongly acid; abrupt smooth boundary.

B23tg—33 to 41 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct brown (10YR 4/3) mottles; moderate medium subangular blocky structure; firm; continuous distinct clay films on faces of peds; common weblike black stains on peds; few roots and root channels; few dark accretions; strongly acid; clear wavy boundary.

B24tg—41 to 50 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct brown (10YR 4/3) mottles; moderate medium subangular blocky structure; firm; continuous distinct clay films on faces of peds; few black stains; common dark accretions; neutral; gradual wavy boundary.

Cg—50 to 72 inches; gray (5Y 5/1) silt loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable; few dark accretions; few pores; neutral.

The Ap horizon is grayish brown, dark grayish brown, or brown. The A2g horizon is gray or light brownish gray. The B horizon is gray or grayish brown silt loam or silty clay loam. The C horizon is at a depth of 40 to 70 inches. Unless limed, the upper part of the soil is strongly acid or very strongly acid. The B24 horizon and C horizon are strongly acid to neutral.

The B horizon is dominantly olive gray, and the lower part of the soil is strongly alkaline. These Calhoun soils are outside the defined range of the series in this respect, but this difference does not alter their use or behavior.

Calhoun soils are associated with Crowley, Foley, Hillemann, and Jackport soils. They have less clay in the B horizon than Crowley and Jackport soils. Their high content of sodium and magnesium begins at a greater depth in the B2t horizon than in Foley and Hillemann soils. In contrast with Hillemann soils, they lack red mottles in the B2t horizon.

Captina Series

The Captina series consists of moderately well drained, nearly level to moderately sloping soils on hillcrests, hillsides, and valley sides in the uplands. These soils formed in loamy material weathered from cherty limestone, thin loess deposits, or old valleyfill or alluvium. The native vegetation is hardwoods.

In a representative profile the surface layer is dark yellowish brown silt loam about 5 inches thick. The upper 17 inches of the subsoil is strong brown and yellowish brown silty clay loam. The lower part of the subsoil is a firm, brittle fragipan of mottled, yellowish brown and strong brown silt loam and silty clay loam to a depth of 72 inches or more.

Captina soils are low in natural fertility. Permeability is slow, and the available water capacity is medium. The firm, brittle fragipan restricts root penetration and slows the movement of water through the soil. The soils respond well to fertilization. The surface layer is easy to till, but in some areas slopes limit the use of some farm equipment.

If erosion is controlled, the less sloping areas of these soils are suitable for cultivation. The more sloping areas are poorly suited to cultivated crops. A small acreage is used for crops, but most is used for pasture and woodland.

Representative profile of Captina silt loam, 3 to 8 percent

slopes, in a moist idle field in SW¼SW¼NW¼ sec. 6, T. 17 N., R. 2 W.

Ap—0 to 5 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; friable; many fine roots; few pores; strongly acid; clear smooth boundary.

B21t—5 to 14 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; continuous thin clay films on faces of peds and in pores; few fine roots; few pores; few krotovinas; few fine dark concretions; strongly acid; clear smooth boundary.

B22t—14 to 22 inches; yellowish brown (10YR 5/8) silty clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; continuous thin clay films on faces of peds; few fine roots; common pores; few krotovinas; very strongly acid; clear wavy boundary.

Bx1—22 to 28 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct strong brown (7.5YR 5/6) and common fine faint pale brown mottles; moderate coarse columnar structure parting to moderate medium angular blocky structure; firm; compact and brittle; continuous distinct clay films on faces of peds; common pores; very strongly acid; clear wavy boundary.

Bx2—28 to 41 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate coarse prismatic structure parting to moderate medium angular blocky; very firm; compact and brittle; continuous distinct clay films on faces of peds and in pores; vertical streaks of gray (10YR 6/1) silty clay as much as ½ inch wide at 3- to 8-inch intervals; common pores; few roots and root channels; very strongly acid; clear irregular boundary.

Bx3—41 to 53 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; compact and brittle; continuous distinct clay films on faces of peds; peds coated with strong brown (7.5YR 5/8); few streaks of light brownish gray in cracks and wormholes; very strongly acid; clear smooth boundary.

Bx4—53 to 72 inches; yellowish brown (10YR 5/8) silty clay loam; moderate medium distinct strong brown (7.5YR 5/6) mottles; moderate medium angular blocky structure; hard; compact and brittle; continuous distinct clay films on faces of peds; few streaks of gray (10YR 6/1) and pale brown (10YR 6/3) in cracks; very strongly acid.

The A1 horizon ranges from very dark grayish brown to brown. In places there is a 0- to 8-inch A2 horizon that is brown or yellowish brown silt loam. The Bt horizon is yellowish brown or strong brown silt loam or silty clay loam. The Bx horizon is strong brown to pale brown silt loam or silty clay loam and is mottled in shades of red, brown, yellow, and gray. In places it has a gravelly or cherty layer as much as 12 inches thick. In unlimed areas the A horizon is medium acid or strongly acid, and the B horizon is strongly acid or very strongly acid.

Captina soils are associated with Boden, Loring, Portia, and Tonti soils. In contrast with Boden and Tonti soils, they have a fragipan. They have less chert in the A horizon and upper part of the B horizon than Tonti soils. They have less than 35 percent base saturation 30 inches below the fragipan, and Loring soils have more than 35 percent base saturation.

CaB—Captina silt loam, 1 to 3 percent slopes. This nearly level soil is on hillcrests and valley sides. Areas range from 10 to 100 acres in size. Included in mapping are a few spots of Loring, Portia, and Tonti soils; a few spots where chert fragments are on the surface; and small areas where slopes are 3 to 8 percent. Also included is about 200 acres of somewhat poorly drained soils near Annieville that have gray mottles in the upper part of the subsoil.

This soil is suited to farming, but the erosion hazard is moderate. Under good management that includes contour cultivation and terraces on long slopes, clean-tilled crops that leave large amounts of residue can be safely grown year after year.

Grain sorghum, winter small grain, and soybeans are the main crops. Okra, strawberries, melons, cucumbers, and green beans are suitable truck crops. Most acreage of this soil is suited to pasture and hay (fig. 5). Bahiagrass, bermudagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza are suitable pasture plants. Capability unit IIe-2; pasture and hayland group 8A; woodland group 4o7; not in a range site.

CaC—Captina silt loam, 3 to 8 percent slopes. This gently sloping soil is on hillcrests, hillsides, and valleysides. Areas range from 20 to more than 300 acres in size. The profile of this soil is the one described as representative of the series. Included in mapping are a few wet spots; spots where the upper part of the subsoil is yellowish red; small areas where clay is beneath the fragipan at a depth of 40 to 72 inches; and spots of Boden, Loring, Portia, and Tonti soils.

This soil is suited to farming, but runoff is moderate and the erosion hazard is severe. Under good management that includes terraces and contour cultivation, clean-tilled crops that leave large amounts of residue can be safely grown year after year in the less sloping parts. More intensive management is needed as slope increases.

Soybeans, sweet sorghum, grain sorghum, winter small grain, and truck crops such as okra, strawberries, and cucumbers are the main crops. Melons, potatoes, tomatoes, and green beans are also suited. Peaches, apples, pears, and grapes are suitable fruit crops. The soil is used mainly for pasture or meadow (fig. 6) to which it is better suited. Bahiagrass, bermudagrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza are suitable pasture plants. Capability unit IIIe-1; pasture and hayland group 8A; woodland group 4o7; not in a range site.

CaD—Captina silt loam, 8 to 12 percent slopes. This moderately sloping soil is on hillcrests, hillsides, and valleysides. Areas range from 20 to more than 300 acres in size. Included in mapping are a few spots of Boden, Loring, Portia, and Tonti soils; small severely eroded areas; and areas where the upper part of the subsoil is yellowish red.

This soil is poorly suited to cultivated row crops because of slope. Runoff is rapid, and the erosion hazard is very severe. Under good management that includes terraces and contour cultivation, clean-tilled crops and sown crops that leave large amounts of residue can be grown in rotation with grasses and legumes.

Winter small grain is the best suited crop. Most of the acreage of this soil is used for pasture, range, woodland, or wildlife habitat. Bahiagrass, bermudagrass, tall fescue, annual lespedeza, sericea lespedeza, and white clover are suitable pasture plants. Capability unit IVe-1; pasture and hayland group 8A; woodland group 4o7; not in a range site.

Clarksville Series

The Clarksville series consists of somewhat excessively drained, moderately sloping to moderately steep soils on ridgetops and adjacent dissected hillsides. These soils formed in residuum from cherty limestone. The native vegetation is hardwoods.

In a representative profile the surface layer is dark grayish brown cherty silt loam about 2 inches thick. The subsurface layer is yellowish brown cherty silt loam 6 inches thick. The upper 14 inches of the subsoil is yellowish brown cherty silt loam; the next 24 inches is strong brown, mottled cherty silty clay loam; and the lower part is variegated yellowish brown, red, and gray silty clay to a depth of 72 inches or more.

Figure 5.—**Captina silt loam, 1 to 3 percent slopes, is well suited to forage crops, such as Coastal bermudagrass.**

Clarksville soils are low in natural fertility. Permeability is moderately rapid, and the available water capacity is low. The root zone is very cherty. Droughtiness is a severe limitation. The response to fertilization is poor.

These soils are generally not suited to cultivated crops. They are best suited to pasture, range, wildlife habitat, and woodland. Only a small acreage has been cleared. The rest is woodland.

Representative profile of Clarksville cherty silt loam, 8 to 12 percent slopes, in a moist wooded area in NW¼NW¼SW¼ sec. 6, T. 17 N., R. 3 W.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) cherty silt loam; weak fine granular structure; very friable; common fine roots; few wormholes and castings; about 50 percent chert fragments as much as 6 inches in diameter; slightly acid; clear smooth boundary.

A2—2 to 8 inches; yellowish brown (10YR 5/4) cherty silt loam; few fine distinct strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable; few fine roots; few wormholes and castings; few dark stains on faces of peds; about 50 percent chert fragments as much as 6 inches in diameter; strongly acid; clear wavy boundary.

B1t—8 to 22 inches; yellowish brown (10YR 5/8) cherty silt loam; few medium faint yellowish brown (10YR 5/4) mottles and few fine distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; continuous distinct clay films on faces of peds; few medium and fine roots; few red stains on chert fragments; few fine pores; about 50 percent chert fragments as much as 6 inches in diameter; slightly acid; clear wavy boundary.

B21t—22 to 46 inches; strong brown (7.5YR 5/6) cherty silty clay loam; many fine and medium distinct yellowish red (5YR 4/8) mottles; weak fine and medium subangular blocky structure; firm; continuous distinct clay films on faces of peds; few fine roots; few pores; common red stains on chert fragments; about 40 percent chert fragments as much as 6 inches in diameter; strongly acid; clear wavy boundary.

B22t—46 to 60 inches; variegated yellowish brown (10YR 5/8), red (2.5YR 4/8), and light gray (10YR 7/1) silty clay; moderate medium subangular blocky structure parting to weak fine angular blocky; firm; continuous distinct clay films on faces of peds; few fine roots; 10 percent chert fragments as much as 6 inches in diameter; very strongly acid; clear wavy boundary.

B3t—60 to 72 inches; variegated yellowish brown (10YR 5/6), red (2.5YR 4/8), and light gray (10YR 7/1) silty clay; moderate medium subangular blocky structure; firm; broken distinct clay films on faces of peds; few pieces of weathered siltstone and sandstone; very strongly acid.

The A1 horizon ranges from pale brown to very dark grayish brown. The A2 horizon is brown to light yellowish brown. The B1 horizon is yellowish brown to yellowish red. The B21t horizon is strong brown to red silt loam or silty clay loam. The content of chert through the B21t horizon is 35 to 75 percent and ranges from 5 to 90 percent in the B22t horizon. The soils are slightly acid to strongly acid through the B1 horizon, and are strongly acid or very strongly acid in the B2 horizon.

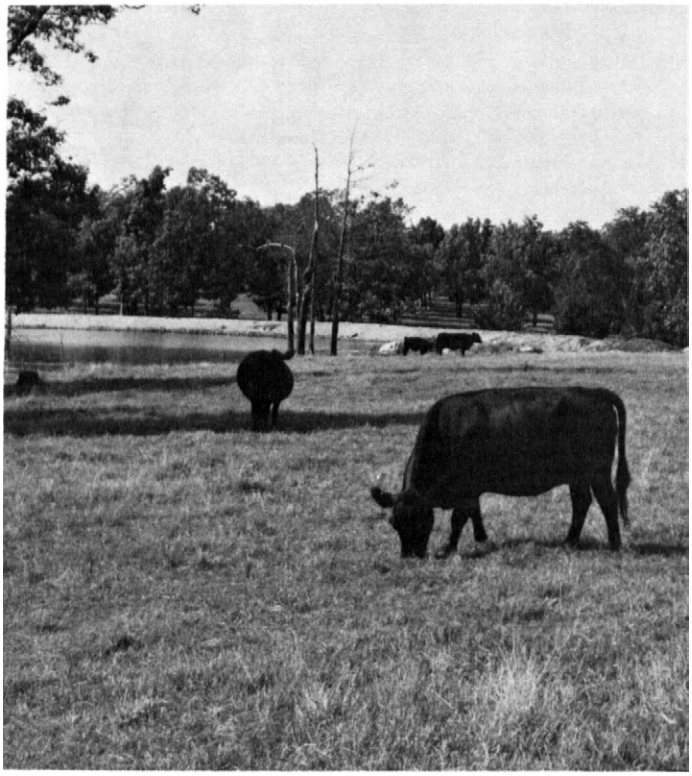

Figure 6.—**Captina silt loam, 3 to 8 percent slopes, is well suited to ponds for livestock water. It produces large amounts of forage for cattle.**

Clarksville soils are associated with Agnos, Gepp, and Tonti soils. They have more chert and less clay in the upper part of the B horizon than Agnos and Gepp soils. In contrast with Tonti soils, they do not have a fragipan.

CeD—Clarksville cherty silt loam, 8 to 12 percent slopes. This moderately sloping soil is mainly on ridgetops and adjacent upper side slopes at the higher elevations. Areas range from 20 to 100 acres in size. The profile of this soil is the one described as representative of the series. Included in mapping are spots of Agnos, Gepp, and Tonti soils and a few areas where the subsoil rests on a chert bed.

This soil is generally not suited to cultivated crops because the slope and cherty surface restrict the use of some farm equipment. Runoff is rapid, and the erosion hazard is very severe. The soil is best suited to woodland, pasture, range, or wildlife habitat.

Most of the acreage is poor-quality woodland, but a small part has been cleared and used for pasture. Bermudagrass, bahiagrass, weeping lovegrass, tall fescue, annual lespedeza, and sericea lespedeza are suitable pasture plants. Capability unit VIs-1; pasture and hayland group 8G; woodland group 4f8; range site Chert Hills.

CeE—Clarksville cherty silt loam, 12 to 20 percent slopes. This moderately steep soil is on sharp ridges and adjacent side slopes at the higher elevations. Areas range from 20 to 150 acres in size. Included in mapping are spots of Agnos, Gepp, and Tonti soils and a few areas where the subsoil rests on a chert bed.

This soil is not suited to cultivated crops and is poorly suited to improved pasture. The slope and cherty surface severely restrict the use of farm equipment. Runoff is rapid, and the erosion hazard is very severe. The soil is best suited to pasture, range, woodland, or wildlife habitat. Bahiagrass, tall fescue, weeping lovegrass, bermudagrass, annual lespedeza, and sericea lespedeza are suitable pasture plants. Capability unit VIIs-3; pasture and hayland group 8H; woodland group 4f8; range site Chert Hills.

Crowley Series

The Crowley series consists of poorly drained, level soils on broad upland flats. These soils formed in a thin layer of loamy sediments of eolian or alluvial origin, high in content of silt, and the underlying clayey sediments. The native vegetation is hardwoods and an understory of grass and sedges.

In a representative profile the surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is light brownish gray, mottled silt loam 2 inches thick. The upper 30 inches of the subsoil is grayish brown silty clay that is mottled in the upper 9 inches. The lower part is olive gray, mottled silty clay loam to a depth of 72 inches or more.

Crowley soils are moderate in natural fertility. Permeability is very slow, and the available water capacity is high. The soils respond well to fertilization. They are easy to till, but the surface crusts over after rain.

If drained and well managed, these soils are suited to most crops grown in the county. Most of the acreage is cultivated.

Representative profile of Crowley silt loam, 0 to 1 percent slopes, in a moist cultivated area in SW¼NE¼NW¼ sec. 23, T. 15 N., R. 1 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; friable; few fine roots; common dark concretions; strongly acid; clear smooth boundary.

A2g—7 to 9 inches; light brownish gray (10YR 6/2) silt loam; common medium faint grayish brown mottles and few medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; light gray (10YR 7/1) silt coats on faces of some peds; few fine roots; few pores; common hard dark concretions; very strongly acid; abrupt smooth boundary.

B21tg—9 to 18 inches; grayish brown (10YR 5/2) silty clay; common fine distinct yellowish brown (10YR 5/6) mottles; strong medium subangular blocky structure; firm; plastic; few fine roots; few pores; continuous distinct clay films on faces of peds; very strongly acid; clear smooth boundary.

B22tg—18 to 39 inches; grayish brown (2.5Y 5/2) silty clay; moderate medium subangular blocky structure; firm; plastic; patchy thin clay films on faces of peds; few medium roots; very strongly acid; gradual wavy boundary.

B3tg—39 to 72 inches; olive gray (5Y 5/2) silty clay loam; common medium prominent dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; firm; continuous distinct clay films on vertical faces of peds; few pores; few medium roots and root channels; few black stains; moderately alkaline.

The Ap horizon is dark grayish brown or grayish brown. The A2g horizon is gray or light brownish gray. The B2tg horizon is gray or grayish brown. The B3tg horizon is gray or olive gray silty clay loam or silty clay.

The A horizon is medium acid to very strongly acid in unlimed areas. The B2t horizon is strongly acid or very strongly acid, and the B3t horizon is medium acid to moderately alkaline.

These soils lack red mottles in the upper part of the B2t horizon and, as a result, are outside the range of characteristics for the Crowley series, but this difference does not alter their use and behavior.

Crowley soils are associated with Calhoun, Foley, Hillemann, and Jackport soils. In contrast with those soils, they have an abrupt textural change between the A and B horizons. They have more clay in the B horizon than Calhoun, Foley, and Hillemann soils.

Figure 7.—**Crowley silt loam, 0 to 1 percent slopes, is poorly drained. Surface drains are needed if it is used for crops.**

CoA—Crowley silt loam, 0 to 1 percent slopes. This level soil is at higher elevations of broad flats. Areas range from 20 to more than 300 acres in size. Included in mapping are a few narrow escarpments and spots of Calhoun, Foley, Hillemann, and Jackport soils.

This soil is suited to farming, but excess water is a severe hazard. Fieldwork is delayed several days after a rain unless surface drains are installed. Under good management that includes adequate drainage (fig. 7), clean-tilled crops that leave large amounts of residue can be safely grown year after year. Depth to the subsoil should be determined before cuts are made because the sticky, plastic, clayey subsoil is difficult to cultivate if exposed at the surface by grading or smoothing.

Soybeans and rice are the main crops. Corn, cotton, and grain sorghum are other suitable crops. If surface drainage is adequate, winter small grain can be grown. Bermudagrass, tall fescue, bahiagrass, annual lespedeza, and white clover are suitable pasture plants. Capability unit IIIw-2; pasture and hayland group 8F; woodland group 3w9; not in a range site.

Dubbs Series

The Dubbs series consists of well drained, level and undulating soils on older natural levees along creeks and abandoned river channels. These soils formed in stratified beds of loamy sediments. The native vegetation is bottom-land hardwoods and an understory of vines, canes, and shrubs.

In a representative profile the surface layer is brown silt loam about 8 inches thick. The upper 4 inches of the subsoil is brown silt loam; the next 15 inches is brown silty clay loam; and the lower 18 inches is brown, mottled silt loam. The underlying material is light brownish gray, mottled very fine sandy loam to a depth of 72 inches or more.

Dubbs soils are high in natural fertility. Permeability is moderate, and the available water capacity is high. The soils respond well to fertilization. They are easy to till and can be cultivated throughout a wide range of moisture content. In places a plowpan has formed. This pan restricts root penetration and movement of water through the soil.

These soils are well suited to most crops grown in the county. Most of the acreage is cultivated.

Representative profile of Dubbs silt loam, 1 to 3 percent slopes, in a moist cultivated area in NW¼NE¼NE¼ sec. 4, T. 16 N., R. 1 E.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable; few fine roots; few pores; few fine dark concretions; medium acid; clear smooth boundary.

B1—8 to 12 inches; brown (7.5YR 4/4) silt loam; weak medium subangular blocky structure; friable; few fine roots; few

pores; few fine dark concretions; medium acid; clear smooth boundary.

B21t—12 to 27 inches; brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; continuous distinct clay films on faces of peds and in pores; peds partly coated with silt; few fine roots; few pores; few fine dark concretions; strongly acid; gradual wavy boundary.

B22t—27 to 45 inches; brown (7.5YR 4/4) silt loam; common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable; patchy distinct clay films on faces of peds; vertical faces of some peds coated with yellowish brown (10YR 5/4) silt; common pores; few dark concretions; few red stains; very strongly acid; gradual wavy boundary.

C—45 to 72 inches; light brownish gray (2.5Y 6/2) very fine sandy loam; common coarse prominent brown (7.5YR 4/4) and dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; few weblike black stains on faces of some peds; few pores; few dark concretions and accretions; very strongly acid.

The B1 horizon, which is lacking in places, is mainly brown or yellowish brown. The B2t horizon is brown, strong brown, or yellowish brown, and in some pedons the lower part is mottled in shades of gray and brown. It is silty clay loam, silt loam, or loam. The C horizon ranges from very fine sandy loam to loamy fine sand. The soils are medium acid to very strongly acid in unlimed areas.

Dubbs soils are associated with Amagon, Beulah, Bosket, and Dundee soils. They have less sand in the A and B horizons than Beulah and Bosket soils. They have a browner B horizon than Amagon and Dundee soils.

DeA—Dubbs silt loam, 0 to 1 percent slopes. This level soil is on the higher parts of natural levees. Areas range from 10 to 200 acres in size. Included in mapping are a few undulating areas; small spots of Amagon, Bosket, and Dundee soils; and small areas where the surface layer is fine sandy loam.

This soil is well suited to farming (fig. 8). It warms early in spring, and crops can be planted early. If management is good, clean-tilled crops that leave large amounts of residue can be safely grown year after year.

Cotton and soybeans are the main crops. Grain sorghum, corn, peanuts, and winter small grain are other suitable crops. Truck crops, such as green beans, okra, tomatoes, sweet corn, strawberries, and potatoes, can be grown. Bermudagrass, bahiagrass, and white clover are suitable pasture plants. Capability unit I-1; pasture and hayland group 2A; woodland group 2o4; not in a range site.

DeB—Dubbs silt loam, 1 to 3 percent slopes. This soil is mainly on the tops and sides of natural levees in areas of low ridges that slope toward adjacent lowlands. The slope is generally less than 3 percent. Areas range from 10 to more than 300 acres in size. The profile of this soil is the one described as representative of the series. Included in mapping are a few narrow escarpments; small spots of Beulah, Bosket,

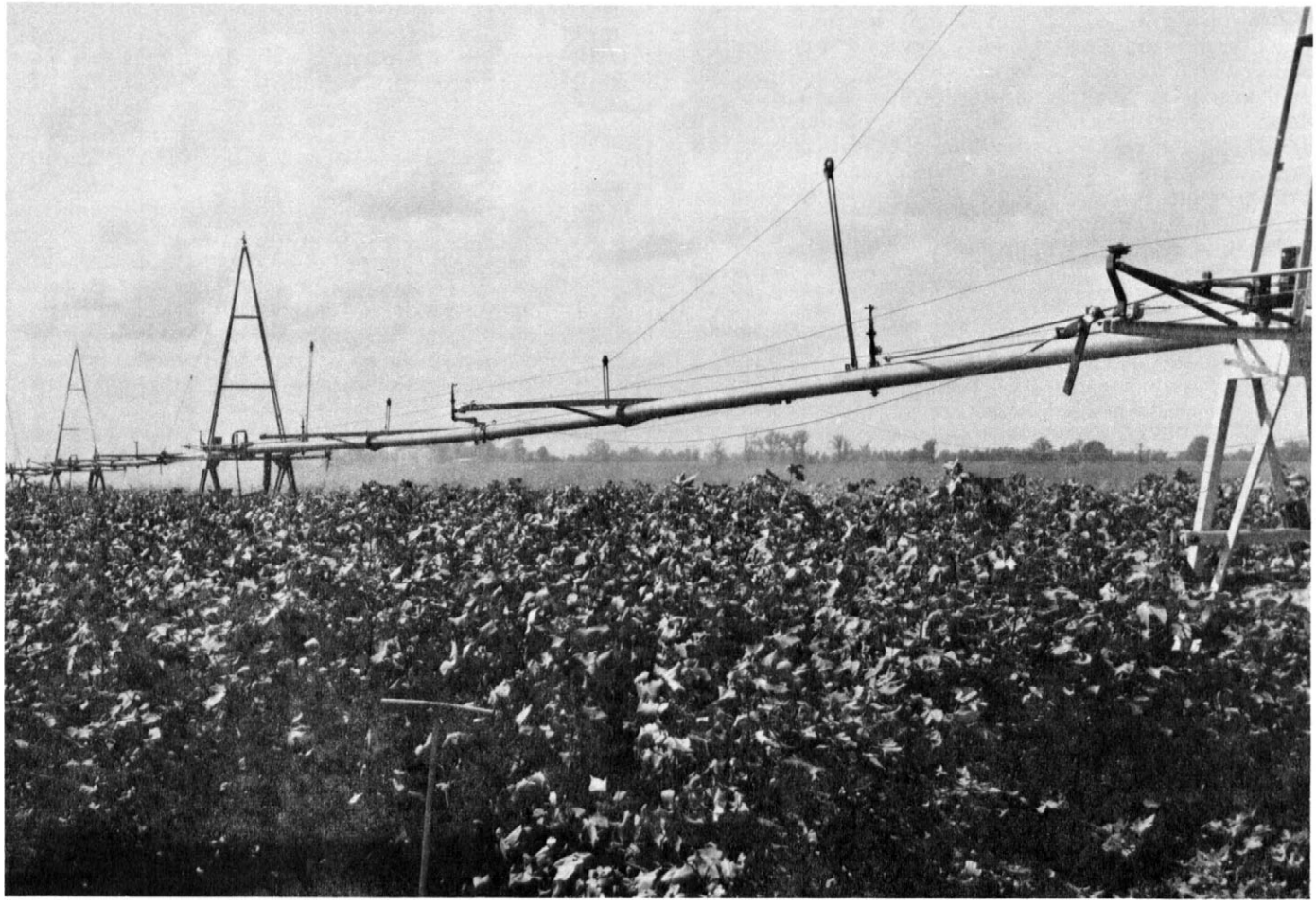

Figure 8.—**This overhead irrigation system helps insure excellent crops on Dubbs silt loam, 0 to 1 percent slopes.**

and Dundee soils; and small areas where the surface layer is fine sandy loam.

This soil is suited to farming. The erosion hazard is moderate in the steeper areas. The soil warms early in spring and can be planted early. If management is good, clean-tilled crops that leave large amounts of residue can be safely grown year after year.

Cotton and soybeans are the main crops. Corn, grain sorghum, peanuts, and winter small grain are other suitable crops. Truck crops, such as okra, green beans, sweet corn, potatoes, tomatoes, melons, and strawberries, can be grown. Bermudagrass, bahiagrass, tall fescue, and white clover are suitable pasture plants. Capability unit IIe-1; pasture and hayland group 2A; woodland group 2o4; not in a range site.

Dundee Series

The Dundee series consists of somewhat poorly drained, level and gently undulating soils on the lower parts of older natural levees along streams and abandoned river channels. These soils formed in stratified beds of loamy sediments. The native vegetation is mainly bottom-land, water-tolerant hardwoods.

In a representative profile the surface layer is brown silt loam about 7 inches thick. The upper 12 inches of the subsoil is grayish brown, mottled silt loam; the next 6 inches is light brownish gray, mottled silt loam; and the lower 7 inches is light brownish gray, mottled fine sandy loam. The underlying material is gray, mottled silty clay loam to a depth of 72 inches or more.

Dundee soils are high in natural fertility. Permeability is moderately slow, and the available water capacity is high. The soils respond well to fertilization. They are easy to till, but the surface puddles and crusts over after rain.

If drained and well managed, these soils are suited to most crops grown in the county. Most of the acreage is cultivated.

Representative profile of Dundee silt loam, 0 to 1 percent slopes, in a moist cultivated area in NW¼NW¼NE¼ sec. 1, T. 15 N., R. 2 W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak medium granular structure; very friable; few fine roots; common dark concretions; medium acid; abrupt smooth boundary.

B21tg—7 to 19 inches; grayish brown (10YR 5/2) silt loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; patchy distinct clay films on faces of peds and in pores; few fine roots; few pores; common dark accretions and concretions; very strongly acid; clear wavy boundary.

B22tg—19 to 25 inches; light brownish gray (10YR 6/2) silt loam; common medium distinct strong brown (7.5YR 5/6) and yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; patchy faint clay films on faces of peds; common dark accretions and concretions; very strongly acid; clear wavy boundary.

B3tg—25 to 32 inches; light brownish gray (10YR 6/2) fine sandy loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; patchy faint clay films on vertical faces of peds; common pores; common dark accretions; very strongly acid; clear smooth boundary.

C1—32 to 50 inches; gray (10YR 6/1) silty clay loam; common medium distinct dark yellowish brown (10YR 4/4) and brown (10YR 5/3) mottles; weak medium subangular blocky structure; firm; common pores; common dark accretions; strongly acid; clear smooth boundary.

C2—50 to 72 inches; gray (10YR 5/1) silty clay loam; common fine and medium distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; firm; few pores; common dark accretions; medium acid.

The Ap horizon is brown or dark grayish brown. The B2t horizon is silt loam or silty clay loam. The B3 horizon is grayish brown, light brownish gray, or gray silt loam, silty clay loam, or fine sandy loam. The C horizon is gray or light brownish gray fine sandy loam, silt loam, silty clay loam, or silty clay. These soils are medium acid to very strongly acid in unlimed areas.

Dundee soils are associated with Amagon, Dubbs, and Sharkey soils. They are browner in the upper part of the B horizon than Amagon soils and lack an A2g horizon. They are grayer throughout the B horizon than Dubbs soils. They are browner and have less clay in the B horizon than Sharkey soils.

DvA—Dundee silt loam, 0 to 1 percent slopes. This level soil is on the lower parts of natural levees. Areas range from 20 to 200 acres in size. The profile of this soil is the one described as representative of the series. Included in mapping are a few undulating areas; spots of Amagon, Dubbs, and Sharkey soils; and a few small tracts that are occasionally flooded.

This soil is suited to farming, but excess water is a moderate hazard. Fieldwork is often delayed several days after a rain unless surface drains are installed. Under good management that includes adequate drainage, clean-tilled crops that leave large amounts of residue can be safely grown year after year.

Soybeans and grain sorghum are the main crops. Cotton, rice, peanuts, and winter small grain are other suitable crops. Truck crops, such as okra, green beans, sweet corn, and tomatoes, can be grown. Bermudagrass, bahiagrass, tall fescue, and white clover are suitable pasture plants. Capability unit IIw-1; pasture and hayland group 2B: woodland group 2w5; not in a range site.

DvB—Dundee silt loam, gently undulating. This soil is in alternating areas of long, narrow swales and low ridges that rise 2 to 5 feet above the swales. The areas are generally on the lower parts of natural levees. Slopes are less than 3 percent. Areas range from 10 to 200 acres in size. Included in mapping are a few narrow escarpments; small level areas; spots of Amagon, Dubbs, and Sharkey soils; and a few small tracts that are occasionally flooded.

This soil is suited to farming, but excess water is a moderate hazard. After rain, water collects in the swales and fields dry unevenly. Fieldwork is often delayed several days unless adequate surface drains are installed. Under good management that includes adequate drainage, clean-tilled crops that leave large amounts of residue can be safely grown year after year.

Soybeans and grain sorghum are the main crops. Cotton, corn, peanuts, and winter small grain are other suitable crops. Truck crops, such as okra, green beans, sweet corn, and tomatoes, can be grown. Bermudagrass, bahiagrass, tall fescue, and white clover are suitable pasture plants. Capability unit IIw-1; pasture and hayland group 2B; woodland group 2w5; not in a range site.

Foley Series

The Foley series consists of poorly drained, level soils on broad flats. These soils formed in loamy eolian or alluvial sediments that are high in content of silt. The native vegetation is mixed hardwoods and an understory of grass or shrubs.

In a representative profile the surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is grayish brown silt loam 4 inches thick and is mottled with gray and dark grayish brown. The upper 12 inches of the subsoil is grayish brown silt loam and tongues of the gray and grayish brown silt loam that extend down from the sub-

surface layer. The next 31 inches is olive gray silty clay loam. The lower part is olive gray, mottled silt loam to a depth of 72 inches or more.

Foley soils are moderate in natural fertility. Permeability is slow, and the available water capacity is medium. Because the content of sodium and magnesium is high in the lower part of the subsoil, the effective rooting depth is limited. The soils are easy to till, but the surface puddles and crusts over after rain.

If drained and well managed, these soils are suited to most crops grown in the county. Most of the acreage is cultivated.

The Foley soils in Lawrence County are mapped only with Calhoun or Lafe soils. Areas that are dominantly Lafe soils are generally idle or used for pasture.

Representative profile of Foley silt loam in an area of Foley-Calhoun complex, 0 to 1 percent slopes, in a moist cultivated area in SW¼SW¼NE¼ sec. 1, T. 15 N., R. 1 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; friable; common fine roots; few dark concretions; medium acid; clear smooth boundary.

A2g—7 to 11 inches; grayish brown (10YR 5/2) silt loam; common medium faint gray (10YR 6/1) and dark grayish brown (10YR 4/2) mottles; weak medium subangular blocky structure; friable; few fine roots; few pores; few dark concretions; medium acid; clear irregular boundary.

B1g—11 to 23 inches; grayish brown (10YR 5/2) silt loam; moderate medium subangular blocky structure; friable; gray (10YR 6/1) silt coats on peds; tongues of gray and grayish brown silt loam from A2g horizon, ½ inch to 3 inches wide, are throughout the horizon at 6- to 18-inch intervals; few roots; few dark concretions; medium acid; clear wavy boundary.

B21tg—23 to 33 inches; olive gray (5Y 5/2) silty clay loam; weak medium prismatic structure parting to moderate medium angular blocky; firm; vertical crack fills of light brownish gray (2.5Y 6/2) silt as much as ¼ inch wide between some prisms; few roots; few pores; neutral; clear smooth boundary.

B22tg—33 to 54 inches; olive gray (5Y 5/2) silty clay loam; moderate medium angular blocky structure; firm; patchy distinct clay films on faces of peds; thin vertical streaks of gray silt on faces of some peds; strongly alkaline; clear wavy boundary.

B3g—54 to 72 inches; olive gray (5Y 5/2) silt loam; few fine distinct brown (10YR 4/3) and yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; firm; few white concretions; strongly alkaline.

The Ap horizon is dark grayish brown or grayish brown. The A2g horizon is gray, grayish brown, or light brownish gray. The B1g horizon is grayish brown, light brownish gray, or gray. The B2g horizon is grayish brown or olive gray silt loam or silty clay loam. The B3g horizon is gray to olive gray. In places the C horizon is fine sandy loam. The A horizon and B1g horizon are medium acid to neutral, and the lower horizons are neutral to strongly alkaline.

Foley soils are associated with Calhoun, Crowley, Jackport, Lafe, and McCrory soils. They have alkaline layers of high sodium content at a shallower depth than Calhoun soils and at a greater depth than Lafe soils. They have less clay in the B horizon than Crowley and Jackport soils and less sand in the A and B horizons than McCrory soils.

FcA—Foley-Calhoun complex, 0 to 1 percent slopes. This level mapping unit is on broad flats. It is about 45 percent Foley silt loam, 35 percent Calhoun silt loam, and 20 percent Crowley, Jackport, Lafe, and McCrory soils. Slopes are less than 1 percent. Areas range from 10 to more than 300 acres in size. The profiles of the Foley and Calhoun soils are the ones described as representative of their respective series.

This mapping unit is suited to farming, but excess water is a severe hazard. Fieldwork is delayed several days after a rain unless surface drains are installed. Under good management that includes adequate drainage, clean-tilled crops that leave large amounts of residue can be safely grown year after year. If the unit is graded and smoothed, depth to the sodium-affected layer should be determined before cuts are made. If sodium-affected material is too near to the surface, productivity is impaired.

Soybeans and grain sorghum are the main crops. Rice and cotton also are suitable. Winter small grain can be grown if surface drainage is adequate. Bermudagrass, bahiagrass, tall fescue, and white clover are suitable pasture plants. Capability unit IIIw-3; pasture and hayland group 8F; woodland group 3w9; not in a range site.

Gepp Series

The Gepp series consists of well drained, moderately sloping to moderately steep soils on hilltops and hillsides. These soils formed in residuum from a thin layer of cherty loamy material and the underlying clayey material derived from cherty limestone or limestone and perhaps some shale. The native vegetation is hardwoods (fig. 9).

In a representative profile the surface layer is dark grayish brown cherty silt loam about 2 inches thick. The subsurface layer is brown cherty silt loam 8 inches thick. The upper 4 inches of the subsoil is yellowish red cherty silty clay loam; the next 20 inches is red clay; the next 22 inches is red, mottled clay; and the lower 16 inches is red and strong brown clay that has a few gray mottles.

Gepp soils are low in natural fertility. Permeability is moderate, and the available water capacity is medium to high. The soils respond well to fertilization. Because the surface layer is cherty, it is difficult to till.

If erosion is controlled, some areas are suitable for cultivation. Most areas are too steep and cherty and are used for pasture or range, wildlife habitat, and woodland.

Representative profile of Gepp cherty silt loam, 8 to 12 percent slopes, in a moist wooded area in SW¼NW¼NE¼ sec. 9, T. 18 N., R. 3 W.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) cherty silt loam; weak fine granular structure; very friable; many fine roots; about 50 percent, by volume, angular chert fragments ½ inch to 3 inches in diameter; medium acid; clear wavy boundary.

A2—2 to 10 inches; brown (10YR 5/3) cherty silt loam; weak medium subangular blocky structure; very friable; common fine and medium roots; about 35 percent, by volume, angular chert fragments ½ inch to 3 inches in diameter; strongly acid; gradual irregular boundary.

B1—10 to 14 inches; yellowish red (5YR 5/8) cherty silty clay loam; moderate medium subangular blocky structure; friable; few fine and medium roots; about 25 percent, by volume, angular chert fragments ½ inch to 3 inches in diameter; few pores; strongly acid; clear smooth boundary.

B21t—14 to 34 inches; red (2.5YR 4/6) clay; moderate medium angular blocky structure parting to fine angular blocky; firm; continuous distinct clay films on faces of peds; few medium roots; few pores; less than 1 percent, by volume, angular chert fragments as much as 1 inch in diameter; very strongly acid; gradual smooth boundary.

B22t—34 to 56 inches; red (2.5YR 4/6) clay; common medium distinct strong brown (7.5YR 5/8) mottles and few fine distinct light brownish gray (10YR 6/2) mottles; moderate medium angular blocky structure parting to fine angular blocky; firm; continuous distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

B3t—56 to 72 inches; mottled red (2.5YR 4/6) and strong brown (7.5YR 5/6) clay; few medium prominent gray (10YR 6/1) mottles; moderate medium subangular blocky structure parting to fine angular blocky; firm; broken faint clay films on faces of peds; few nonintersecting slickensides as much as 3 inches long; very strongly acid.

Figure 9.—**Typical upland hardwoods on Gepp cherty silt loam, 8 to 12 percent slopes. The large tree in the foreground is a den tree used by squirrels.**

The A1 horizon is dark grayish brown or very dark grayish brown. The A2 horizon is brown or yellowish brown. In cultivated areas, the Ap horizon is brown or grayish brown. In places the B1 horizon is lacking. The B2t horizon is red or yellowish red, and the lower part is mottled in shades of brown and gray. The B3t horizon is dominantly red or strong brown and is mottled with gray and yellowish brown.

Chert fragments in the A horizon range from 25 to 55 percent by volume and from 10 to 30 percent by volume in the B1 horizon. The A horizon is slightly acid to strongly acid, and the B horizon is strongly acid or very strongly acid.

Gepp soils are associated with Agnos, Boden, Clarksville, and Ventris soils. They are redder throughout than Agnos and Ventris soils. They lack the cherty B horizon of Clarksville soils. They have a thicker B horizon and less sand and more chert in the A horizon than Boden soils.

GpD—Gepp cherty silt loam, 8 to 12 percent slopes. This moderately sloping soil is mainly on toe slopes and hilltops. Areas range from 10 to 100 acres in size. The profile of this soil is the one described as representative of the series. Included in mapping are a few spots of Agnos, Boden, Clarksville, and Ventris soils.

This soil is poorly suited to cultivated crops. Runoff is rapid, and the erosion hazard is very severe. The soil is suited to sown crops, such as winter small grain and legumes, if erosion is controlled.

This soil is best suited to pasture, range, wildlife habitat, or woodland, and most of the acreage is used for those purposes. Bermudagrass, bahiagrass, tall fescue, orchardgrass, white clover, alfalfa, sericea lespedeza, and annual lespedeza are suitable pasture plants. Capability unit IVe-3; pasture and hayland group 8A; woodland group 3o7; range site Loamy Upland.

GpE—Gepp cherty silt loam, 12 to 20 percent slopes. This moderately steep soil is on sharp ridges and hillsides. Areas range from 10 to more than 300 acres in size. Included in mapping are spots of Agnos, Boden, Clarksville, and Ventris soils and a few small areas where coarse cherty fragments are on the surface.

This soil is not suitable for cultivation. The chert fragments on the surface and the slope restrict the use of farm equipment. Runoff is rapid, and the erosion hazard is severe. The soil is best suited to pasture, range, woodland, or wildlife habitat.

Most of the acreage is woodland of red oak, white oak, post oak, and hickory. Bahiagrass, weeping lovegrass, orchardgrass, tall fescue, sericea lespedeza, and annual lespedeza are suitable pasture plants. Capability unit VIe-2; pasture and hayland group 8B; woodland group 3o7; range site Loamy Upland.

Healing Series

The Healing series consists of well drained soils on flood plains of bottom lands. These soils formed in loamy alluvial sediments derived from limestone, cherty limestone, and shale. The native vegetation is bottom-land hardwoods and an understory of vines and canes.

In a representative profile the surface layer is about 9 inches of dark brown silt loam over 7 inches of very dark grayish brown silt loam. The subsoil is brown silty clay loam to a depth of 72 inches or more.

Healing soils are high in natural fertility. Permeability is moderate, and the available water capacity is high. The soils respond well to fertilization. They are easy to till and can be cultivated within a wide range of moisture content.

Most areas are frequently flooded. Most have been cleared

and are used for forage crops or pasture. A few small low-lying areas are wooded. Some higher areas are used for row crops.

Representative profile of Healing silt loam, frequently flooded, in a moist meadow in NE¼NW¼NE¼ sec. 12, T. 18 N., R. 3 W.

Ap—0 to 6 inches; dark brown (10YR 3/3) silt loam; weak medium subangular blocky structure; friable; common fine roots; few wormholes and castings; mildly alkaline; clear smooth boundary.

A12—6 to 9 inches; dark brown (10YR 3/3) silt loam; weak fine granular structure; friable; common fine roots; common wormholes and castings; few pores; mildly alkaline; clear wavy boundary.

A3—9 to 16 inches; very dark grayish brown (10YR 3/2) silt loam; moderate medium subangular blocky structure parting to weak fine granular; friable; common fine roots; few wormholes and castings; common pores; neutral; gradual smooth boundary.

B21t—16 to 27 inches; brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; few wormholes and castings; common pores; thin patchy clay films on vertical ped faces; neutral; gradual smooth boundary.

B22t—27 to 49 inches; brown (10YR 4/3) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; few wormholes and castings; thin patchy clay films on faces of peds; common pores; neutral; gradual smooth boundary.

B23t—49 to 72 inches; brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; common pores; patchy distinct films on faces of peds, in wormholes, and root channels; neutral.

The A horizon is dark brown or very dark grayish brown. The B horizon is silt loam or silty clay loam. The C horizon, which is lacking in places, ranges from silt loam to loamy sand. The content of chert throughout the profile ranges from 0 to 5 percent. The soils are slightly acid to mildly alkaline.

Healing soils are associated with Hontas and Peridge soils. Their B horizon is not so red as that of Peridge soils, and in contrast with Hontas soils it is not mottled. Healing soils have a thicker, darker A horizon than Hontas and Peridge soils.

Hc—Healing silt loam, frequently flooded. This level soil is mainly in long narrow strips along streams that drain upland areas. Areas are commonly less than ¼ mile wide and extend, unbroken, the length of the stream. Areas range from 20 to more than 300 acres in size. Slopes are less than 1 percent. Included in mapping are small undulating areas where slopes are 2 percent; gravel and sand bars along streams; soils similar to this Healing soil but lack a subsoil; soils that have more sand in the profile than is typical of the series; and spots of Hontas and Peridge soils.

This soil is poorly suited to farming because the hazard of frequent flooding is severe. In most years floods occur between December and June. A few small areas are protected by upstream, flood-control impoundments. The soil is best suited to pasture, woodland, and wildlife habitat. If management is good, warm-season crops that leave large amounts of residue can be grown most years. Flooding often delays planting, and in some years it severely damages or destroys the crop.

Soybeans and grain sorghum are the main crops. Most of the acreage is used for improved pasture and hay. Bermudagrass, orchardgrass, redtop, tall fescue, and white clover are suitable pasture plants. Capability unit IVw-1; pasture and hayland group 2A; woodland group 2o7; not in a range site.

Hillemann Series

The Hillemann series consists of somewhat poorly drained, level soils on broad flats. These soils formed in dominantly loamy eolian or alluvial sediments that are high in content of silt. The native vegetation is hardwoods.

In a representative profile the surface layer is brown silt loam about 7 inches thick. The subsurface layer is grayish brown, mottled silt loam 4 inches thick. The upper 5 inches of the subsoil is light brownish gray, mottled silt loam; the next 9 inches is grayish brown, mottled silty clay; the next 10 inches is grayish brown, mottled silty clay loam; and the lower 31 inches is light brownish gray, mottled silt loam. The underlying material is yellowish brown, mottled very fine sandy loam to a depth of 72 inches or more.

Hillemann soils are moderate in natural fertility. Permeability is very slow, and the available water capacity is medium. The lower part of the subsoil has a moderately high concentration of sodium and magnesium. The soils respond well to fertilization. They are easy to till, but the surface puddles and crusts over after rain.

If drained and well managed, these soils are suited to most crops grown in the county. Most of the acreage is cultivated.

Representative profile of Hillemann silt loam in a moist cultivated area in SE¼SE¼SE¼ sec. 8, T. 17 N., R. 2 E.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; few medium distinct grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; very friable; common dark concretions; medium acid; clear smooth boundary.

A2—7 to 11 inches; grayish brown (10YR 5/2) silt loam; common medium distinct dark yellowish brown (10YR 3/4) mottles; weak medium subangular blocky structure; very friable; few fine roots; few pores; common fine dark concretions; medium acid; clear wavy boundary.

B1—11 to 16 inches; light brownish gray (10YR 6/2) silt loam; common medium distinct yellowish brown (10YR 5/8), common medium prominent red (2.5YR4/8), and few faint gray mottles; moderate medium subangular blocky structure; friable; thin patchy clay films on faces of peds; silt coats cover most faces of peds; few fine roots; few pores; common dark concretions; strongly acid; clear wavy boundary.

B21t—16 to 25 inches; grayish brown (10YR 5/2) silty clay; common fine and medium red (2.5YR 5/8) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; common thin clay films on faces of peds and in pores; few vertical streaks of gray silty clay loam about ½ inch wide between prisms; few fine roots; few pores; common fine black concretions and accretions; strongly acid; clear smooth boundary.

B22t—25 to 35 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/8) mottles and few fine red and brown mottles; moderate medium subangular blocky structure; firm; common thin clay films on faces of peds; few fine roots; few pores; common black concretions and accretions; strongly acid; gradual wavy boundary.

B3—35 to 66 inches; light brownish gray (2.5Y 6/2) silt loam; common medium distinct brown (10YR 4/3) mottles; weak medium subangular blocky structure; friable; patchy faint clay films on vertical faces of peds; few pores; medium acid; gradual smooth boundary.

IIC—66 to 72 inches; yellowish brown (10YR 5/4) very fine sandy loam; few medium faint grayish brown mottles; massive; few bedding planes; friable; few black stains; medium acid.

The Ap horizon is brown or dark grayish brown. The A2 horizon, which is lacking in places, is grayish brown, light brownish gray, or gray. The B horizon lacks red mottles in places. The B1 horizon and B2 horizon are grayish brown or light brownish gray. The B1 horizon is silt loam or silty clay loam. The B21t horizon is silty clay loam or silty clay. The B22t horizon is silty clay loam or silt loam. The B3 horizon is gray, grayish brown, or light brownish gray. The C horizon is silt loam to loamy fine sand. The A horizon and B horizon are medium acid or strongly acid in unlimed areas. The C horizon is medium acid or slightly acid.

Hillemann soils are associated with Calhoun, Crowley, Foley, and Jackport soils. They have less clay in the B horizon than

Crowley and Jackport soils. They are more acid in the B2t horizon than Foley soils and commonly have a red, mottled subhorizon in the B2t horizon that is lacking in Foley and Calhoun soils.

Hn—Hillemann silt loam. This level soil is at the higher elevations on broad flats. The slope is less than 1 percent. Areas range from 10 to 150 acres in size. Included in mapping are a few areas where slope is 1 to 3 percent; a few narrow escarpments; and spots of Calhoun, Crowley, Foley, and Jackport soils.

This soil is suited to farming, but excess water is a moderate hazard. Fieldwork is often delayed several days after a rain unless surface drains are installed. Under good management that includes adequate drainage, clean-tilled crops that leave large amounts of residue can be safely grown year after year. Depth to the subsoil should be determined before cuts are made because in places the subsoil is a plastic, sticky silty clay. If the subsoil is exposed at the surface by grading, cultivation is difficult. Also, if brought too near to the surface by grading and smoothing, the sodium-affected material within the subsoil seriously affects the growth and yields of crops.

Soybeans and cotton are the main crops. Grain sorghum, rice, and corn also are suitable crops. Winter small grain can be grown where surface drainage is adequate. Bermudagrass, bahiagrass, tall fescue, white clover, and annual lespedeza are suitable pasture plants. Capability unit IIw-2; pasture and hayland group 8F; woodland group 3w9; not in a range site.

Hontas Series

The Hontas series consists of moderately well drained, level soils on the flood plains along creeks and rivers. These soils formed in loamy alluvial sediments washed from soils formed in dominantly cherty limestone material. They are subject to frequent flooding. The native vegetation is hardwoods.

In a representative profile the surface layer is brown silt loam about 11 inches thick. The upper 4 inches of the subsoil is brown, mottled silt loam; the next 6 inches is mottled brown and grayish brown silt loam; and the lower 10 inches is brown, mottled silt loam. The underlying material is grayish brown and gray, mottled silt loam and silty clay loam to a depth of 72 inches or more.

Hontas soils are high in natural fertility. Permeability is moderate, and the available water capacity is high. The soils respond well to fertilization. They are easy to till, and can be cultivated within a wide range of moisture content.

Because of frequent flooding, most of the acreage is used for forage crops (fig. 10).

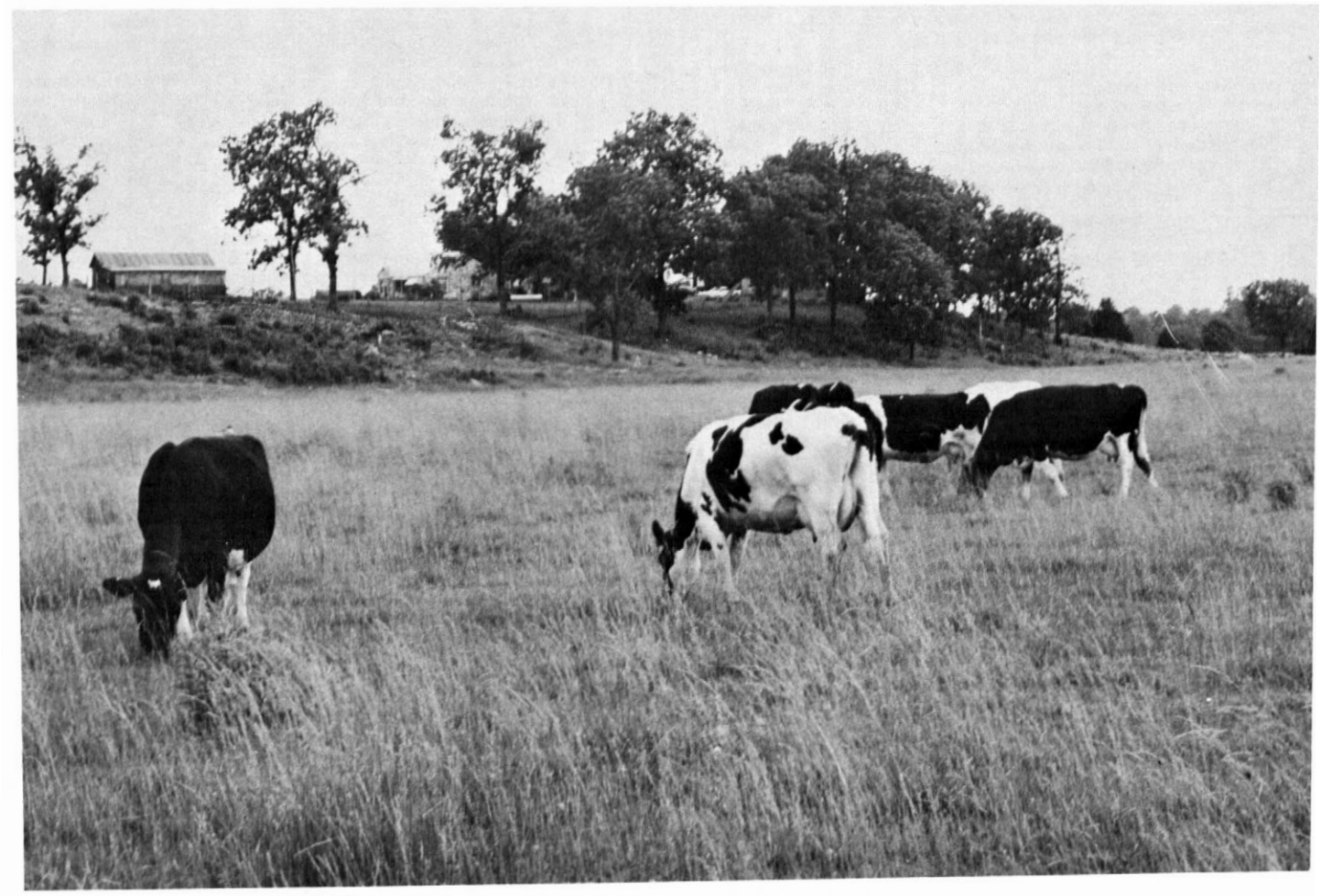

Figure 10.—**Hontas soils, frequently flooded, are poorly suited to crops, but produce excellent forage for livestock.**

Representative profile of Hontas silt loam in an area of Hontas soils, frequently flooded, in a moist cultivated area in NW¼SW¼NW¼ sec. 22, T. 16 N., R. 3 W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable; few fine roots; few fine concretions; slightly acid; clear smooth boundary.

A12—7 to 11 inches; brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable; few fine roots; few wormholes and castings; few pores; slightly acid; clear smooth boundary.

B21—11 to 15 inches; brown (10YR 4/3) silt loam; common medium faint brown (10YR 5/3) and grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable; few fine roots; common pores; few black concretions; medium acid; clear wavy boundary.

B22—15 to 21 inches, mottled brown (10YR 4/3) and grayish brown (10YR 5/2) silt loam; weak medium subangular blocky structure; friable; few fine roots; common pores; common dark concretions; medium acid; gradual wavy boundary.

B23—21 to 31 inches; brown (10YR 5/3) silt loam; common medium faint grayish brown (10YR 5/2) mottles and few medium faint dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; common pores; few fine dark concretions; medium acid; clear wavy boundary.

C1—31 to 38 inches; grayish brown (10YR 5/2) silt loam; common medium distinct gray (10YR 5/1), brown (10YR 5/3), and yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; many pores; common dark concretions; strongly acid; clear wavy boundary.

C2—38 to 49 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct brown (10YR 4/4) and gray (10YR 6/1) mottles; moderate medium subangular blocky structure; friable; many pores; common small and medium black concretions; medium acid; clear wavy boundary.

C3—49 to 72 inches; gray (10YR 5/1) silty clay loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; friable; broken distinct clay films; common pores; common black concretions; mildly alkaline.

The A horizon is brown or dark yellowish brown. It is slightly acid or neutral. The B horizon is brown, yellowish brown, or dark yellowish brown. It is slightly acid or medium acid. The C horizon is grayish brown, gray, or dark gray silt loam or silty clay loam. It is slightly acid to mildly alkaline.

Hontas soils are associated with Healing and Peridge soils. In contrast with those soils, they have grayish brown mottles in the B horizon.

Ho—Hontas soils, frequently flooded. This moderately well drained, level mapping unit is on flood plains along small streams and on low bends along the Black River. Slopes are less than 2 percent. Most areas range from 20 to more than 300 acres in size. The unit is about 35 percent Hontas soils, 30 percent soils that are slightly grayer and have slightly less clay in the subsoil, and 20 percent soils that lack a subsoil and have thin sandy strata. Included in mapping are a few spots of Healing and Peridge soils.

This mapping unit is poorly suited to farming because the hazard of frequent flooding is severe. In most years floods occur between December and June. A few small areas are protected by upstream, flood-control impoundments. The unit is best suited to pasture, woodland, and wildlife habitat. If management is good, warm-season crops that leave large amounts of residue can be grown most years. Flooding often delays planting, and in some years it severely damages or destroys the crop.

Soybeans and grain sorghum are the main crops. Most of the acreage is used for improved pasture and hay. Bermudagrass, tall fescue, and white clover are suitable pasture plants. Capability unit IVw-1; pasture and hayland group 2A; woodland group 2w7; not in a range site.

Jackport Series

The Jackport series consists of poorly drained, level soils in abandoned backswamps. These soils formed in beds of dominantly clayey sediments. The native vegetation is hardwoods, mainly water-tolerant oaks.

In a representative profile the surface layer is 8 inches of dark grayish brown silty clay that is mottled in the lower 3 inches. The upper 8 inches of the subsoil is dark grayish brown silty clay; the next 10 inches is grayish brown, mottled clay; and the lower 6 inches is grayish brown clay. The underlying material to a depth of 72 inches or more is olive gray mottled silty clay, silty clay loam, and fine sandy loam.

Jackport soils are moderate in natural fertility. Permeability is very slow, and the available water capacity is high. The soils respond well to fertilization. The surface clods if plowed when wet, and seedbed preparation is difficult. The soil shrinks and cracks when dry. When wet, it expands and the cracks seal.

If adequately drained, these soils are suited to most crops grown in the county. Most of the acreage is cultivated.

Representative profile of Jackport silty clay in a moist cultivated area in NE¼NE¼NW¼ sec. 12, T. 16 N., R. 1 E.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silty clay; weak medium subangular blocky structure; firm; few fine roots; medium acid; abrupt smooth boundary.

A12—5 to 8 inches; dark grayish brown (10YR 4/2) silty clay; common fine distinct brown mottles; moderate medium subangular blocky structure; firm; common fine roots; common fine black accretions; strongly acid; clear smooth boundary.

B21tg—8 to 16 inches; dark grayish brown (10YR 4/2) silty clay; moderate medium subangular blocky structure; firm; peds have shiny faces; few roots that have yellowish red and brown stains lining their channels; few fine black accretions; very strongly acid; clear smooth boundary.

B22tg—16 to 26 inches; grayish brown (10YR 5/2) clay; few coarse faint dark grayish brown (10YR 4/2) mottles; moderate medium subangular blocky structure; firm; few slickensides; common pressure faces; peds have shiny faces; few roots that have brown stains along their channels; very strongly acid; clear wavy boundary.

B3g—26 to 32 inches; grayish brown (2.5Y 5/2) clay; weak medium subangular blocky structure; firm; few slickensides; few roots that have brown stains along their channels; very strongly acid; clear wavy boundary.

C1g—32 to 42 inches; olive gray (5Y 5/2) silty clay; massive; firm; few root channels; few fine black accretions; neutral; clear smooth boundary.

C2g—42 to 60 inches; olive gray (5Y 5/2) silty clay loam; common fine distinct brown mottles; massive; firm; patchy clay films in vertical crevices; few pores; common fine black accretions; few white calcium carbonate concretions; mildly alkaline; gradual smooth boundary.

IICg—60 to 72 inches; olive gray (5Y 5/2) fine sandy loam; common medium distinct brown (10YR 5/3) mottles; moderate medium subangular blocky structure; friable; few black stains; few pores; mildly alkaline.

The Ap horizon is very dark grayish brown or dark grayish brown. The A12 horizon is lacking in places. The B21t horizon is dark grayish brown or grayish brown clay or silty clay. The B22t horizon is grayish brown or olive gray. The B3 horizon is olive gray or grayish brown clay, silty clay, or silty clay loam. The C horizon is at a depth of 30 to 50 inches. It is silty clay, silty clay loam, or fine sandy loam.

Except where the soil has been limed or where it has been irrigated for several years, the A horizon is medium acid or strongly acid. The B horizon is strongly acid or very strongly acid, and the C horizon is slightly acid to mildly alkaline.

Jackport soils are associated with Calhoun, Crowley, Foley, and

Hillemann soils. They have a finer textured A horizon than those soils. They lack the A2 horizon that is typical of Crowley soils. They have more clay in the B horizon than Calhoun, Foley, and Hillemann soils.

Ja—Jackport silty clay. This level soil is in broad depressions. Slopes are generally less than 1 percent. Areas range from 20 to more than 500 acres in size. Included in mapping are spots of Calhoun, Crowley, Foley, and Hillemann soils. Also included are irrigated areas where the upper part of the subsoil is slightly acid or neutral.

This soil is suited to farming, but excess water is a severe hazard. Fieldwork is often delayed several days after a rain unless surface drains are installed to prevent ponding. Under good management that includes adequate drainage, clean-tilled crops that leave large amounts of residue can be safely grown year after year.

Soybeans is the main crop. Rice and grain sorghum are other suitable crops (fig. 11). Winter small grain can be grown if surface drainage is adequate. Bermudagrass, tall fescue, and white clover are suitable pasture plants. Capability unit IIIw-4; pasture and hayland group 1A; woodland group 2w6; not in a range site.

Lafe Series

The Lafe series consists of somewhat poorly drained, level soils on broad flats. These soils formed in beds of loamy eolian or alluvial sediments that are high in content of silt. The native vegetation is a sparse stand of drought-tolerant trees and forbs and an understory of grasses (fig. 12).

In a representative profile the surface layer is brown silt loam about 7 inches thick. The subsurface layer is grayish brown, mottled silt loam 3 inches thick. The upper 10 inches of the subsoil is yellowish brown, mottled silt loam, and the lower 15 inches is brown, mottled silt loam. The underlying material is light brownish gray, mottled silt loam that extends to a depth of 72 inches or more.

Lafe soils are low in natural fertility. Permeability is very slow, and the available water capacity is low. The response to fertilization is poor.

Because of the high content of sodium and magnesium, at toxic levels to most plants, these soils are poorly suited to cultivated crops. They are best suited to pasture and wildlife habitat.

The Lafe soils in this county are mapped with Foley soils.

Representative profile of Lafe silt loam in a moist cultivated area of Lafe-Foley complex, 0 to 1 percent slopes, in SE¼NE¼SW¼ sec. 18, T. 15 N., R. 2 E.

A1—0 to 7 inches; brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable; few fine roots; few pores; few dark concretions; strongly acid; clear smooth boundary.

A2—7 to 10 inches; grayish brown (10YR 5/2) silt loam; common fine faint gray and brown mottles; weak medium sub-

Figure 11.—**Rice grows well on Jackport silty clay.**

Figure 12.—**Native vegetation on Lafe silt loam in an area of Lafe-Foley complex, 0 to 1 percent slopes.**

angular blocky structure; friable; few fine roots; common pores; few dark concretions; medium acid; clear smooth boundary.

B21t—10 to 20 inches; yellowish brown (10YR 5/4) silt loam; common fine faint grayish brown (10YR 5/2), dark grayish brown (10YR 4/2), and gray (10YR 6/1) mottles; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm; continuous distinct clay films on faces of peds; pale brown silt coatings on prism faces; few pores; few medium roots; few dark concretions; moderately alkaline; clear wavy boundary.

B22t—20 to 35 inches; brown (10YR 5/3) silt loam; common fine faint grayish brown, gray, and yellowish brown mottles; moderate medium subangular blocky structure; very firm; continuous distinct clay films on faces of some peds and in pores; pale brown and gray silt coats on some peds; many black stains; few dark concretions; strongly alkaline; gradual wavy boundary.

C—35 to 72 inches; light brownish gray (10YR 6/2) silt loam; common medium distinct brown (7.5YR 4/4) mottles; massive; hard and compact in place; firm; strongly alkaline.

The A1 horizon is brown or dark brown. The A2 horizon is lacking in places. The Ap horizon is 4 to 6 inches thick and is brown, grayish brown, or dark grayish brown. The B2t horizon is brown or yellowish brown silt loam or silty clay loam and is mottled in shades of brown and gray. The C horizon is gray to pale brown fine sandy loam or silt loam.

The A horizon is strongly acid or medium acid. The B21 horizon is mildly alkaline to moderately alkaline, and the B22 and C horizons are moderately alkaline or strongly alkaline.

Lafe soils are associated with Calhoun and Foley soils. The high concentration of sodium and magnesium is nearer the surface than in those soils.

LfA—Lafe-Foley complex, 0 to 1 percent slopes. This level mapping unit is on broad flats. Individual areas range from 20 to more than 300 acres in size and are 25 to 75 percent Lafe soil and 25 to 75 percent Foley soil. About 55 percent of the total acreage is Lafe silt loam, 35 percent is Foley silt loam, and 10 percent is spots of Calhoun silt loam. The profile of the Lafe soil is the one described as representative of the series.

This mapping unit is poorly suited to farming because of droughtiness and the high concentration of sodium and magnesium in the subsoil. Plants grown on the Lafe soil in this unit are stunted in many places, and in some spots die before maturity. Plants grown on the Foley soil thrive better and are more productive. Excess surface water is also a severe hazard. Fieldwork is delayed several days after a rain unless surface drains are installed. Grading and smoothing is generally not feasible because of the shallow depth to sodium-affected material, which if brought too near to the surface further restricts productivity.

About half the acreage is used for cultivated row crops, such as soybeans and grain sorghum. The rest is idle or used for pasture. Where surface drainage is adequate, shallow-rooted, cool-season plants thrive better than warm-season crops. This mapping unit is best suited to pasture and wild-

life habitat. Bermudagrass and annual lespedeza are the best suited pasture plants. Capability unit IVs-1; pasture and hayland group 8E; woodland group 5t0; range site Alkali Flats.

Loring Series

The Loring series consists of moderately well drained, gently sloping and moderately sloping soils on hillcrests, hillsides, and valleysides in the uplands. These soils formed in loamy windblown sediments high in content of silt. The native vegetation is hardwoods.

In a representative profile the surface layer is dark yellowish brown silt loam about 4 inches thick. The upper 6 inches of the subsoil is strong brown silt loam, and the next 9 inches is yellowish brown silty clay loam. Below this is a firm, brittle fragipan. The upper 33 inches of the pan is strong brown, mottled and streaked silty clay loam, and the lower part is brown silt loam to a depth of 72 inches or more.

Loring soils are moderate in natural fertility. Permeability is moderately slow, and the available water capacity is high. The firm, brittle fragipan slows the movement of water through the soil and restricts root penetration. The soils respond well to fertilization. They are easy to till.

If erosion is controlled, these soils are suitable for cultivation. A small acreage is used for crops. Most is used for pasture and woodland.

Representative profile of Loring silt loam, 3 to 8 percent slopes, eroded, in a moist meadow in SW¼SW¼SE¼ sec. 17, T. 16 N., R. 2 W.

Ap—0 to 4 inches; dark yellowish brown (10YR 4/4) silt loam and pieces of strong brown (7.5YR 5/6) silt loam from the B21t horizon; weak medium subangular blocky structure; friable; common wormholes and castings; common fine roots; few fine dark concretions; slightly acid; clear smooth boundary.

B21t—4 to 10 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; friable; continuous thin clay films on faces of peds; common fine roots; few fine pores; few fine dark concretions; strongly acid; clear smooth boundary.

B22t—10 to 19 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; continuous thin clay films on faces of peds; few fine roots; few fine pores; few fine dark concretions; strongly acid; clear wavy boundary.

Bx1—19 to 35 inches; strong brown (7.5YR 5/6) silty clay loam; moderate coarse prismatic structure parting to moderate medium angular blocky; firm; compact and brittle; continuous distinct clay films on faces of peds; pale brown (10YR 6/3) and brown (7.5YR 5/4) silty clay loam in cracks; common pores; strongly acid; diffuse boundary.

Bx2—35 to 42 inches; strong brown (7.5YR 5/6) silty clay loam; common medium distinct yellowish red (5YR 4/6) mottles and ped coatings; moderate coarse prismatic structure parting to moderate medium angular blocky; hard; compact and brittle; continuous distinct and prominent clay films on faces of peds; streaks of brown (7.5YR 5/4) and gray (10YR 6/1) silty clay loam between prisms; common pores; strongly acid; gradual wavy boundary.

Bx3—42 to 52 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium angular blocky structure; hard; compact and brittle; vertical and horizontal lenses of gray (10YR 6/1) silty clay about ¼ inch thick; continuous distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bx4—52 to 72 inches; brown (7.5YR 4/4) silt loam; moderate medium angular blocky structure; hard; compact and brittle; few crack fills of brown (7.5YR 5/4) and pale brown (10YR 6/3) silt; few pores; strongly acid.

The Ap horizon ranges from dark yellowish brown to brown. In undisturbed areas the A1 horizon is dark grayish brown and is 1 inch to 3 inches thick. If present, the A12 horizon is brown or yellowish brown silt loam and is 0 to 5 inches thick. The B2t horizon is strong brown, brown, or yellowish brown silt loam or silty clay loam. The Bx horizon is at a depth of 18 to 26 inches. It is strong brown, brown, and yellowish brown silt loam or silty clay loam and is mottled in shades of gray, brown, and red. The A horizon is slightly acid to strongly acid, and the B horizon is medium acid or strongly acid.

Loring soils are associated with Captina and Portia soils. They have more than 35 percent base saturation within 30 inches beneath the top of the fragipan, and Captina soils have less than 35 percent base saturation within this depth. They have less sand throughout than Portia soils.

LoC2—Loring silt loam, 3 to 8 percent slopes, eroded. This gently sloping soil is on hillcrests and hillsides. Areas range from 20 to more than 200 acres in size. There are a few rills and shallow gullies. The profile of this soil is the one described as representative of the series. Included in mapping are a few spots of Captina and Portia soils and a few, small, severely eroded areas.

This soil is suited to farming, but runoff is medium to rapid and the erosion hazard is severe. Under good management that includes contour cultivation and terraces, clean-tilled crops that leave large amounts of residue can be safely grown year after year in less sloping areas. Conservation must be intensified as slope increases.

Soybeans, grain sorghum, winter small grain, and truck crops, such as okra and cucumbers, are the main crops. Potatoes, tomatoes, strawberries, and melons are also suited. Fruit crops, such as peaches, apples, and pears, are suited. Most of the acreage of this soil was once cultivated but is now used mainly for pasture and meadow. Bermudagrass, bahiagrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza are suitable pasture plants. Capability unit IIIe-1; pasture and hayland group 8A; woodland group 3o7; not in a range site.

LoD2—Loring silt loam, 8 to 12 percent slopes, eroded. This moderately sloping soil is mainly on hillcrests or hillsides. Areas range from 20 to more than 300 acres in size. There are a few rills and shallow gullies in most areas. In some areas a few gullies are uncrossable by farm machinery. Included in mapping are spots of Captina and Portia soils; a few small severely eroded areas; a few small areas where slopes are as much as 16 percent; and some wooded areas that have little evidence of erosion except for a thin surface layer.

This soil is poorly suited to cultivated row crops because of slope. Runoff is rapid, and the erosion hazard is very severe. Under good management that includes terraces and contour cultivation, clean-tilled crops and sown crops that leave large amounts of residue can be grown in rotation with grasses and legumes. Winter small grain is the best suited crop.

Most of the acreage of this soil is used for pasture or range and woodland. The soil is best suited to those purposes. Bermudagrass, bahiagrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza are suitable pasture plants. Capability unit IVe-1; pasture and hayland group 8A; woodland group 3o7; not in a range site.

McCrory Series

The McCrory series consists of poorly drained, level soils on broad flats and lower parts of natural levees. These soils formed in beds of loamy alluvial sediments. The native vegetation is hardwoods.

In a representative profile the surface layer is dark grayish brown fine sandy loam about 8 inches thick. The subsurface layer is gray, mottled fine sandy loam about 4 inches thick. The upper 8 inches of the subsoil is dark gray, mottled fine sandy loam; the next 12 inches is dark gray loam; and the lower 12 inches is dark gray, mottled fine sandy loam. The underlying material is grayish brown loamy fine sand to a depth of 72 inches or more.

McCrory soils are moderate in natural fertility. Permeability is slow, and the available water capacity is medium. The soils respond well to fertilization. They are easy to till and can be cultivated within a wide range of moisture content.

If drained and well managed, these soils are suited to most crops grown in the county. Most of the acreage is cultivated.

Representative profile of McCrory fine sandy loam in a moist cultivated area in NW¼NE¼NW¼ sec. 36, T. 17 N., R. 1 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine and medium granular structure; very friable; few fine roots; few dark concretions; strongly acid; abrupt smooth boundary.

A2g—8 to 12 inches; gray (10YR 6/1) fine sandy loam; common medium faint light brownish gray (10YR 6/2) and pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable; few fine roots; common pores; few fine dark concretions; strongly acid; clear wavy boundary.

B1g—12 to 20 inches; dark gray (10YR 4/1) fine sandy loam; common fine faint dark grayish brown mottles; weak coarse prismatic structure; friable; light brownish gray (10YR 6/2) coatings on vertical faces of peds; few fine roots; many pores; strongly acid; clear wavy boundary.

B21tg—20 to 32 inches; dark gray (10YR 4/1) loam; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm; continuous distinct very dark gray (10YR 3/1) clay films on faces of peds; coatings of grayish brown (10YR 5/2) fine sandy loam on prism faces; few fine roots; few brown stains; moderately alkaline; clear wavy boundary.

B22t—32 to 44 inches; dark gray (10YR 4/1) fine sandy loam; common medium faint light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; continuous thin clay films; few fine roots; few pores; few calcium carbonate concretions; moderately alkaline; gradual wavy boundary.

Cg—44 to 72 inches; grayish brown (2.5Y 5/2) loamy fine sand; massive; moderately alkaline.

The A2 horizon is gray or grayish brown. In places the A2 horizon or B1 horizon is lacking. The B horizon is dark gray, gray, or grayish brown fine sandy loam or loam. The C horizon ranges from loamy fine sand to fine sandy loam.

The A horizon is medium acid or strongly acid in unlimed areas. The B1 horizon is medium acid or strongly acid. The upper part of the B2 horizon is strongly acid to moderately alkaline. The lower part of the B2 horizon and the C horizon range from neutral to moderately alkaline.

McCrory soils are associated with Bosket, Foley, Patterson, and Tuckerman soils. They are grayer throughout than Bosket soils. They have more sand throughout the A and B horizons than Foley soils. They are not so acid in the lower part of the B horizon as Patterson and Tuckerman soils.

Mc—McCrory fine sandy loam. This level soil is in depressions on flats and on low natural levees adjacent to small natural drainageways. Slopes are less than 1 percent. Areas range from 20 to 300 acres in size. Included in mapping are spots of Bosket, Foley, Patterson, and Tuckerman soils; spots of a soil that is similar to this McCrory soil except for the acid layers extending to a slightly greater depth; and spots where less clay is in the subsoil than is typical for the McCrory soils.

This soil is suited to farming, but excess water is a severe hazard. Some areas are flooded occasionally, but rarely between June and January. Fieldwork is delayed several days after a rain unless surface drains are installed. Under good management that includes adequate drainage, clean-tilled crops that leave large amounts of residue can be safely grown year after year.

Soybeans and grain sorghum are the main crops, and cotton also is suited. Winter small grain is grown where surface drainage is adequate, but the crop may be damaged by flooding at lower elevations during some years. Bermudagrass, bahiagrass, tall fescue, annual lespedeza, and white clover are suitable pasture plants. Capability unit IIIw-3; pasture and hayland group 8F; woodland group 3w6; not in a range site.

Patterson Series

The Patterson series consists of somewhat poorly drained, level soils in depressions in natural levees. These soils formed in loamy alluvial sediments. The native vegetation is hardwoods.

In a representative profile the surface layer is dark grayish brown fine sandy loam about 11 inches thick. The subsoil is grayish brown, mottled fine sandy loam 21 inches thick. The underlying material is gray, mottled loamy fine sand, fine sandy loam, and loamy sand to a depth of 72 inches or more.

Patterson soils are moderate in natural fertility. Permeability is moderately rapid, and the available water capacity is medium to low. The soils respond well to fertilization. They are easy to till and can be cultivated within a wide range of moisture content. Because of wetness, seedbed preparation and planting are commonly delayed in spring.

These soils are suited to most crops grown in the county. Most of the acreage is cultivated. The rest is used for pasture and woodland.

Representative profile of Patterson fine sandy loam in a moist cultivated area in NW¼NW¼SW¼ sec. 27, T. 17 N., R. 1 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; very friable; common fine roots; few dark concretions; medium acid; abrupt smooth boundary.

A12—7 to 11 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine subangular blocky structure; friable; few fine roots; few dark concretions; medium acid; clear smooth boundary.

B21tg—11 to 24 inches; grayish brown (10YR 5/2) fine sandy loam; common medium distinct dark yellowish brown (10YR 4/4) mottles and few fine faint gray mottles; moderate medium subangular blocky structure; friable; clay bridges on sand grains; few fine roots; common pores; few dark accretions and concretions; very strongly acid; clear wavy boundary.

B22tg—24 to 32 inches; grayish brown (10YR 5/2) fine sandy loam; common medium distinct dark yellowish brown (10YR 4/4) and few medium faint light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; patchy distinct clay films on faces of peds and as bridges on sand grains; few pores; few dark accretions; very strongly acid; gradual wavy boundary.

C1—32 to 38 inches; gray (10YR 6/1) loamy fine sand; few medium and coarse distinct yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) mottles; single grained; very friable; very strongly acid; clear smooth boundary.

C2—38 to 46 inches; gray (10YR 6/1) fine sandy loam; few medium distinct yellowish brown (10YR 5/8) and brown (10YR 4/3) mottles; weak medium subangular blocky structure; friable; strongly acid; clear smooth boundary.

C3—46 to 72 inches; gray (10YR 6/1) loamy sand; massive; very friable; strongly acid.

The A horizon ranges from dark grayish brown to brown. The B horizon is grayish brown or dark grayish brown. In places there is a IIC or buried horizon of finer texture at a depth of 40 inches or more. Mottles are in shades of gray and brown throughout.

The A horizon is slightly acid or medium acid in unlimed areas. The B horizon and C horizon are strongly acid or very strongly acid.

Patterson soils are associated with Beulah, McCrory, and Tuckerman soils. They are grayer throughout than Beulah soils. They have less clay in the B horizon than McCrory and Tuckerman soils. They are more acid in the lower part of the B horizon than McCrory soils.

Pa—Patterson fine sandy loam. This level soil is in depressions in natural levees. Slopes are less than 1 percent. Areas range from 15 to 200 acres in size. Included in mapping are spots of Beulah, McCrory, and Tuckerman soils and a soil that is similar to this Patterson soil but has a grayer subsoil.

This soil is suited to farming, but excess water is a moderate hazard. Fieldwork is delayed in spring and after heavy rain unless surface drains are installed. Under good management that includes adequate drainage, clean-tilled crops that leave large amounts of residue can be safely grown year after year.

Soybeans is the main crop. Corn, cotton, and grain sorghum are other suitable crops. Where surface drainage is adequate, winter small grain is grown. Bahiagrass, bermudagrass, tall fescue, and white clover are suitable pasture plants. Capability unit IIw-1; pasture and hayland group 2B; woodland group 2s5; not in a range site.

Peridge Series

The Peridge series consists of well drained, gently sloping soils on old stream terraces. These soils formed in thick beds of loamy and clayey alluvial sediments derived from limestone, cherty limestone, or interbedded limestone and siltstone. The native vegetation is mixed hardwoods.

In a representative profile the surface layer is brown silt loam about 4 inches thick. The upper 40 inches of the subsoil is red silty clay loam; the next 22 inches is red and yellowish red, mottled silty clay; and the lower part is equally mottled, yellowish brown, strong brown, and yellowish red clay to a depth of 72 inches or more.

Peridge soils are moderate in natural fertility. Permeability is moderate, and the available water capacity is high. The soils respond well to fertilization. Good tilth is easy to maintain, except in areas where erosion has removed most of the silt loam surface layer and exposed the clayey subsoil. Clods form if the soils are plowed when wet. The soils are susceptible to erosion.

These soils are suited to most crops grown in the county. Most of the acreage is used for pasture and meadow.

Representative profile of Peridge silt loam, 3 to 8 percent slopes, eroded, in a moist meadow in SE¼SW¼NE¼ sec. 16, T. 18 N., R. 2 W.

Ap—0 to 4 inches; brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable; common fine roots; few wormholes and castings; slightly acid; abrupt smooth boundary.

B21t—4 to 29 inches; red (2.5YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable; continuous distinct clay films on faces of peds and in pores; common fine roots; few wormholes and castings; few pores; few fine dark concretions; few small chert fragments less than 1 inch in diameter; few dark stains on faces of some peds; very strongly acid; gradual wavy boundary.

B22t—29 to 44 inches; red (2.5YR 4/8) silty clay loam; strong medium angular blocky structure; friable; continuous prominent clay films on faces of peds; few fine roots; few pores; few fine black concretions; few thin strong brown silt coats on peds; few animal holes; few chert fragments; very strongly acid; gradual wavy boundary.

B23t—44 to 54 inches; red (2.5YR 4/8) silty clay; few medium distinct brown (7.5YR 5/4) mottles; strong medium subangular blocky structure parting to fine angular blocky; friable; continuous prominent clay films on faces of peds; few fine roots; few pores; few organic matter stains on faces of peds; very strongly acid; clear wavy boundary.

B24t—54 to 58 inches; yellowish red (5YR 5/8) silty clay; medium distinct brown (7.5YR 5/4) mottles; moderate medium angular blocky structure parting to weak fine angular blocky; friable; continuous distinct clay films on faces of peds; few pores; few wormholes and root channels; silt coats on vertical peds; few small chert fragments; common black stains on faces of peds; very strongly acid; clear wavy boundary.

B25t—58 to 66 inches; yellowish red (5YR 5/8) silty clay; few medium distinct strong brown (7.5YR 5/6) mottles; strong brown coatings on faces of peds; strong medium angular blocky structure parting to weak fine angular blocky; firm; few slickensides; continuous distinct clay films; few pores; common black stains on faces of peds; very strongly acid; clear wavy boundary.

B26t—66 to 72 inches; mottled yellowish red (5YR 4/8), strong brown (7.5YR 5/8), and yellowish brown (10YR 5/8) clay; strong medium angular blocky structure parting to weak fine angular blocky; firm; continuous distinct clay films on faces of peds; few pores; common dark stains on faces of peds; very strongly acid.

The B horizon is red or yellowish red. Mottles in shades of brown and yellow are at a depth of 30 to 40 inches. Texture below a depth of 42 inches ranges from silty clay loam to clay. In unlimed areas, the soils range from medium acid to very strongly acid throughout.

Peridge soils are associated with Healing and Hontas soils. They have a redder B horizon than those soils.

PeC2—Peridge silt loam, 3 to 8 percent slopes, eroded. This gently sloping soil is on hillsides and toe slopes adjacent to bottom land along major creeks and rivers that drain the uplands. Sheet and rill erosion has reduced the surface layer to a thin layer in most places and exposed the subsoil in many spots. Areas range from 15 to 100 acres in size. Included in mapping are a few small areas where slopes are as much as 12 percent; spots of Healing and Hontas soils; and a soil that is similar to this Peridge soil but is only 40 inches deep over bedrock.

This soil is suited to farming, but runoff is moderate and the erosion hazard is severe. Under good management that includes contour cultivation and terraces, clean-tilled crops that leave large amounts of residue can be safely grown year after year in the less sloping areas. More intensive management is needed with increasing slope.

Soybeans, winter small grain, and truck crops, such as okra and cucumbers, are the main crops. Strawberries, green beans, and melons and fruit crops, such as peaches, apples, and pears, are suited. Corn, sweet sorghum, and grain sorghum are suited crops. Most of the acreage of this soil is used for pasture or meadow. Bahiagrass, bermudagrass, orchardgrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza are suitable pasture plants. Capability unit IIIe-2; pasture and hayland group 8A; woodland group 3o7; not in a range site.

Portia Series

The Portia series consists of well drained, gently sloping and moderately sloping soils on hillcrests, hillsides, and valleysides in uplands. These soils formed in beds of loamy

material weathered from sandstone, siltstone, shale, and other sediments. The native vegetation is hardwoods.

In a representative profile the surface layer is brown fine sandy loam about 3 inches thick. The subsurface layer is yellowish brown fine sandy loam 3 inches thick. The upper 5 inches of the subsoil is strong brown fine sandy loam; the next 34 inches is strong brown and yellowish brown, mottled loam; and the lower 17 inches is red, mottled clay loam. Bedrock is at a depth of about 62 inches.

Portia soils are low in natural fertility. Permeability is moderately slow, and the available water capacity is high. The soils are easy to till, and can be cultivated throughout a wide range of moisture content. They respond well to fertilization.

If erosion is controlled, these soils are suitable for cultivation. A small acreage is used for crops. Most is used for pasture and woodland.

Representative profile of Portia fine sandy loam, 3 to 8 percent slopes, in a moist wooded area in SW¼NW¼NE¼ sec. 16, T. 16 N., R. 2 W.

O1—1 inch to 0; partly decomposed organic material.

A1—0 to 3 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; many fine roots; common wormholes and castings; strongly acid; clear smooth boundary.

A2—3 to 6 inches; yellowish brown (10YR 5/4) fine sandy loam; weak medium subangular blocky structure; very friable; common fine and medium roots; few wormholes and castings; few pores; medium acid; clear wavy boundary.

B1—6 to 11 inches; strong brown (7.5YR 5/6) fine sandy loam; few fine distinct yellowish red (5YR 5/8) mottles; some peds coated with yellowish brown (10YR 5/4) material from A2 horizon; weak medium subangular blocky structure; very friable; common fine and medium roots; common pores; few wormholes and castings; few soft black accretions; strongly acid; gradual smooth boundary.

B21t—11 to 24 inches; strong brown (7.5YR 5/6) loam; few fine distinct yellowish red (5YR 5/8) mottles and ped coatings; moderate medium subangular blocky structure; friable; continuous distinct clay films on faces of peds, few medium roots, few pores, few soft black accretions, few krotovinas; strongly acid; clear smooth boundary.

B22t—24 to 32 inches; yellowish brown (10YR 5/8) loam; common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; few roots; common pores, few soft black accretions, black stains on faces of some peds; very strongly acid; clear wavy boundary.

B23t—32 to 45 inches; strong brown (7.5YR 5/8) loam; common medium distinct yellowish brown (10YR 5/6) and few fine prominent red (2.5YR 4/8) mottles; streaks of pale brown (10YR 6/3); moderate medium subangular blocky structure; firm; broken distinct clay films on faces of peds; strongly acid; clear smooth boundary.

B24t—45 to 62 inches; red (2.5YR 4/8) clay loam mottled and streaked with strong brown (7.5YR 5/6), yellowish brown (10YR 5/8), and gray (10YR 6/1); relict rock structure; friable; cracks filled with light olive brown (2.5Y 5/4) sandy clay; very strongly acid.

R—62 inches; sandstone bedrock.

The A1 horizon is brown, dark grayish brown, or very dark grayish brown. The A2 horizon is brown or yellowish brown. In places there is a 6- to 8-inch Ap horizon that is brown or dark yellowish brown fine sandy loam. The B1 horizon is fine sandy loam or silt loam. The B21t horizon is strong brown or yellowish red loam or silt loam. The B22t horizon is loam or silty clay loam. The B23t horizon and B24t horizon are red, yellowish red, or strong brown sandy clay, loam, or clay loam.

The A horizon is medium acid or strongly acid. The B horizon is strongly acid or very strongly acid. Bedrock is at a depth of 60 to 72 inches or more.

Portia soils are associated with Boden, Captina, and Loring soils. They have less clay in the B horizon than Boden soils and more sand throughout than Captina and Loring soils. In contrast with Captina and Loring soils, they do not have a fragipan.

PoC—Portia fine sandy loam, 3 to 8 percent slopes. This gently sloping soil is on hillcrests and hillsides. Areas range from 10 to 200 acres in size. The profile of this soil is the one described as representative of the series. Included in mapping are a few small areas where slopes are as much as 12 percent; narrow creek bottom lands; and spots of Boden, Captina, and Loring soils.

This soil is suited to farming, but runoff is moderate and the erosion hazard is severe. Under good management that includes terraces and contour cultivation, clean-tilled crops that leave large amounts of residue can be grown year after year in the less sloping areas. More intensive management is needed with increasing slope. The soil is best suited to winter small grain.

Soybeans, winter small grain, and truck crops, such as okra and cucumbers, are the main crops. Melons, strawberries, green beans, and fruit crops, such as peaches, apples, and pears, are suited. Most of the acreage of this soil is used for pasture. Bahiagrass, bermudagrass, tall fescue, annual lespedeza, and sericea lespedeza are suitable pasture plants. Capability unit IIIe-2; pasture and hayland group 8A; woodland group 3o7; not in a range site.

PoD—Portia fine sandy loam, 8 to 12 percent slopes. This moderately sloping soil is on hillcrests and hillsides. Areas range from 20 to 400 acres in size. Some are long, narrow bands near the center of hillsides. Included in mapping are a few small areas where slopes are more than 12 percent; narrow creek bottoms lands; and spots of Boden, Captina, and Loring soils.

This soil is poorly suited to cultivated row crops because of slope. Runoff is rapid, and the erosion hazard is very severe. Under good management that includes contour cultivation and terraces, clean-tilled crops and sown crops can be grown in rotation with grasses and legumes. Winter small grain is the best suited crop. The soil is better suited to pasture, range, woodland, or wildlife habitat than to field crops.

Small patches of truck crops, such as okra, cucumbers, and strawberries, are the main crops. Most of the acreage of this soil is used for pasture and woodland. Bahiagrass, bermudagrass, tall fescue, annual lespedeza, sericea lespedeza, and white clover are suitable pasture plants. Capability unit IVe-2; pasture and hayland group 8A; woodland group 3o7; not in a range site.

Rock Outcrop

Rock outcrop consists of narrow limestone ledges and small areas of outcrops exposed through natural erosion processes. Except for small fractures filled with clay, the soil material within areas of outcrop is less than 4 inches thick. The native vegetation consists of lichens on the rock surface, stunted eastern redcedar in fractures, and cool-season grasses and forbs in the areas of thin soil material.

The Rock outcrop in Lawrence County is mapped only with Ventris soils.

Sharkey Series

The Sharkey series consists of poorly drained, level soils on flood plains along rivers. These soils formed in dominantly clayey sediments deposited in backswamps. The native vegetation is hardwoods.

In a representative profile the surface layer is about 3 inches of dark grayish brown silty clay over 6 inches of dark gray, mottled silty clay. The upper 19 inches of the subsoil

is gray, mottled clay; and the lower 26 inches is dark gray, mottled clay. The underlying material is dark gray, mottled silty clay to a depth of 72 inches or more.

Sharkey soils are high in natural fertility. Permeability is very slow, and the available water capacity is high. The soils respond well to fertilization. They shrink and crack when dry. When wet, they swell and the cracks seal. The soils clod if plowed when wet.

If drained and well managed, these soils are suited to most crops grown in the county. Most of the acreage is cultivated.

Representative profile of Sharkey silty clay in a moist cultivated area in SW¼SE¼NW¼ sec. 26, T. 15 N., R. 2 W.

Ap—0 to 3 inches; dark grayish brown (10YR 4/2) silty clay; weak fine and medium subangular blocky structure; firm; common fine roots; common dark concretions; neutral; clear smooth boundary.

A12—3 to 9 inches; dark gray (10YR 4/1) silty clay; common medium faint dark brown (10YR 4/3) mottles and distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; few pores; common fine roots; common dark concretions; neutral; clear smooth boundary.

B21g—9 to 28 inches; gray (10YR 5/1) clay; common medium distinct yellowish brown (10YR 5/8) mottles; moderate medium and fine subangular blocky structure; firm; common dark concretions; few fine roots; neutral; gradual smooth boundary.

B22g—28 to 54 inches; dark gray (10YR 4/1) clay; common medium distinct yellowish brown (10YR 5/8) and brown (10YR 4/3) mottles; weak columnar structure parting to moderate fine subangular blocky; firm; common pressure faces; many dark concretions; few fine roots; neutral; clear smooth boundary.

Cg—54 to 72 inches; dark gray (10YR 4/1) silty clay; common medium distinct yellowish brown (10YR 5/8) and strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm; common soft black and dark brown accretions; mildly alkaline.

The A horizon is dark gray, dark grayish brown, or very dark grayish brown. The B horizon and C horizon are gray or dark gray.

The A horizon ranges from neutral to strongly acid. The B horizon is medium acid to moderately alkaline to a depth of about 20 inches. The lower part of the B horizon and the C horizon are neutral or mildly alkaline.

Sharkey soils are associated with Amagon and Dundee soils. They have more clay throughout the A and B horizons than those soils.

Sh—Sharkey silty clay. This level soil is in depressions and on flats between sloughs and abandoned river channels on bottom lands. Slopes are less than 1 percent. Areas range from 20 to more than 200 acres in size. Included in mapping are spots of Amagon and Dundee soils and a few small tracts that are occasionally flooded, but rarely between June and January.

This soil is suited to farming, but excess water is a severe hazard. Fieldwork is delayed several days after a rain unless surface drains are installed. Under good management that includes adequate drainage, clean-tilled, warm-season crops that leave large amounts of residue can be grown year after year.

Soybeans is the main crop. Rice, grain sorghum, and cotton are other suitable crops. Winter small grain can be grown if surface drainage is adequate, but it is damaged by flooding in some years. Bermudagrass, tall fescue, and white clover are among the suitable pasture plants. Capability unit IIIw-4; pasture and hayland group 1A; woodland group 2w6; not in a range site.

Tonti Series

The Tonti series consists of moderately well drained, gently sloping to moderately sloping soils on hillcrests and adjacent hillsides. These soils formed in loamy material weathered from cherty limestone and possibly thin loess deposits. The native vegetation is hardwoods.

In a representative profile the surface layer is brown cherty silt loam about 5 inches thick. The upper 4 inches of the subsoil is yellowish brown cherty silt loam, the next 11 inches is strong brown cherty silty clay loam, and the lower 35 inches is a firm, compact and brittle fragipan of yellowish brown and strong brown, mottled cherty silty clay loam. Bedrock is at a depth of about 55 inches.

Tonti soils are low in natural fertility. Permeability is slow, and the available water capacity is medium. The fragipan restricts root penetration and movement of water through the soil. The soils respond well to fertilization. Chert hinders tillage, but the soils can be tilled throughout a wide range of moisture content.

Where erosion is controlled, these soils are suitable for cultivation. Only a small acreage is used for crops. The rest is used for pasture, range, and woodland.

Representative profile of Tonti cherty silt loam, 3 to 8 percent slopes, in a moist idle field in the SE¼NW¼NE¼ sec. 30, T. 18 N., R. 2 W.

Ap—0 to 5 inches; brown (10YR 4/3) cherty silt loam; weak fine subangular blocky structure; friable; many fine roots; few wormholes; about 15 percent by volume, angular chert fragments ½ inch to 3 inches in diameter; strongly acid; clear smooth boundary.

B1—5 to 9 inches; yellowish brown (10YR 5/6) cherty silt loam; weak medium subangular blocky structure; friable; common fine roots; few pores; few wormholes; about 15 percent, by volume, angular chert fragments 2 to 3 inches in diameter; very strongly acid; clear wavy boundary.

B2t—9 to 20 inches; strong brown (7.5YR 5/6) cherty silty clay loam; moderate medium subangular blocky structure; firm; continuous thin clay films on faces of peds; few roots; few pores; about 20 percent, by volume, angular chert fragments ½ inch to 3 inches in diameter; very strongly acid; clear wavy boundary.

Bx1—20 to 28 inches; yellowish brown (10YR 5/6) cherty silty clay loam; moderate coarse prismatic structure parting to moderate fine subangular blocky; firm; compact and brittle; continuous thin clay films on faces of peds; thin streaks of pale brown (10YR 6/3) and light brownish gray (10YR 6/2) silt loam between peds; few roots, mainly along faces of peds; few pores; about 40 percent, by volume, angular chert fragments ¼ inch to 3 inches in diameter; very strongly acid; clear irregular boundary.

Bx2—28 to 55 inches; strong brown (7.5YR 5/6) cherty silty clay loam; few medium distinct yellowish red (5YR 4/6) mottles; moderate coarse prismatic structure parting to moderate medium angular blocky; firm; compact and brittle; continuous distinct clay films on faces of peds; streaks of pale brown (10YR 6/3) and light brownish gray (10YR 6/2) silt loam between prisms; many fine pores in silt loam material; about 50 percent, by volume, angular chert fragments ¼ inch to 3 inches in diameter; very strongly acid; clear wavy boundary.

R—55 inches; cherty bedrock.

The A horizon is dark grayish brown or brown. The content of chert fragments in the A horizon ranges from 5 to 20 percent. If present, the B1 horizon is brown or yellowish brown. The B2t horizon is strong brown or yellowish brown silt loam or silty clay loam. The content of chert fragments in this horizon ranges from 10 to 25 percent, and in the Bx horizon from 20 to 75 percent.

The soils are strongly acid or very strongly acid throughout in unlimed areas. Bedrock is at a depth of 50 to 60 inches.

Tonti soils are associated with Captina and Clarksville soils. They have more chert fragments throughout than Captina soils. In contrast with Clarksville soils, they have a fragipan.

ToC—Tonti cherty silt loam, 3 to 8 percent slopes. This gently sloping soil is on rounded hillcrests and adjacent upper side slopes. Areas range from 20 to 200 acres in size. The profile of this soil is the one described as representative

of the series. Included in mapping are a few small areas where slopes are less than 3 percent; spots of Captina and Clarksville soils; and a soil that is similar to this Tonti soil but has clay at a depth of 40 to 72 inches, below the fragipan.

This soil is suited to farming, but the surface layer is cherty and is difficult to till. Runoff is moderate, and the erosion hazard is severe. Under good management that includes terraces and contour cultivation, clean-tilled crops that leave large amounts of residue can be safely grown year after year in the less sloping areas. Conservation must be intensified as slope increases.

Broadcast or drilled crops, such as winter small grain, are best suited. Some row crops, such as soybeans and sorghums, are grown. Truck crops, such as okra, green beans, strawberries, cucumbers, and melons, are also suited. Most of the acreage of this soil is used for pasture, woodland, or wildlife habitat. Bahiagrass, bermudagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza are suitable pasture plants. Capability unit IIIe-1; pasture and hayland group 8A; woodland group 4o7; not in a range site.

ToD—Tonti cherty silt loam, 8 to 12 percent slopes. This moderately sloping soil is on hillsides and some adjacent hillcrests. Areas range from 20 to more than 300 acres in size. Included in mapping are a few small areas where slopes are more than 12 percent; areas of soils that are similar to this Tonti soil but have clay at a depth of 40 to 72 inches, below the fragipan; and spots of Captina and Clarksville soils.

This soil is poorly suited to cultivated crops. The slope and cherty surface restrict the use of some farm equipment. Runoff is rapid, and the erosion hazard is very severe. Under good management that includes terraces and contour cultivation, clean-tilled crops that leave large amounts of residue can be grown part of the time in rotation with grasses and legumes. Broadcast or drilled crops, however, are better suited to this soil.

This soil is best suited to pasture, woodland, and wildlife habitat, and most of it is used for those purposes. Bahiagrass, bermudagrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza are suitable pasture plants. Capability unit IVe-1; pasture and hayland group 8A; woodland group 4o7; not in a range site.

Tuckerman Series

The Tuckerman series consists of poorly drained, level soils in depressions in natural levees. These soils formed in beds of loamy alluvial sediments. The native vegetation is hardwoods.

In a representative profile the surface layer is grayish brown fine sandy loam about 8 inches thick. The upper 4 inches of the subsoil is gray fine sandy loam; the next 8 inches is dark grayish brown, mottled loam; the next 14 inches is light brownish gray, mottled loam; and the lower 8 inches is dark grayish brown, mottled fine sandy loam. The underlying material is grayish brown, mottled loamy fine sand to a depth of 72 inches or more.

Tuckerman soils are moderate in natural fertility. Permeability is slow, and the available water capacity is medium. The soils respond well to fertilization. They are easy to till and can be cultivated throughout a wide range of moisture content. Seedbed preparation and planting are commonly delayed in spring because of wetness.

If drained and well managed, these soils are suited to most crops grown in the county. Most of the acreage is cultivated. The rest is used for pasture and woodland.

Representative profile of Tuckerman fine sandy loam in a moist cultivated area in the NE¼SE¼NE¼ sec. 7, T. 15 N., R. 1 W.

Ap—0 to 8 inches; grayish brown (10YR 5/2) fine sandy loam; weak fine and medium granular structure; very friable; few fine roots; few fine dark concretions; medium acid; abrupt smooth boundary.

B1g—8 to 12 inches; gray (10YR 5/1) fine sandy loam; few fine faint brown and dark brown mottles; moderate medium subangular blocky structure; friable; few fine roots; few pores; few fine concretions; strongly acid; clear wavy boundary.

B21tg—12 to 20 inches; dark grayish brown (10YR 4/2) loam; common medium faint grayish brown (10YR 5/2) mottles and few medium distinct light olive brown (2.5Y 5/4) mottles; weak prismatic structure parting to moderate medium subangular blocky; firm; continuous distinct clay films on faces of peds; few pockets of fine sandy loam in root channels and animal holes; few medium roots; few pores; few fine concretions; very strongly acid; clear wavy boundary.

B22tg—20 to 34 inches; light brownish gray (10YR 6/2) loam; common medium faint grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) mottles; weak prismatic structure parting to moderate medium subangular blocky; firm; continuous thin clay films on faces of peds; thin lens of brown fine sandy loam on faces of some peds; few fine roots; common pores; few black concretions; very strongly acid; gradual wavy boundary.

B3g—34 to 42 inches; dark grayish brown (10YR 4/2) fine sandy loam; few medium distinct brown (7.5YR 4/4) mottles; weak medium subangular blocky structure; friable; patchy faint clay films on faces of peds; few black weblike coatings on some faces of peds; few black accretions; medium acid; gradual wavy boundary.

C—42 to 72 inches; grayish brown (2.5Y 5/2) loamy fine sand; common medium faint pale brown (10YR 6/3) mottles and common medium distinct dark yellowish brown (10YR 4/4) mottles; massive; compact in place; friable, disturbed; medium acid.

The Ap horizon is grayish brown or dark grayish brown. The B2 horizon is light brownish gray, dark grayish brown, or dark gray sandy clay loam, loam, or fine sandy loam. The C horizon is loamy fine sand or fine sandy loam. The soils are medium acid to very strongly acid throughout in unlimed areas.

Tuckerman soils are associated with Bosket, McCrory, and Patterson soils. They are grayer throughout than Bosket soils. They are more acid in the lower part of the B horizon than McCrory soils and also lack the high concentration of sodium in this layer. They have more clay in the B horizon than Patterson soils.

Tu—Tuckerman fine sandy loam. This level soil is in depressions in natural levees. Slopes are less than 1 percent. Areas range from about 20 to more than 200 acres in size. Included in mapping are spots of Bosket, McCrory, and Patterson soils and areas where the surface layer is loamy fine sand.

This soil is suited to farming, but excess water is a severe hazard. Fieldwork is delayed in spring and for a few days after heavy rain unless surface drainage is installed. Under good management that includes adequate drainage, clean-tilled crops that leave large amounts of residue can be safely grown year after year.

Soybeans is the main crop. Corn, cotton, and grain sorghum are other suitable crops. If surface drainage is adequate, winter small grain can be grown. Bermudagrass, tall fescue, and white clover are suitable pasture plants. Capability unit IIIw-1; pasture and hayland group 2B; woodland group 1w6; not in a range site.

Ventris Series

The Ventris series consists of moderately well drained, gently sloping to steep soils on hilltops, hillsides, and benches. These soils formed in a thin layer of loamy material and the underlying clayey material weathered from limestone or mixed limestone and shale. The native vegetation is hardwoods.

In a representative profile the surface layer is very dark grayish brown silty clay loam about 4 inches thick. The subsoil is light olive brown, mottled clay about 24 inches thick. The upper 9 inches is mottled with yellowish red and yellowish brown, and the lower 15 inches is mottled with light brownish gray and gray. Bedrock is at a depth of about 28 inches.

Ventris soils are moderate in natural fertility, but are low in productivity. The surface layer is thin, and in places rock crops out. These limitations and the clayey subsoil restrict root penetration and movement of water through the soil. Permeability is very slow, and the available water capacity is medium.

These soils are generally not suitable for cultivation. They are best suited to pasture, range, wildlife habitat, and woodland. Only a small acreage is cleared. The rest is wooded.

Representative profile of Ventris silty clay loam, in a moist wooded area of Ventris-Rock outcrop complex, 12 to 30 percent slopes, in NE¼NE¼SW¼ sec. 18, T. 18 N., R. 2 W.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) silty clay loam; common fine faint brown mottles; weak fine subangular blocky structure; friable; many wormholes and castings; many fine roots; about 10 percent, by volume, limestone and chert fragments as much as 6 inches in diameter; neutral; clear smooth boundary.

B21t—4 to 13 inches; light olive brown (2.5Y 5/4) clay; many medium distinct yellowish brown (10YR 5/8) and yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure parting to weak fine angular blocky structure; firm; continuous distinct clay films on faces of peds; few wormholes in upper part filled with material from the horizon above; common fine roots; few small chert fragments; slightly acid; gradual smooth boundary.

B22t—13 to 26 inches; light olive brown (2.5Y 5/6) clay; few medium faint light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; firm; few slickensides; common pressure faces; few fine roots; common fine soft black accretions; mildly alkaline; clear wavy boundary.

B3—26 to 28 inches; mottled light olive brown (2.5Y 5/6) and gray (10YR 6/1) clay; weak medium subangular blocky structure; firm; few medium roots; few chert and limestone fragments; mildly alkaline; abrupt wavy boundary.

R—28 inches; bedrock.

The A horizon is very dark grayish brown to dark brown. In places there is a 1- to 4-inch A2 horizon that is dark grayish brown silt loam or silty clay loam. Stones are on and in the surface layer in places. The B2t horizon is light olive brown or yellowish brown. Mottles are in shades of red and brown in the B21 horizon and in shades of gray in the B22 horizon.

The A horizon and B21 horizon range from medium acid to neutral. The B22 horizon and the B3 horizon range from slightly acid to mildly alkaline. Depth to bedrock is 20 to 40 inches.

Ventris soils are associated with Agnos and Gepp soils. They are shallower over bedrock than those soils. Ventris soils are not so red in the B horizon as Gepp soils.

VrD—Ventris-Rock outcrop complex, 3 to 12 percent slopes. This gently sloping and moderately sloping mapping unit is on the crests, benches, and toe slopes of hills. It is 50 percent Ventris silty clay loam, 20 percent Rock outcrop, and 30 percent Agnos and Gepp soils and a soil that is similar to Ventris soil but has a red subsoil. Areas range from 10 to 100 acres in size.

This mapping unit generally is not suited to cultivated crops and is poorly suited to improved pasture. The surface stones and outcrops of rock restrict the use of farm equipment, and most of the acreage is droughty. The unit is best suited to native grass pasture, wildlife habitat, and woodland. Most of the acreage is woodland of eastern redcedar and poor-quality upland oaks. Capability unit VIIs-1; pasture and hayland group 8K; woodland group 5x2; range site Clay Break Limestone.

VrF—Ventris-Rock outcrop complex, 12 to 30 percent slopes. This moderately steep and steep mapping unit is on hillsides. It is 40 percent Ventris silty clay loam, 25 percent Rock outcrop, and 35 percent Agnos and Gepp soils and a soil that is similar to the Ventris soil but has a red subsoil. The profile of the Ventris soil is the one described as representative of the series. Areas range from 10 to 100 acres in size.

This mapping unit is not suited to cultivated crops and is poorly suited to improved pasture. The slope, surface stones, and Rock outcrop severely restrict the use of farm equipment, and part of the acreage is droughty. The unit is best suited to native grass pasture, wildlife habitat, and woodland. Most of the acreage is woodland of eastern redcedar or poor-quality upland oaks. Capability unit VIIs-1; pasture and hayland group 8D; woodland group 5x2; range site Clay Break Limestone.

Use and Management of the Soils

This part of the survey relates to the use, suitability, and limitations of the soils for crops, pasture and hayland, wildlife habitat, woodland, range, engineering, town and country planning, and recreation.

Crops[2]

This section describes management of the soils of Lawrence County for crops and explains the system of capability grouping used by the Soil Conservation Service. It also provides a table showing predicted yields of the principal crops under improved management.

In the upland part of the county, most cleared areas are used for forage for livestock, mainly beef cattle. Scattered farms grow small acreages of truck crops, orchard crops, and berries; field corn; and small grain, soybeans, and sorghum.

On the bottom land, most of the acreage is cleared and used for such crops as corn, cotton, grain sorghum, rice, soybeans, and winter small grain. Peanuts and watermelons are other crops.

In general, the soils in this county are low in nitrogen, potassium, phosphorus, calcium, and content of organic matter. Many upland soils are poorly suited or not suited to intensive use because they are stony or rocky, are shallow over bedrock, or have a high content of coarse fragments. Many bottom land soils are limited by poor surface or internal drainage and are subject to flooding. Many upland soils and some bottom land soils that are otherwise suitable for cultivation are erodible.

[2] W. WILSON FERGUSON, conservation agronomist, Soil Conservation Service, helped prepare this section.

Contour cultivation, vegetated waterways, and terraces are needed on sloping soils used for tilled crops. Row arrangement and surface drains are needed for dependable growth in wet areas.

Annual cover crops or grasses and legumes should be grown regularly in the cropping system if the erosion hazard is severe or if the crops grown leave only small amounts of residue. Crop residue should be shredded and spread evenly on the soil to provide a protective cover and active organic matter. Tillage should be minimized to the extent practical for the soil and the crop. If left bare, many soils tend to pack and crust over after periods of heavy rain, and other soils are susceptible to soil blowing. Growing cover crops and managing crop residue help preserve tilth and reduce soil losses.

The amount of fertilizer applied is generally determined by soil tests, the kinds of crops grown, and past experience with crops and fertilization. On most soils, periodic applications of agricultural limestone, according to soil tests, are beneficial to most crops and are generally necessary for satisfactory growth of such crops as alfalfa and white clover. Agricultural limestone is abundant in Lawrence County.

Capability Grouping

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

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

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

In the capability system, all kinds of soil are grouped at three levels: the class, the subclass, and the unit. The broadest grouping, the capability class, is designated by Roman numerals I to VIII. In class I are the soils that have the fewest limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, forage, or wood products. The subclass indicates major kinds of limitations within the classes. Within most of the classes there can be as many as four subclasses. The subclasses are indicated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* means that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c* indicates that the chief limitation is climate that is too cold or too dry.

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

Subclasses are further divided into groups called capability units. These are groups of soils that are so much alike that they are suited to the same crops and pasture plants, they require about the same management, and have generally similar productivity and other response to management. Capability units are generally identified by numbers assigned locally, for example, IIe-1 or VIs-2.

The eight classes in the capability system and the subclasses and units in Lawrence County are described in the list that follows. The capability unit for each soil is given at the end of each mapping unit description.

Class I.—Soils have few limitations that restrict their use. (No subclasses.)
- Unit I–1.—Level, well drained, deep loamy soils on natural levees and dunes.

Class II.—Soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.
- Subclass IIe.—Soils subject to moderate erosion unless protected.
  - Unit IIe–1.—Nearly level and undulating, well drained, deep loamy soils on natural levees and dunes of windblown sediment high in content of sand.
  - Unit IIe–2.—Nearly level, moderately well drained, deep loamy soils that have a fragipan in the subsoil; on uplands.
- Subclass IIw.—Soils moderately limited by excess water.
  - Unit IIw–1.—Level and gently undulating, somewhat poorly drained, deep loamy soils on natural levees.
  - Unit IIw–2.—Level, somewhat poorly drained, deep loamy soils that have a high content of sodium in the middle and lower part of the subsoil; on broad flats.
- Subclass IIs.—Soils moderately limited by low available water capacity.
  - Unit IIs–1.—Undulating, somewhat excessively drained, deep loamy soils on natural levees and dunes of wind-blown sediments high in content of sand.

Class III.—Soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
- Subclass IIIe.—Soils subject to severe erosion if they are cultivated and not protected.
  - Unit IIIe–1.—Gently sloping, moderately well drained, deep loamy soils that have a fragipan; on uplands and terraces.
  - Unit IIIe–2.—Gently sloping, well drained, deep loamy soils on uplands and terraces.
  - Unit IIIe–3.—Gently sloping, well drained, deep loamy soils that have a clayey subsoil; on uplands.
- Subclass IIIw.—Soils severely limited for cultivation by excess water.
  - Unit IIIw–1.—Level, poorly drained, deep loamy soils on natural levees.

Unit IIIw–2.—Level, poorly drained, deep loamy soils that have a predominantly clayey subsoil; on broad flats.

Unit IIIw–3.—Level, poorly drained, deep loamy soils that have a high content of sodium in the middle and lower part of the subsoil; on broad flats.

Unit IIIw–4.—Level, poorly drained, deep clayey soils in active and abandoned back swamps.

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

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

Unit IVe–1.—Moderately sloping, moderately well drained, deep loamy soils that have a fragipan; on uplands.

Unit IVe–2.—Moderately sloping, well drained, deep loamy soils on uplands.

Unit IVe–3.—Moderately sloping, well drained, deep loamy soils that have a predominantly clayey subsoil; on uplands.

Unit IVe–4.—Gently sloping, well drained, deep loamy soils that have a predominantly clayey subsoil; on uplands.

Subclass IVw.—Soils subject to frequent flooding in winter and spring unless protected.

Unit IVw–1.—Level, well drained and moderately well drained, deep loamy soils on bottom land.

Subclass IVs.—Soils very severely limited by low available water capacity.

Unit IVs–1.—Level, poorly drained to somewhat poorly drained, deep loamy soils that have a high content of sodium at variable depths in the subsoil; on broad flats.

Class V.—Soils subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife habitat. (None in Lawrence County.)

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

Subclass VIe.—Soils severely limited by rapid runoff and erosion hazard unless a protective cover is maintained.

Unit VIe–1.—Moderately sloping, well drained, deep loamy soils that have a predominantly clayey subsoil; on uplands.

Unit VIe–2.—Moderately steep, well drained, deep loamy soils that have a predominantly clayey subsoil; on uplands.

Subclass VIs.—Soils severely limited by surface stones, low available water capacity, and risk of erosion unless a protective cover is maintained.

Unit VIs–1.—Moderately sloping, somewhat excessively drained, deep loamy soils that are cherty throughout; on uplands.

Unit VIs–2.—Gently sloping and moderately sloping, deep loamy soils that have stones on the surface and have a clayey subsoil; on uplands.

Class VII.—Soils have very severe limitations that make them unsuitable for cultivation and restrict their use largely to pasture, range, woodland, or wildlife habitat.

Subclass VIIs.—Soils very severely limited by surface stones, slope, and risk of erosion unless a protective cover is maintained.

Unit VIIs–1.—Gently sloping to steep, moderately well drained, moderately deep loamy soils that have stones on the surface and a clayey subsoil; on uplands. Most areas are intermingled with Rock outcrop.

Unit VIIs–2.—Moderately steep to steep, well drained, deep loamy soils that have stones on the surface and have a clayey subsoil; on uplands.

Unit VIIs–3.—Moderately steep, somewhat excessively drained, deep loamy soils that are cherty throughout; on uplands.

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

Predicted Yields

The predicted yields of principal crops shown in table 3 are based mainly on data supplied by farmers, soil scientists, agronomists, and others who have knowledge of yields in the county and on information based on research data. These predicted average yields per acre are obtained by farmers at the level of management that tends to produce the highest economic return.

Crops other than those shown in table 3 are grown in the county, but the acreage is small or reliable yield data are not available. Not included in table 3 are soils that are mainly in urban development.

The predicted yields given in table 3 can be expected under the following management:

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

Pasture and Hay[3]

General guidelines for managing soils for pasture and hay are described in this section. The soils in the county are assigned to 12 pasture and hayland groups, and each group is described. The pasture and hayland group for each soil in the county is given at the end of each mapping unit description. For detailed information about management, refer to the section "Descriptions of the Soils."

A large part of the upland in Lawrence County is used for pasture and hay. The trend in this part of the county has been to convert cropland to forage crops. More tracts of woodland are being cleared each year for production of forage.

Tall fescue and bermudagrass are the principal base grasses grown. They are well suited to most soils of the county. On many farms tall fescue is the only permanent grass grown.

[3] W. WILSON FERGUSON, conservation agronomist, Soil Conservation Service, helped prepare this section.

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

[The yields listed can be obtained under improved management. Absence of a figure indicates that the crop is not suited to or is not commonly grown on the soil]

Soil	Cotton	Rice	Soybeans	Wheat	Grain sorghum	Bahia-grass	Hybrid bermuda-grass	Common bermuda-grass	Tall fescue
	Lb of lint	*Bu*	*Bu*	*Bu*	*Cwt*	*AUM*[1]	*AUM*[1]	*AUM*[1]	*AUM*[1]
Agnos cherty silt loam, 3 to 8 percent slopes				25		5.5		5.0	5.0
Agnos cherty silt loam, 8 to 12 percent slopes						5.0		4.5	4.5
Agnos stony silt loam, 3 to 12 percent slopes						4.5		4.0	4.0
Agnos soils, 12 to 25 percent slopes						4.0		3.5	3.5
Amagon silt loam	650	120	35		50			7.5	9.0
Beulah sandy loam, undulating	550		30	45	45		10.0	7.0	7.0
Boden gravelly sandy loam, 3 to 8 percent slopes				25		5.5		5.0	5.0
Boden gravelly sandy loam, 8 to 12 percent slopes						5.0		4.5	4.5
Boden gravelly sandy loam, 12 to 20 percent slopes						5.0		4.5	4.5
Bosket fine sandy loam, 0 to 1 percent slopes	800		40	50	60		12.0	10.0	10.0
Bosket fine sandy loam, undulating	750		35	50	60		12.0	10.0	10.0
Captina silt loam, 1 to 3 percent slopes			20	25	30	8.5	8.0	6.5	8.0
Captina silt loam, 3 to 8 percent slopes				30		7.5	7.0		7.0
Captina silt loam, 8 to 12 percent slopes						6.5	6.0		6.0
Clarksville cherty silt loam, 8 to 12 percent slopes						4.5		4.0	5.0
Clarksville cherty silt loam, 12 to 20 percent slopes						4.5		4.0	5.0
Crowley silt loam, 0 to 1 percent slopes	475	130	30		50	6.0	8.0	5.5	6.5
Dubbs silt loam, 0 to 1 percent slopes	850		40	45	60		12.0	9.0	10.0
Dubbs silt loam, 1 to 3 percent slopes	800		35	40	60		12.0	9.0	10.0
Dundee silt loam, 0 to 1 percent slopes	750	120	40	40	60		9.0		9.0
Dundee silt loam, gently undulating	750		35	35	60		9.0		9.0
Foley-Calhoun complex, 0 to 1 percent slopes	650	120	30	30	45	6.5		6.0	8.0
Gepp cherty silt loam, 8 to 12 percent slopes						6.5	6.5	5.5	5.5
Gepp cherty silt loam, 12 to 20 percent slopes						5.5	5.5	5.0	5.0
Healing silt loam, frequently flooded			30		50		10.0		7.5
Hillemann silt loam	600	120	35	40	50			7.0	7.0
Hontas soils, frequently flooded			30		45		8.5		7.5
Jackport silty clay	550	130	35		50			7.0	8.0
Lafe-Foley complex, 0 to 1 percent slopes	350	80	20	25	35	4.0		3.5	
Loring silt loam, 3 to 8 percent slopes, eroded				35		7.0	8.0	6.5	6.5
Loring silt loam, 8 to 12 percent slopes, eroded						7.0	7.5	6.0	6.5
McCrory fine sandy loam	650	120	30	40	45			6.0	8.0
Patterson fine sandy loam	550		30	30	45		8.0		8.0
Peridge silt loam, 3 to 8 percent slopes, eroded				45	50	8.0	7.5		7.5
Portia fine sandy loam, 3 to 8 percent slopes				35	45	7.5	7.0		7.0
Portia fine sandy loam, 8 to 12 percent slopes						6.5	6.0		6.0
Sharkey silty clay	650	130	35		50			6.5	9.0
Tonti cherty silt loam, 3 to 8 percent slopes				35		7.5	7.0		7.0
Tonti cherty silt loam, 8 to 12 percent slopes						6.5	6.0		6.0
Tuckerman fine sandy loam	700		30		45			7.5	9.0
Ventris-Rock outcrop complex, 3 to 12 percent slopes						4.5			
Ventris-Rock outcrop complex, 12 to 30 percent slopes						3.5			

[1] Animal-unit-months. The figures represent the number of months that 1 acre will provide grazing for 1 animal (1,000 pounds live weight), or the number of months the pasture can be grazed multiplied by the number of animal units an acre will support.

Orchardgrass is grown to a limited extent. Common bermudagrass and Coastal bermudagrass are the warm-season, perennial grasses most commonly grown. Pensacola bahiagrass, a warm-season perennial grass that can be established from seed and has proved to be suited to this county, is grown to a moderate extent. Plantings can be expected to increase. Volunteer stands of johnsongrass are commonly used for hay.

Annual lespedeza and white clover are the legumes most commonly grown. They are most commonly grown in combination with grasses, but some pure stands of annual lespedeza are grown for hay. Alfalfa is also grown for hay.

Sorghum-sudangrass hybrids are grown for supplemental grazing during summer months when the tall fescue is dormant. Fall-sown small grain is sometimes used for supplemental, cool-season grazing.

Lawrence County produces agricultural limestone. Crushed limestone is applied to pastures and hayfields at a comparatively low cost. In addition to limestone, commercial fertilizer is used extensively.

Management and maintenance

Proper grazing is essential for the production of high-quality forage, stand survival, and erosion control. Sufficient topgrowth on plants during the growing season maintains vigorous, healthy growth. Grazing of tall fescue is restricted

during the summer months. Brush control is essential, and weed control is also often needed.

Grass pasture responds well to nitrogen fertilizer. A grass-legume mixture requires the application of phosphate and potash fertilizers and lime at rates based on soil tests. Rotation grazing and renovation are also important measures in a good pasture and hay management program.

Pasture and hayland groups

Pasture and hayland suitability groupings have been made to assist in the selection of suitable forage plants. The groups are described on the following pages. The soils included in each group grow similar kinds of forage plants and require similar management. Forage production is essentially the same for all soils in the group under the same management. Soils that formed under woodland require repeated brush control. Failure to control brush eventually results in a stand of trees and a gradual reduction of forage. Yields of pasture and hay are listed in table 3, under "Predicted Yields."

PASTURE AND HAYLAND GROUP 1A

In this group are deep soils that are clayey throughout. They are very slowly permeable and poorly drained. Some are subject to occasional flooding. All have a high potential for such forage plants as bermudagrass, tall fescue, white clover, and annual lespedeza.

PASTURE AND HAYLAND GROUP 2A

In this group are deep soils that are loamy throughout. They are moderately permeable or moderately rapidly permeable and moderately well drained to somewhat excessively drained. Some are subject to frequent flooding. All have a high potential for such forage plants as bahiagrass, bermudagrass, tall fescue, white clover, and annual lespedeza.

PASTURE AND HAYLAND GROUP 2B

In this group are deep soils that are loamy throughout. They are slowly permeable to moderately rapidly permeable and are poorly drained or somewhat poorly drained. Some are flooded occasionally. All have a high potential for such forage crops as bermudagrass, bahiagrass, tall fescue, white clover, and annual lespedeza.

PASTURE AND HAYLAND GROUP 8A

In this group are deep, loamy soils that have a loamy or clayey subsoil. They are slowly permeable to moderately permeable and moderately well drained or well drained. Some have a fragipan, and some have a cherty or gravelly surface layer. All are on uplands and old stream terraces. All have a moderately high potential for such forage plants as bahiagrass, bermudagrass, tall fescue, white clover, and annual lespedeza.

PASTURE AND HAYLAND GROUP 8B

In this group are deep loamy soils that have gravel or chert fragments and a predominantly clayey subsoil. They are moderately permeable to moderately slowly permeable and are well drained. They are on uplands and are difficult to manage for forage production because slopes restrict the use of conventional equipment. All have moderate potential for such forage plants as bahiagrass, bermudagrass, tall fescue, and annual lespedeza.

PASTURE AND HAYLAND GROUP 8C

In this group are deep, loamy soils that have gravel, chert fragments, or stones and a predominantly clayey subsoil. They are very slowly permeable and well drained. They are on uplands. All have a moderately low potential for such forage plants as bahiagrass, bermudagrass, weeping lovegrass, and annual lespedeza.

PASTURE AND HAYLAND GROUP 8D

In this group are moderately deep and deep stony soils on uplands. Some are intermingled with Rock outcrop. The soils have a loamy surface layer and are clayey throughout most of the subsoil. They are very slowly permeable and moderately well drained or well drained. They are difficult to manage for forage production because the surface stones and the slope impede the use of conventional farm equipment. All have low potential for such forage plants as bahiagrass, bermudagrass, weeping lovegrass, and annual lespedeza.

PASTURE AND HAYLAND GROUP 8E

The one mapping unit in this group is Lafe-Foley complex, 0 to 1 percent slopes. These soils are deep and loamy throughout. They are intermingled on broad flats. They have dense, dispersed layers in the upper or middle part of the subsoil that contain large amounts of sodium and magnesium. They are very slowly permeable and poorly drained to somewhat poorly drained. They are seasonally wet and are also droughty. All have low potential for such forage plants as bermudagrass and tall fescue.

PASTURE AND HAYLAND GROUP 8F

In this group are deep, loamy soils that have a loamy or clayey subsoil. Some have large amounts of sodium in the middle or the lower part of the subsoil. All are slowly permeable to very slowly permeable, poorly drained to somewhat poorly drained, and seasonally wet. All have a moderately high potential for such forage plants as bahiagrass, bermudagrass, tall fescue, and annual lespedeza.

PASTURE AND HAYLAND GROUP 8G

The only soil in this group is Clarksville cherty silt loam, 8 to 12 percent slopes. It is a deep, droughty soil on uplands. The content of chert is high throughout the root zone. The soil is droughty, and management for forage production is somewhat difficult. The slope and coarse fragments on the surface impede the use of conventional farm equipment. The soil has a low to moderate potential for such forage plants as bermudagrass, tall fescue, weeping lovegrass, and annual lespedeza.

PASTURE AND HAYLAND GROUP 8H

The only soil in this group is Clarksville cherty silt loam, 12 to 20 percent slopes. It is a deep, droughty soil on uplands. The content of chert is high throughout the root zone. The soil is droughty, and management for forage production is difficult. The slope and coarse fragments impede the use of conventional farm equipment. The soil has a low potential for such forage plants as bermudagrass, tall fescue, weeping lovegrass, and annual lespedeza.

PASTURE AND HAYLAND GROUP 8K

The only soil in this group is a Ventris soil that is intermingled with Rock outcrop. It is a moderately deep, season-

ally droughty soil on uplands. It has a predominantly clayey subsoil. It is very slowly permeable and moderately well drained. Management for forage production is difficult. Surface stones and Rock outcrop restrict the use of conventional farm equipment. The soil has a low or moderately low potential for such forage crops as bahiagrass, bermudagrass, weeping lovegrass, and annual lespedeza.

Wildlife[4]

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

In table 4 the soils of Lawrence County are rated according to their suitability for producing seven elements of wildlife habitat and three kinds of wildlife.

A rating of *good* means that the element of wildlife and kind of habitat generally are easily created, improved, and maintained. Few or no limitations affect management, and satisfactory results are expected.

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

A rating of *poor* means that limitations are severe for the element of wildlife habitat and the designated kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and requires intensive effort.

A rating of *very poor* means that limitations are very severe for the elements of wildlife habitat and unsatisfactory results are expected. Habitat is impossible or impractical to create, improve, or maintain.

The ratings in table 4 mainly take into account the characteristics of the soils and the closely related natural factors of the environment. The climate, present use of soils, or present distribution of wildlife and people is not considered. For these reasons, selection of a site for development as wildlife habitat requires inspection at the site.

The column Grain and seed crops in table 4 refers to annual, grain-producing plants, such as corn, sorghum, millet, and soybeans.

Grasses and legumes are domestic grasses and legumes that are established by planting. They provide food and cover for wildlife. Among the grasses are bahiagrass, ryegrass, and panicgrass. Legumes are annual lespedeza, shrub lespedeza, and other clovers.

Wild herbaceous plants are native or introduced perennial grasses, forbs, and weeds that provide food and cover for upland wildlife. Beggarweed, perennial lespedeza, wildbean, pokeweed, and cheatgrass are examples.

Hardwood trees are nonconiferous trees, shrubs, and woody vines that produce wildlife food in the form of fruits, nuts, buds, catkins, or browse. Such plants commonly grow in their natural environment, but they can be planted and developed through wildlife management. Typical are oak, beech, cherry, dogwood, maple, viburnum, grape, honeysuckle, greenbrier, and silverberry.

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

Wetland plants are annual and perennial herbaceous plants that grow wild on wet or moist sites. They furnish food and cover mostly for wetland wildlife. Typical are smartweed, wild millet, spikerush and other rushes, sedges, burreed, tearthumb, and aneilema. Submerged and floating aquatics are not included.

Shallow water areas are impoundments or excavations for controlling water, generally not more than 5 feet deep, to create habitat suitable for waterfowl. Some are designed to be drained, planted, and then flooded; others are permanent impoundments that grow submerged aquatics.

Suitability ratings for the three kinds of wildlife in the county—openland, woodland, and wetland—are related to ratings made for the elements of habitat. For example, soils rated very poor for shallow water areas are rated very poor for wetland wildlife.

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

Woodland wildlife are birds and mammals that commonly live in wooded areas of hardwood trees, coniferous trees, and shrubs. Woodcocks, thrushes, wild turkeys, vireos, deer, squirrels, and raccoons are typical examples.

Wetland wildlife are birds and mammals that commonly live in wet areas, marshes, and swamps. Ducks, geese, rails, shore birds, herons, minks, and muskrats are typical examples.

Woodland[5]

Originally Lawrence County was wooded, except for scattered savannas throughout the county. Now, only about 29 percent of the county is wooded, including about 10,000 acres of public land in the Shirey Bay-Rainey Brake game management area.

Stands of commercial trees range from good to poor. Broadleaf forest types are dominant, but mixed broadleaf and needleleaf types occur in a few scattered tracts on uplands.

The value of the wood products is substantial, but production is far below its potential. Other values from woodland are grazing, wildlife, recreation, natural beauty, and conservation of soil and water.

This part of the survey explains how soils affect tree growth and management. Table 5 lists the potential productivity and the management concerns of the soils in Lawrence County.

In the first column of table 5, the soils are listed by mapping unit symbols under the series name. The next

[4] ROY A. GRIZZELL, biologist, Soil Conservation Service, helped prepare this section.

[5] MAX D. BOLAR, woodland conservationist, and Ivan R. Porter, range conservationist, helped prepare this section.

TABLE 4.—*Suitability of soils for elements*

Series name and map symbols	Elements of wildlife habitat			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees
Agnos:				
AcC	Fair	Good	Good	Good
AcD	Fair	Good	Good	Good
AgD	Poor	Fair	Good	Good
AnE	Poor	Fair	Good	Good
Amagon: Ao	Fair	Fair	Fair	Fair
Beulah: BeB	Fair	Fair	Fair	Good
Boden:				
BnC	Fair	Good	Good	Good
BnD	Fair	Good	Good	Good
BnE	Poor	Fair	Good	Good
Bosket:				
BoA	Good	Good	Good	Good
BoB	Good	Good	Good	Good
Captina:				
CaB	Good	Good	Good	Good
CaC	Good	Good	Good	Good
CaD	Fair	Good	Good	Good
Clarksville:				
CeD	Poor	Fair	Fair	Fair
CeE	Poor	Fair	Fair	Fair
Crowley: CoA	Fair	Fair	Fair	Good
Dubbs: DeA, DeB	Good	Good	Good	Good
Dundee: DvA, DvB	Fair	Good	Good	Good
Foley: FcA	Fair	Fair	Fair	Fair
Gepp:				
GpD	Fair	Good	Good	Good
GpE	Poor	Fair	Good	Good
Healing: Hc	Poor	Fair	Fair	Good
Hillemann: Hn	Fair	Good	Good	Good
Hontas: Ho	Poor	Fair	Fair	Good
Jackport: Ja	Fair	Fair	Fair	Fair
Lafe: LfA	Very poor	Very poor	Poor	Poor
Loring: LoC2, LoD2	Fair	Good	Good	Good
McCrory: Mc	Fair	Fair	Fair	Fair
Patterson: Pa	Fair	Good	Good	Good
Peridge: PeC2	Fair	Good	Good	Good
Portia:				
PoC	Fair	Good	Good	Good
PoD	Fair	Good	Good	Good
Sharkey: Sh	Fair	Fair	Fair	Good
Tonti:				
ToC	Fair	Good	Good	Fair
ToD	Fair	Good	Good	Fair
Tuckerman: Tu	Fair	Fair	Fair	Fair
Ventris:				
VrD	Poor	Fair	Good	Fair
VrF	Very poor	Poor	Good	Fair

of wildlife habitat and kinds of wildlife

Elements of wildlife habitat—Continued			Kinds of wildlife		
Coniferous trees	Wetland plants	Shallow water areas	Openland	Woodland	Wetland
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Fair	Good	Good	Fair	Fair	Good.
Poor	Very poor	Very poor	Fair	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Poor	Poor	Poor	Good	Good	Poor.
Poor	Very poor	Very poor	Good	Good	Very poor.
Poor	Very poor	Very poor	Good	Good	Very poor.
Fair	Very poor	Very poor	Poor	Fair	Very poor.
Fair	Very poor	Very poor	Poor	Fair	Very poor.
Poor	Fair	Good	Fair	Good	Good.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Fair	Fair	Good	Good	Fair.
Fair	Good	Good	Fair	Fair	Good.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Poor	Very poor	Fair	Good	Very poor.
Good	Good	Good	Good	Good	Good.
Good	Poor	Poor	Fair	Good	Poor.
Not rated	Good	Good	Fair	Fair	Good.
Poor	Poor	Good	Very poor	Poor	Fair.
Good	Very poor	Very poor	Good	Good	Very poor.
Not rated	Good	Fair	Fair	Good	Fair.
Good	Fair	Poor	Good	Good	Poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Not rated	Good	Good	Fair	Good	Good.
Fair	Poor	Very poor	Good	Fair	Very poor.
Fair	Very poor	Very poor	Good	Fair	Very poor.
Not rated	Good	Fair	Fair	Fair	Fair.
Fair	Very poor	Very poor	Fair	Fair	Very poor.
Fair	Very poor	Very poor	Poor	Fair	Very poor.

TABLE 5.—*Potential productivity*

Soil series and map symbols	Woodland group	Important trees	Potential productivity	
			Estimated site index [1]	Understory vegetation (medium canopy)
Agnos:				
AcC, AcD	4o7	Red oak	60	Little bluestem, big bluestem, indiangrass, wildrye, beaked panicum, low panicum, other grasses, legumes, and forbs.
		Eastern redcedar	40	
		Loblolly pine	65	
				Total, favorable years
				Total, unfavorable years
AgD, AnE	4x8	Shortleaf pine	60	Little bluestem, big bluestem, indiangrass, wildrye, beaked panicum, low panicum, other grasses, legumes, and forbs.
				Total, favorable years
				Total, unfavorable years
Amagon: Ao	1w6	Eastern cottonwood	100	Switchgrass, eastern gamagrass, beaked panicum, redtop panicum, Virginia wildrye, sedges and rushes, and other shrubs.
		Willow oak	100	
		Nuttall oak	100	
		Water oak	100	
		Cherrybark oak	90	
		Green ash	80	
		Sweetgum	100	
				Total, favorable years
				Total, unfavorable years
Beulah: BeB	2o4	Eastern cottonwood	100	Switchgrass, little and big bluestem, indiangrass, eastern gamagrass, Virginia wildrye, beaked panicum, sedges, other grasses, and other shrubs.
		Cherrybark oak	90	
		Nuttall oak	90	
		Water oak	90	
		Willow oak	----------	
		American sycamore	----------	
				Total, favorable years
				Total, unfavorable years
Boden: BnC, BnD, BnE	4o7	Red oak	65	Little and big bluestem, indiangrass, wildrye, beaked panicum, low panicum, native lespedeza, perennial sunflowers, farkelberry, sedges, and other forbs and shrubs.
		Eastern redcedar	40	
		Black walnut	----------	
		Shortleaf pine	60	
		Black locust	----------	
		White oak	----------	
		Black cherry	----------	
		Loblolly pine	----------	
				Total, favorable years
				Total, unfavorable years
Bosket: BoA, BoB	2o4	Eastern cottonwood	100	Giant cane, switchgrass, indiangrass, Virginia wildrye, uniolas, beaked panicum, sedges, other shrubs, grasses, and forbs.
		Green ash	80	
		Sweetgum	90	
		Cherrybark oak	90	
		Water oak	90	
		Willow oak	90	
				Total, favorable years
				Total, unfavorable years
Captina: CaB, CaC, CaD	4o7	Shortleaf pine	60	Little and big bluestem, indiangrass, switchgrass, wildryes, beaked panicum, low panicum, other grasses, forbs and shrubs.
		Red oak	65	
		Black locust	----------	
		Black walnut	----------	
		Eastern redcedar	40	
				Total, favorable years
				Total, unfavorable years
Clarksville: CeD, CeE	4f8	Shortleaf pine	55	Little and big bluestem, indiangrass, goldenrod, aster, New Jersey tea, deerberry, other grasses, legumes, and forbs.
		Red oak	60	
		Eastern redcedar	40	
		Loblolly pine	----------	
		Black walnut	----------	
		Black locust	----------	
		White oak	----------	
				Total, favorable years
				Total, unfavorable years
Crowley: CoA	3w9	Loblolly pine	90	Switchgrass, beaked panicum, plumegrasses, giant cane, velvet panicum, uniolas, low panicum, sedges and rushes, other forbs, and vines.
		Shortleaf pine	----------	
		Sweetgum	----------	
		Water oak	----------	
				Total, favorable years
				Total, unfavorable years
Dubbs: DeA, DeB	2o4	Green ash	80	Switchgrass, big and little bluestem, indiangrass, eastern gamagrass, wildryes, beaked panicum, sedges, other grasses, forbs, and shrubs.
		Cherrybark oak	100	
		Nuttall oak	95	
		Water oak	90	
		Willow oak	95	
		Shumard oak	100	
		Sweetgum	95	
		Eastern cottonwood	100	
				Total, favorable years
				Total, unfavorable years

of woodland and forage

Potential productivity—Continued	Management problems			Trees suitable for planting
Estimated yields of forage	Erosion hazard	Equipment limitations	Seedling mortality	
Lbs per acre				
	Slight	Slight	Slight	Shortleaf pine, eastern redcedar, loblolly pine.
2,500 1,500	Slight	Moderate	Slight to moderate	Shortleaf pine, eastern redcedar, loblolly pine.
2,500 1,500	Slight	Severe	Moderate	Eastern cottonwood, cherrybark oak, Nuttall oak, Shumard oak, water oak, willow oak, sweetgum, American sycamore.
4,000 3,000	Slight	Slight	Slight	Eastern cottonwood, cherrybark oak, Nuttall oak, Shumard oak, water oak, willow oak, American sycamore, black walnut, yellow poplar.
4,000 3,000	Slight	Slight	Slight	Shortleaf pine, loblolly pine, eastern redcedar; and on north and east slopes in coves and at slope bases, black walnut, black locust, and red oak.
3,500 1,800	Slight	Slight	Slight	Eastern cottonwood, green ash, sweetgum, cherrybark oak, water oak, willow oak, Shumard oak, American sycamore, black walnut, black locust, yellow poplar.
3,500 2,000	Slight	Slight	Slight	Shortleaf pine, eastern redcedar; and on north and east slopes in covers and at slopes bases, black walnut, black locust, and red oak.
3,500 2,000	Slight	Slight	Moderate	Shortleaf pine, loblolly pine, redcedar; and on north and east slopes in covers and at slope bases, black walnut, black locust, and red oak.
2,800 1,500	Slight	Severe	Moderate	Loblolly pine, sweetgum, cherrybark oak, water oak, Shumard oak.
3,000 1,500	Slight	Slight	Slight	Green ash, eastern cottonwood, Nuttall oak, sweetgum, American sycamore, yellow poplar, black walnut, cherrybark oak, Shumard oak.
4,000 3,000				

TABLE 5.—*Potential productivity of*

Soil series and map symbols	Woodland group	Important trees	Potential productivity	
			Estimated site index [1]	Understory vegetation (medium canopy)
Dundee: DvA, DvB	2w5	Eastern cottonwood	100	Switchgrass, eastern gamagrass, Virginia wildrye, broadleaf uniola, beaked panicum, redtop panicum, velvet panicum, other Total, favorable years Total, unfavorable years
		Cherrybark oak	103	
		Water oak	94	
		Sweetgum	98	
Foley-Calhoun: FcA	3w9	Sweetgum	70	Switchgrass, beaked panicum, velvet panicum, plumegrass, Florida paspalum, low panicums, other grasses, sedges, and rushes Total, favorable years Total, unfavorable years
		Cherrybark oak	70	
		Water oak	70	
		Loblolly pine	60	
Gepp: GpD, GpE	3o7	White oak	70	Big and little bluestem, indiangrass, wildrye, beaked panicum, low panicum, purpletop, sedges, tickclovers, native lespedeza, perennial sunflowers, goldenrod, flameleaf sumac, other shrubs. Total, favorable years Total, unfavorable years
		Shortleaf pine	70	
Healing: Hc	2o7	Shortleaf pine	80	Big and little bluestem, indiangrass, switchgrass, low panicum, beaked panicum, giant cane, eastern gamagrass, other grasses, sedges, forbs, and shrubs. Total, favorable years Total, unfavorable years
		Red oak	80	
		White oak	70	
		American sycamore	----	
		Eastern cottonwood	----	
Hillemann: Hn	3w9	Sweetgum	----	Switchgrass, beaked panicum, plumegrasses, velvet panicum, broadleaf uniola, low panicum, sedges, rushes, and other shrubs. Total, favorable years Total, unfavorable years
		Water oak	----	
		Cherrybark oak	----	
Hontas: Ho	2w7	Shortleaf pine	80	Giant cane, eastern gamagrass, wildrye, uniolas, beaked panicum, low panicum, sedges, goldenrod, perennial sunflowers, wild grape, huckleberry. Total, favorable years Total, unfavorable years
		Shumard oak	80	
		Sweetgum	80	
		Eastern cottonwood	80	
		American sycamore	----	
		Water oak	----	
Jackport: Ja	2w6	Green ash	80	Switchgrass, eastern gamagrass, Virginia wildrye, broadleaf uniola, beaked panicum, low panicum, sedges and rushes, other forbs, and shrubs. Total, favorable years Total, unfavorable years
		Cherrybark oak	90	
		Water oak	90	
		Willow oak	90	
		Sweetgum	90	
Lafe-Foley: LfA	5t0	Unsuitable for tree growth	----	Switchgrass, beaked panicum, plumegrass, Florida paspalum, indiangrass, wildrye, dropseed, three-awns, sedges, other forbs. Total, favorable years Total, unfavorable years
Loring: LoC2, LoD2	3o7	Cherrybark oak	----	Switchgrass, beaked panicum, Florida paspalum, big and little bluestem, wildrye, plumgrass, low panicum, other grasses, sedges, forbs, and shrubs. Total, favorable years Total, unfavorable years
		Red oak	74	
		Sweetgum	90	
		Loblolly pine	85	
		Water oak	82	
McCrory: Mc	3w6	Sweetgum	85	Switchgrass, giant cane, eastern gamagrass, Virginia wildrye, broadleaf uniola, beaked panicum, low panicum, sedges and rushes, other forbs, and shrubs. Total, favorable years Total, unfavorable years
		Water oak	80	
Patterson: Pa	2s5	Green ash	----	Switchgrass, giantcane, eastern gamagrass, Virginia wildrye, beaked panicum, low panicum, other grasses, sedges, forbs, and shrubs. Total, favorable years Total, unfavorable years
		Cherrybark oak	95	
		Nuttall oak	85	
		Water oak	----	
		Willow oak	90	
		Sweetgum	90	

woodland and forage—Continued

Potential productivity—Continued	Management problems			Trees suitable for planting
Estimated yields of forage	Erosion hazard	Equipment limitations	Seedling mortality	
Lbs per acre				
2,500 1,800	Slight	Moderate	Slight	Eastern cottonwood, cherrybark oak, water oak, sweetgum, Nuttall oak, Shumard oak.
2,000 1,200	Slight	Severe	Moderate	Sweetgum, American sycamore, loblolly pine, Nuttall oak, water oak.
3,000 1,500	Slight	Slight	Slight	Black walnut, loblolly pine, shortleaf pine, red oak.
4,000 3,000	Slight	Slight	Slight	Shortleaf pine, red oak, white oak, American sycamore, eastern cottonwood, black walnut, black locust.
3,000 1,500	Slight	Moderate	Moderate	Sweetgum, loblolly pine, cherrybark oak, water oak, Shumard oak, Nuttall oak.
3,500 2,000	Slight	Moderate	Moderate	Shortleaf pine, loblolly pine, eastern cottonwood, American sycamore, Shumard oak, sweetgum.
3,000 2,000	Slight	Severe	Moderate	Green ash, eastern cottonwood, Nuttall oak, willow oak, sweetgum, American sycamore, water oak, cherrybark oak.
1,500 500	Slight	Slight	Severe	None.
2,500 1,000	Slight	Slight	Slight	Loblolly pine, yellow poplar, red oak, black walnut, shortleaf pine, redcedar.
3,000 1,800	Slight	Severe	Moderate	Sweetgum, American sycamore, green ash, swamp chestnut oak, Nuttall oak, water oak.
2,500 1,800	Slight	Moderate	Moderate	Green ash, cherrybark oak, Nuttall oak, water oak, willow oak, sweetgum, American sycamore.

TABLE 5.—*Potential productivity of*

Soil series and map symbols	Woodland group	Important trees	Potential productivity	
			Estimated site index [1]	Understory vegetation (medium canopy)
Peridge: PeC2	3o7	Shortleaf pine	70	Indiangrass, switchgrass, big and little bluestem, wildryes, beaked panicum, low panicum, other shrubs, grasses, and forbs.
		Red oak	70	
		Eastern redcedar	---	Total, favorable years
		Black walnut	---	Total, unfavorable years
		White oak	---	
		White ash	---	
		Black cherry	---	
		Black locust	---	
		Loblolly pine	---	
Portia: PoC, PoD	3o7	Sweetgum	80	Little and big bluestem, indiangrass, wildrye, beaked panicum, low panicum, sedges, perennial sunflowers, native lespedeza, asters, sumac, huckleberry.
		Loblolly pine	75	
				Total, favorable years
				Total, unfavorable years
Sharkey: Sh	2w6	Green ash	85	Switchgrass, eastern gamagrass, wildryes, broadleaf uniolar, beaked panicum, redtop panicum, sedges, other forbs, vines, and shrubs.
		Eastern cottonwood	100	
		Cherrybark oak	90	Total, favorable years
		Sweetgum	90	Total, unfavorable years
		Water oak	---	
		Pecan	---	
		American Sycamore	---	
Tonti: ToC, ToD	4o7	Shortleaf pine	60	Bluestems, indiangrass, Canada wildrye, uniolas, beaked panicum, low panicum, other grasses, forbs, and shrubs.
		Red oak	---	
		Black locust	---	Total, favorable years
		Black walnut	---	Total, unfavorable years
		Eastern redcedar	40	
Tuckerman: Tu	1w6	Green ash	---	Beaked panicum, Virginia wildrye, redtop panicum, switchgrass, eastern gamagrass, low panicums, sedges and rushes, other shrubs.
		Eastern cottonwood	---	
		Cherrybark oak	95	Total, favorable years
		Nuttall oak	95	Total, unfavorable years
		Water oak	95	
		Willow oak	95	
		Sweetgum	---	
Ventris: VrD	5x2	Shortleaf pine	55	Little bluestem, indiangrass, big bluestem, tall dropseed, plumegrass, sedges, other grasses, forbs, and shrubs.
		Red oak	---	
		Eastern redcedar	35	Total, favorable years
		Loblolly pine	---	Total, unfavorable years
VrF	5x2	Shortleaf pine	55	Little bluestem, indiangrass, big bluestem, tall dropseed, plumegrass, sedges, other grasses, forbs, and shrubs.
		Red oak	---	
		Eastern redcedar	35	Total, favorable years
		Loblolly pine	---	Total, unfavorable years

[1] Site class rating adapted from data gathered in soil site studies by the Soil Conservation Service and the Forest Service.

column designates the woodland group. Each group is made up of soils that are suited to the same kind of trees, have about the same potential productivity, and require about the same kind of woodland management.

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

The second part of the symbol, a letter, indicates an important soil property that imposes a moderate or severe hazard or limitation in managing the soils for wood crops. The letter *x* shows that the main limitation is stoniness or rockiness; *w*, excessive water on or in the soil; *t* toxic substances in the soil; *d*, restricted rooting depth; *c*, clay in the upper part of the soil; *s*, sandy soil; *f*, large amounts of coarse fragments; and *r*, steep slopes. The letter *o* indicates no significant restrictions or limitations for woodland use or management.

The third element in the symbol indicates the degree of management concerns and the general suitability of the soils for certain kinds of trees.

Also in table 5 are some of the commercially important

woodland and forage—Continued

Potential productivity—Continued	Management problems			Trees suitable for planting
Estimated yields of forage	Erosion hazard	Equipment limitations	Seedling mortality	
Lbs per acre				
2,500 1,000	Slight	Slight	Slight	Shortleaf pine, loblolly pine, black walnut, black locust, red oak, white ash, eastern redcedar, yellow poplar.
3,000 1,500	Slight	Slight	Slight	Loblolly pine, shortleaf pine, yellow poplar, black walnut, black locust, red oak, redcedar.
3,000 2,000	Slight	Severe	Moderate	Eastern cottonwood, American sycamore, sweetgum, bald cypress, green ash, cherrybark oak, Nuttall oak, Shumard oak, water oak, swamp chestnut oak.
3,000 1,800	Slight	Slight	Slight	Shortleaf pine, loblolly pine, eastern redcedar; and on north and east slopes in coves and on lower slopes bases, black walnut, black locust, red oak.
3,000 1,800	Slight	Severe	Moderate	Green ash, eastern cottonwood, sweetgum, American sycamore, cherrybark oak, Nuttall oak, water oak, willow oak, baldcypress.
2,000 1,000	Slight	Moderate	Moderate	Shortleaf pine, loblolly pine, eastern redcedar.
2,000 1,000	Moderate	Moderate to severe	Moderate to severe	Shortleaf pine, loblolly pine, eastern redcedar.

trees suited to the soil. These are the trees that woodland managers generally favor in intermediate or improvement cuttings.

Potential productivity is indicated by site index. The site index is the average height of dominant trees, in feet, at age 30 for cottonwood; at age 35 for sycamore; at age 25 for planted pines; and at age 50 for all other species or types. Although some of the listed trees make suitable growth, no information on site index is available. Dashes indicate that no data are available.

Also shown in the table is the understory vegetation, the grasses, legumes, forbs, and low shrubs that grow under a medium, or 36 to 55 percent, canopy and the yields of all understory vegetation within reach of livestock and game animals. Yields are expressed in pounds of air-dry forage per acre. Where yield data are not available, the important forage-producing species are listed in approximate order of productivity.

The management concerns evaluated in table 5 are erosion hazard, equipment limitations, and seedling mortality. Erosion hazard measures the risk of soil losses in well-managed woodlands. The hazard is *slight* if expected soil

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

Equipment limitations reflect the soil conditions that restrict the use of equipment normally used in woodland management or harvesting. *Slight* indicates that equipment use is not limited to kind or time of year. A rating of *moderate* indicates a seasonal limitation or need for modification in methods or equipment. *Severe* limitations indicate the need for specialized equipment or management.

Seedling mortality ratings indicate the degree of expected mortality of planted seedlings when plant competition is not a limiting factor. Normal rainfall, good planting stock, and proper planting are assumed. A *slight* rating indicates that expected mortality is less than 25 percent. A *moderate* rating indicates a 25 to 30 percent loss; and *severe* indicates more than a 50 percent loss of seedlings.

In the last column of table 5 is a list of trees suitable for planting in commercial wood production.

Range[6]

Different kinds of soil vary in their capacity to produce grass and other plants for grazing. Soils that produce about the same kinds and amounts of forage, if the range is in similar condition, make up a range site.

Range sites differ in their ability to produce vegetation. The soils of any one range site produce about the same kind of climax vegetation. Climax vegetation is the stabilized plant community that reproduces itself and does not change so long as the environment remains unchanged. Throughout the woodland and the savanna, the climax vegetation consists of the plants that were growing there when the region was first settled. If cultivated crops are not grown, the most productive combination of forage plants on a range site is generally the climax vegetation.

Decreasers are plants in the climax vegetation that tend to decrease in relative amount under close growing. They generally are the tallest and most productive perennial grasses and forbs and the most palatable to livestock.

Increasers are plants in the climax vegetation that increase in relative amount as the more desirable decreaser plants are reduced by close grazing. They are commonly shorter than decreasers and are generally less palatable to livestock.

Invaders are plants that cannot compete with plants in the climax plant community for moisture, nutrients, and light. Hence, they invade the site and grow along with increasers after the climax vegetation has been reduced by grazing. Many are annual weeds. Some are shrubs that have some grazing value. Others have little value for grazing.

Four range condition classes indicate the degree of departure from the potential, or climax, vegetation brought about by grazing or other uses. The classes show the present condition of the vegetation on a site as related to the native, or climax, vegetation.

A range is in *excellent* condition if 76 to 100 percent of the vegetation is of the same kind as that in the climax stand. It is in *good* condition if the percentage is 51 to 75; in *fair* condition if the percentage is 26 to 50; and in *poor* condition if the percentage is less than 25.

[6] IVAN R. PORTER, range conservationist, Soil Conservation Service, helped prepare this section.

Potential forage production depends on the range site. Current forage production depends on the range condition and the moisture available to plants during their growing season.

A primary objective of good range management is to keep range in excellent or good condition. If this is done, water is conserved, yields are improved, and the soils are protected. The problem is recognizing important changes in the kind of cover on a range site. These changes take place gradually and can be misinterpreted or overlooked. Growth encouraged by heavy rain can lead to the conclusion that the range is in good condition, when actually the cover is weedy and the long-term trend is toward lower production. On the other hand, some range that has been closely grazed for short periods, under the supervision of a careful manager, can have a degraded appearance that temporarily conceals its quality and ability to recover.

On the following pages the range sites of Lawrence County are described, the climax plants and principal invaders on the sites are named, and the potential annual yield of air-dry herbage is estimated for each site in excellent condition. The range site is designated for each soil in the county at the end of each mapping unit description.

ALKALI FLATS

This site occurs as broad silt loam flats. Vegetation ranges from stunted poor growth oaks and associated trees to open grass-forb areas. The soils are somewhat poorly drained and poorly drained. At times excess water ponds until it evaporates because percolation is poor. The soils are extremely hard when dry and very firm when moist. They are also droughty. The root zone is shallow, and the available water capacity is low. The subsoil contains high concentrations of sodium and magnesium.

If this site is in excellent condition, the plant cover is about 10 to 15 percent trees, such as post oak, winged elm, and black hickory, and moderately small amounts of switchgrass, little bluestem, spike tridens, paspalum, low panicums, and meadow dropseed. As the site deteriorates, that plant cover is replaced by annual three-awn, dropseed, umbrella sedge, and low brushy woody species.

If the range is in excellent condition and moisture is favorable, the total annual yield is about 3,800 pounds per acre, air-dry weight, in favorable years to 2,000 pounds in unfavorable years.

CHERT HILLS RANGE SITE

This site is deep and moderately sloping to moderately steep. The soils are somewhat excessively drained. Permeability is moderately rapid, and the available water capacity is low. Content of plant nutrients is low. The content of chert fragments is high. The surface layer and subsurface layer are cherty silt loam. The subsoil ranges from cherty silt loam in the upper part to silty clay in the lower part.

If this site is in excellent condition, the plant cover is 35 percent open stands of oak and hickory. The rest is grasses, legumes, and forbs, mainly big bluestem, little bluestem, indiangrass, lespedeza, tickclover, Virginia tephrosia, New Jersey tea, goldenrod, and aster. As the site deteriorates, oak and hickory increase along with broomsedge bluestem, ragweed, sassafras, persimmon, sumac, coralberry, and hawthorn.

If moisture is favorable, the total annual yield is about 4,500 pounds per acre, air-dry weight, in favorable years to 3,000 pounds in unfavorable years.

CLAY BREAK LIMESTONE RANGE SITE

This site is moderately deep and deep and gently sloping to steep. The soils are moderately well drained or well drained. Permeability is very slow, and the available water capacity is medium to high. The content of plant nutrients is low to high. The root zone is about 20 to 50 inches. The depth to bedrock is 20 to more than 72 inches. The surface layer is cherty silt loam and silty clay loam, and the subsoil is clay. Loose stones are on the surface and bedrock crops out in some places.

If this site is in excellent condition, the plant cover is about 30 to 45 percent open stands of oak, hickory, and redcedar. The rest is mainly big bluestem, little bluestem, indiangrass, switchgrass, lespedeza, catclaw, sensitivebrier, sunflower, and other perennial forbs. As the site deteriorates, woody plants increase along with broomsedge bluestem, poverty oatgrass, ironweed, and numerous annual weeds and grasses.

If moisture is favorable, the total annual yield is about 4,000 pounds per acre, air-dry weight, in favorable years to 2,750 pounds in unfavorable years.

LOAMY UPLAND RANGE SITE

This site is deep and gently sloping to moderately steep. Permeability is moderate or moderately slow. The available water capacity is medium or high. The content of plant nutrients is low. The depth to bedrock is 40 to more than 72 inches. The surface layer is gravelly sandy loam or cherty silt loam, and the subsoil is clayey.

If this site is in excellent condition, the plant cover is about 40 to 50 percent trees, such as white oak, red oak, post oak, and hickory. The rest is tall grasses, legumes, and forbs. The main decreasers are little bluestem, big bluestem, indiangrass, beaked panicum, native lespedeza, and perennial sunflower. As the site deteriorates, the decreasers are replaced by broomsedge bluestem, annual three-awn grasses, ragweed, white snakeroot, ironweed, and tree seedlings. The canopy can be hardwood and eastern redcedar with but few palatable understory plants.

If moisture is favorable, the total annual yield is about 5,500 pounds per acre, air-dry weight, in favorable years to 3,000 pounds per acre in unfavorable years.

Engineering[7]

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

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

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

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

Most of the information in this section is presented in tables 6 and 7, which show, respectively, several estimated soil properties significant in engineering and interpretations for various engineering uses.

This information, along with the soil map and other parts of this publication, can be used to make interpretations in addition to those given in tables 6 and 7, and it also can be used to make other useful maps.

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

Some terms used in this soil survey have special meaning in soil science that may be unfamiliar to engineers. The Glossary defines many of these terms.

Engineering classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified soil classification system (*2*) used by the SCS engineers, Department of Defense, and others, and the AASHTO system (*1*) adopted by the American Association of State Highway and Transportation Officials.

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

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

[7] VANCE B. FINCH, civil engineer, Soil Conservation Service, helped prepare this section.

TABLE 6.—*Estimated engineering*

[An asterisk in the first column indicates that at least one mapping unit is made up of two or more kinds of soil. The soils in such mapping units symbol > means more than;

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification		Coarse fraction greater than 3 inches	Percentage less than 3 inches passing sieve—	
	Bedrock	Seasonal high water table			Unified	AASHTO		No. 4 (4.7 mm)	No. 10 (2.0 mm)
	In	*In*	*In*						
Agnos: AcC, AcD, AgD, AnE.	>72	>6	0–8	Cherty silt loam	ML, SM	A–4	0–25	55–85	50–80
			8–72	Clay	CH, MH	A–7	0	95–100	95–100
Amagon: Ao	>72	0–1	0–7	Silt loam	CL, ML, CL–ML	A–4	0		100
			7–21	Silt loam	CL, CL–ML	A–4, A–6	0		100
			21–40	Silty clay loam	CL	A–6, A–7	0		100
			40–72	Loam and silt loam	CL, CL–ML	A–4, A–6	0		100
Beulah: BeB	>72	>6	0–10	Sandy loam	SM	A–2, A–4	0		100
			10–36	Fine sandy loam	SM, ML	A–2, A–4	0		100
			36–72	Loamy sand	SM	A–2, A–4	0		100
Boden: BnC, BnD, BnE.	>40	>6	0–7	Gravelly sandy loam	GM, SM	A–2, A–4	0–5	65–85	60–80
			7–11	Fine sandy loam	SM, SM–SC	A–2, A–4	0–5	85–95	80–95
			11–32	Clay	CL, CH	A–6, A–7	0	90–100	90–100
			32–42	Sandy clay	CL, SC	A–2, A–4, A–6	0–20	80–95	75–95
			42–50	Sandy clay loam	CL, CL–ML, SC, SM–SC	A–2, A–4	0	95–100	90–100
Bosket: BoA, BoB.	>72	>6	0–14	Fine sandy loam	SM	A–2, A–4	0		100
			14–30	Loam	CL, CL–ML, SC, SM–SC	A–4, A–6	0		100
			30–37	Fine sandy loam	SM	A–4, A–2	0		100
			37–72	Loamy sand	SM	A–2	0		100
Calhoun Mapped only with Foley soils.	>72	1–2	0–13	Silt loam	CL, ML, CL–ML	A–4	0		100
			13–50	Silty clay loam and silt loam.	CL	A–6	0		100
			50–72	Silt loam	CL, CL–ML	A–4, A–6	0		100
Captina: CaB, CaC, CaD.	>72	2–3	0–5	Silt loam	ML, CL–ML	A–4	0		95–100
			5–22	Silty clay loam	CL	A–4	0		95–100
			22–72	Silt loam and silty clay loam.	CL, CL–ML	A–4, A–6	0	90–100	60–100
Clarksville: CeD, CeE.	>72	>6	0–8	Cherty silt loam	GM	A–1, A–2	5–20	35–55	30–40
			8–46	Cherty silt loam and cherty silty clay loam.	GC	A–2, A–4, A–6	10–25	35–60	30–35
			46–72	Silty clay	MH, CH	A–7	0–5	85–100	85–100
Crowley: CoA	>72	½–1½	0–9	Silt loam	CL, ML, CL–ML	A–4	0		100
			9–39	Silty clay	CL, CH	A–7	0		100
			39–72	Silty clay loam	CL, CH	A–6, A–7	0		100
Dubbs: DeA, DeB.	>72	>6	0–8	Silt loam	CL, CL–ML	A–4	0		100
			8–45	Silt loam and silty clay loam.	CL	A–6, A–7	0		100
			45–72	Very fine sand	ML, CL–ML	A–4	0		100
Dundee: DvA, DvB.	>72	1–2	0–7	Silt loam	ML, CL–ML	A–4	0		100
			7–25	Silt loam	CL, CL–ML	A–6 or A–7	0		100
			25–32	Fine sandy loam	SM, SM–SC, ML, CL–ML	A–2, A–4	0		100
			32–72	Silty clay loam	CL	A–6, A–7	0		100

properties of soils

may have different properties and limitations, and for this reason it is necessary to follow the instructions in the first column of this table. The the symbol < means less than]

Percentage less than 3 inches passing sieve—Continued		Liquid limit	Plasticity index	Permeability [1]	Available water capacity	Reaction	Shrink-swell potential	Risk of corrosion to—	
No. 40 (0.42 mm)	No. 200 (0.074 mm)							Uncoated steel	Concrete
		Pct		*In per hr*	*In per in of soil*	*pH*			
45–75	40–70	----------	[2] NP	0.6–2.0	0.10–0.14	5.1–6.0	Low----------	Low----------	Moderate.
95–100	90–100	55–65	20–35	<0.06	0.12–0.18	4.0–5.5	High----------	High----------	High.
95–100	85–95	<30	NP–10	0.6–2.0	0.16–0.24	4.5–6.0	Low----------	High----------	High.
95–100	85–95	25–40	7–18	0.2–0.6	0.16–0.24	4.5–6.0	Low----------	High----------	High.
95–100	85–95	30–45	11–25	0.06–0.2	0.18–0.22	4.5–6.0	Moderate------	High----------	High.
80–100	60–95	15–30	1–15	0.2–0.6	0.15–0.24	5.1–7.3	Low----------	High----------	Moderate.
75–100	25–45	----------	NP	2.0–6.0	0.10–0.14	4.5–6.0	Low----------	Low----------	Moderate.
85–100	25–60	----------	NP	2.0–6.0	0.11–0.15	4.5–6.0	Low----------	Low----------	Moderate.
65–100	15–45	----------	NP	>6.0	0.06–0.10	4.5–6.0	Low----------	Low----------	Moderate.
30–45	25–35	<20	NP	0.6–6.0	0.07–0.12	4.5–5.5	Low----------	Low----------	High:
75–90	30–45	<25	NP–7	0.6–2.0	0.11–0.15	4.5–5.5	Low----------	Low----------	High.
85–95	55–80	35–55	15–30	0.2–0.6	0.12–0.18	4.5–5.5	Moderate------	High----------	High.
65–90	35–70	25–40	10–20	0.6–2.0	0.14–0.18	4.5–5.5	Moderate------	Low----------	High.
75–90	35–70	20–30	5–10	0.6–2.0	0.12–0.17	4.5–5.5	Low----------	Low----------	High.
80–100	30–45	<20	NP–3	2.0–6.0	0.11–0.15	5.1–6.5	Low----------	Low----------	Moderate.
90–100	45–65	25–40	5–17	0.6–2.0	0.15–0.20	5.1–6.5	Low----------	Low-------	Moderate.
80–100	30–45	<20	NP–3	2.0–6.0	0.11–0.15	5.1–6.5	Low----------	Low----------	Moderate.
65–85	15–30	<20	NP–3	>6.0	0.06–0.10	5.1–6.5	Low----------	Low----------	Moderate.
100	95–100	<30	NP–10	0.2–0.6	0.21–0.24	4.5–6.0	Low----------	High----------	Moderate.
100	95–100	30–40	12–18	0.06–0.2	0.18–0.24	4.5–5.5	Low to moderate.	High----------	Moderate to high.
100	95–100	25–35	5–15	0.2–0.6	0.21–0.24	5.1–7.3	Low----------	High----------	Moderate.
90–100	80–95	<25	NP–5	0.6–2.0	0.16–0.24	5.0–6.5	Low----------	High----------	Moderate.
90–100	85–95	20–40	8–20	0.6–2.0	0.18–0.22	4.5–5.5	Low to moderate.	High----------	Moderate to high.
60–100	50–95	20–40	5–20	0.06–0.2	0.08–0.12	4.5–5.5	Low----------	High----------	Moderate to high.
25–35	20–35	----------	NP	2.0–6.0	0.05–0.10	5.1–6.5	Low----------	Low----------	Low to moderate.
25–40	20–40	25–40	8–20	2.0–6.0	0.05–0.10	4.5–5.5	Low----------	Low----------	High.
80–95	75–85	51–65	20–35	0.2–0.6	0.12–0.18	4.5–5.5	Moderate------	Moderate------	Moderate to high.
95–100	90–100	<30	NP–10	0.2–0.6	0.16–0.24	4.5–6.0	Low----------	High----------	Moderate to high.
95–100	95–100	41–60	19–35	<0.06	0.14–0.18	4.5–5.5	High----------	High----------	Moderate to high.
90–100	90–100	36–52	15–30	0.06–0.2	0.18–0.22	5.6–8.4	Moderate to high.	High----------	Moderate to high.
100	85–100	20–30	6–10	0.6–2.0	0.16–0.24	4.5–6.0	Low----------	Low to moderate.	Moderate to high.
95–100	85–100	30–45	12–25	0.6–2.0	0.16–0.24	4.5–6.0	Moderate------	Low to moderate.	Moderate to high.
85–95	50–65	<30	NP–7	0.6–2.0	0.13–0.20	4.5–6.0	Low----------	Low to moderate.	Moderate to high.
100	80–95	<30	NP–7	0.6–2.0	0.16–0.24	4.5–6.0	Low----------	High----------	Moderate to high.
95–100	85–100	20–35	5–15	0.6–2.0	0.16–0.24	4.5–6.0	Moderate------	High----------	Moderate to high.
85–95	30–65	<30	NP–7	0.6–2.0	0.11–0.15	4.5–6.0	Low----------	High----------	Moderate to high.
95–100	85–100	35–45	18–25	0.2–0.6	0.18–0.22	4.5–6.0	Moderate------	High----------	Moderate to high.

TABLE 6.—*Estimated engineering*

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification		Coarse fraction greater than 3 inches	Percentage less than 3 inches passing sieve—	
	Bedrock	Seasonal high water table			Unified	AASHTO		No. 4 (4.7 mm)	No. 10 (2.0 mm)
	In	*In*	*In*						
*Foley: FcA	>72	0–1	0–11	Silt loam	CL or CL–ML	A–4, A–6	0		100
			11–23	Silt loam	CL	A–6, A–7	0		100
			23–54	Silty clay loam	CL, CH	A–6, A–7	0		100
			54–72	Silt loam	CL	A–6	0		100
For Calhoun part, see Calhoun series.									
Gepp: GpD, GpE	>72	6	0–10	Cherty silt loam	GC, GM–GC, GM, ML, CL–ML, CL, SC, SM, SM–SC	A–2, A–4	10–25	45–75	45–75
			10–14	Cherty silty clay loam	CL	A–4, A–6	0–15	65–100	65–100
			14–72	Clay	CH, MH	A–7	0–5	90–100	90–100
Healing [3]: Hc	>72	>6	0–16	Silt loam	ML, CL–ML	A–4	0		100
			16–72	Silty clay loam	CL, CL–ML	A–4, A–6	0		100
Hillemann: Hn	>72	½–1	0–11	Silt loam	CL, ML, CL–ML	A–4	0		100
			11–16	Silt loam	CL, CL–ML	A–4, A–6	0		100
			16–25	Silty clay	CL, CH	A–6, A–7	0		100
			25–66	Silty clay loam and silt loam.	CL, CL–ML	A–4, A–6, A–7	0		100
Hontas [3]: Ho	>72	2–2½	0–72	Silt loam and silty clay loam.	CL, CL–ML	A–4, A–6	0		100
Jackport: Ja	>72	0–1	0–16	Silty clay	CH	A–7	0		100
			16–32	Clay	CH	A–7	0		100
			32–60	Silty clay and silty clay loam.	CH, CL	A–7	0		100
			60–72	Fine sandy loam	CL, ML, CL–ML, SM–SC, SM, SC	A–4, A–6	0		100
*Lafe: LfA	>72	0–1	0–10	Silt loam	CL, CL–ML, ML	A–4	0		100
			10–35	Silt loam	CL	A–6, A–7	0		100
			35–72	Silt loam	CL, ML	A–4, A–6	0		100
For Foley part, see Foley series.									
Loring: LoC2, LoD2.	>72	2–3	0–4	Silt loam	ML	A–4	0		100
			4–19	Silt loam and silty clay loam.	CL	A–4, A–6	0		100
			19–72	Silty clay loam and silt loam.	CL	A–4, A–6	0		100
McCrory: Mc	>72	0–1	0–22	Fine sandy loam	SM, ML	A–4	0		100
			20–44	Loam and fine sandy loam.	CL, ML, CL–ML, SC, SM–SC, SM	A–4	0		100
			44–72	Loamy fine sand	SM	A–2, A–4	0		100
Patterson: Pa	>72	0–1	0–32	Fine sandy loam	SM, SM–SC	A–2, A–4	0		100
			32–38	Loamy fine sand	SM	A–2, A–4	0		100
			38–46	Fine sandy loam	SM, SM–SC	A–2, A–4	0		100
			46–72	Loamy sand	SM	A–2	0		100
Peridge: PeC2	>72	>6	0–4	Silt loam	ML, CL–ML	A–4	0	95–100	90–100
			4–44	Silty clay loam	CL	A–6	0	95–100	90–100
			44–62	Silty clay and clay	CL	A–6, A–7	0	95–100	90–100
Portia: PoC, PoD	>60	>6	0–11	Fine sandy loam	SM, ML	A–4	0		95–100
			11–45	Loam	CL, CL–ML	A–4, A–6	0		95–100
			45–62	Clay loam	CL, SC	A–6, A–4	0		95–100

properties of soils—Continued

Percentage less than 3 inches passing sieve—Continued		Liquid limit	Plasticity index	Permeability [1]	Available water capacity	Reaction	Shrink-swell potential	Risk of corrosion to—	
No. 40 (0.42 mm)	No. 200 (0.074 mm)							Uncoated steel	Concrete
		Pct		*In per hr*	*In per in of soil*	*pH*			
95–100	85–95	25–45	5–20	0.6–2.0	0.16–0.24	5.6–7.3	Low	High	Low to moderate.
95–100	90–100	30–50	11–30	0.2–0.6	0.16–0.24	5.6–7.3	Moderate	High	Low to moderate.
95–100	90–100	40–60	20–40	0.06–0.2	0.10–0.15	6.6–9.0	Moderate	High	Low.
95–100	85–100	30–40	20–30	0.06–0.2	0.10–0.15	6.6–9.0	Moderate	High	Low.
35–65	25–55	<30	NP–10	0.6–2.0	0.08–0.22	5.6–6.5	Low	Low	Moderate.
55–95	51–90	25–40	8–20	0.6–2.0	0.10–0.18	4.5–5.5	Low	Moderate	High.
85–100	80–95	55–75	25–40	0.6–2.0	0.10–0.18	4.5–5.5	Moderate	High	Moderate.
95–100	90–100	<30	NP–7	0.6–2.0	0.16–0.24	6.1–7.8	Low	Low	Low to moderate.
95–100	90–100	20–30	5–15	0.6–2.0	0.18–0.22	6.1–7.8	Low	Low	Low to moderate.
90–100	85–100	<30	NP–10	0.2–0.6	0.16–0.24	5.1–6.0	Low	High	Moderate.
90–100	90–100	20–30	5–11	0.2–0.6	0.16–0.24	5.1–6.0	Low	High	Moderate.
90–100	90–100	35–55	15–30	<0.06	0.14–0.18	5.1–6.0	Moderate	High	Moderate.
90–100	90–100	25–45	5–25	<0.06	0.10–0.14	5.6–6.5	Low	High	Moderate.
90–100	85–95	20–35	5–15	0.6–2.0	0.16–0.24	5.6–7.8	Low	Moderate	Low.
95–100	90–100	55–70	30–50	<0.06	0.14–0.18	4.5–6.0	High	High	High.
95–100	90–100	65–85	35–55	<0.06	0.12–0.18	4.5–5.5	High	High	High.
95–100	90–100	45–75	30–55	<0.06	0.14–0.22	6.1–7.8	Moderate to high.	High	Low.
70–85	40–60	25–35	5–11	0.2–0.6	0.11–0.15	6.1–7.8	Low	High	Low.
95–100	90–100	<30	NP–10	0.6–2.0	0.16–0.24	5.1–6.0	Low	High	Moderate.
95–100	90–100	30–45	15–25	<0.06	0.09–0.15	7.4–9.0	Moderate	High	Low.
90–100	85–100	<40	NP–20	<0.2	0.02–0.07	7.9–9.0	Low to moderate.	High	Low.
100	95–100	30–35	5–10	0.6–2.0	0.20–0.24	5.1–6.5	Low	Moderate	Moderate.
100	95–100	30–40	10–20	0.6–2.0	0.18–0.24	5.1–6.0	Low	Moderate	Moderate.
100	95–100	30–40	10–16	0.2–0.6	0.14–0.17	5.1–6.0	Low	Moderate	Moderate.
70–90	40–65	<30	NP–3	0.6–2.0	0.11–0.15	5.1–6.0	Low	High	Moderate to high.
70–90	35–65	<30	NP–10	0.06–0.2	0.06–0.10	5.1–8.4	Moderate	High	Moderate to low.
60–85	25–40		NP	0.6–2.0	0.05–0.08	6.6–8.4	Low	High	Low.
75–100	25–45	<25	NP–6	2.0–6.0	0.11–0.15	4.5–6.5	Low	Moderate	Moderate to high.
70–95	25–45		NP	>6.0	0.07–0.11	4.5–5.5	Low	Moderate	Moderate to high.
75–100	25–45	<25	NP–6	2.0–6.0	0.11–0.15	4.5–5.5	Low	Moderate	Moderate to high.
50–75	15–30		NP	>6.0	0.06–0.10	4.5–5.5	Low	Moderate	Moderate to high.
90–100	90–100	<20	NP–5	0.6–2.0	0.16–0.24	4.5–6.5	Low	Moderate	Moderate.
90–100	90–100	30–40	11–20	0.6–2.0	0.18–0.22	4.5–6.0	Low	Moderate	Moderate.
90–100	90–100	35–50	15–25	0.6–2.0	0.12–0.18	4.5–6.0	Moderate	Moderate	Moderate.
70–85	36–60		NP	0.6–2.0	0.11–0.15	5.1–6.0	Low	Low	Moderate.
80–95	65–85	20–40	6–20	0.2–0.6	0.15–0.20	4.5–5.5	Low	Moderate	High.
80–95	36–75	25–40	8–25	0.2–2.0	0.15–0.20	4.5–5.5	Moderate	High	Moderate.

TABLE 6.—*Estimated engineering*

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification		Coarse fraction greater than 3 inches	Percentage less than 3 inches passing sieve—	
	Bedrock	Seasonal high water table			Unified	AASHTO		No. 4 (4.7 mm)	No. 10 (2.0 mm)
	In	*In*	*In*						
Sharkey: Sh	>72	0–1	0–9	Silty clay	CH	A–7	0		100
			9–54	Clay and silty clay	CH	A–7	0		100
			54–72	Silty clay	CH	A–7	0		100
Tonti: ToC, ToD	>50	>6	0–9	Cherty silt loam	ML	A–4	0–5	70–90	70–90
			9–20	Cherty silty clay loam	CL, ML, CL–ML	A–4, A–6	0–5	70–85	65–85
			20–55	Cherty silty clay loam	CL, ML, CL–ML, GC, SC, SM–SC, GM—GC	A–4, A–6, A–2	0–5	15–70	15–70
Tuckerman: Tu	>72	0–1	0–8	Fine sandy loam	ML, SM	A–4, A–2	0		100
			8–42	Fine sandy loam and loam.	ML, CL–ML, SM, SM–SC	A–4, A–6	0		100
			42–72	Loamy fine sand	ML, SM	A–2, A–4	0		100
*Ventris: VrD, VrF.	>20	>6	0–4	Silt clay loam	CL	A–4, A–6	3–30	60–95	60–95
Rock outcrop part too variable to rate.			4–28	Clay	CH, MH	A–6, A–7	0–5	80–95	80–95

[1] These values should not be confused with the coefficient "K" used by engineers.
[2] NP means nonplastic.

divided as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. As additional refinement, the engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest. The estimated AASHTO classification for all soils mapped in the survey area is shown in table 6.

Soil properties significant in engineering

Several estimated soil properties significant in engineering are given in table 6. These estimates are made for typical soil profiles, by layers sufficiently different to have different significance for soil engineering. The estimates are based on field observations made in the course of mapping, on test data for these and similar soils, and on experience with the same kinds of soil in other counties. Following are explanations of some of the columns in table 6.

Depth to bedrock is the distance from the surface of the soil to the upper surface of the rock layer.

Depth to seasonal high water table is the distance from the surface of the soil to the highest level that ground water reaches in the soil in most years. The depths given in table 6 are the depths to a seasonal perched water table that is separated from the permanent water table by an impervious layer or a dry zone.

Soil texture is described in table 6 in the standard terms used by the Department of Agriculture. These terms take into account relative percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the soil contains gravel or other particles coarser than sand, an appropriate modifier is added, as for example, "gravelly loamy sand." "Sand," "silt," "clay," and some of the other terms used in USDA textural classification are defined in the Glossary of this soil survey.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semisolid to a plastic. If the moisture content is further increased, the material changes from a plastic to a liquid. The plastic limit is the moisture content at which the soil material changes from a semisolid to a plastic; and the liquid limit, from a plastic to a liquid. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic. Liquid limit and plasticity index are estimated in table 6.

Permeability is the quality that enables a soil to transmit water or air. It is estimated on basis of those soil characteristics observed in the field, particularly structure and texture. The estimates in table 6 do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

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

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

properties of soils—Continued

Percentage less than 3 inches passing sieve—Continued		Liquid limit	Plasticity index	Permeability [1]	Available water capacity	Reaction	Shrink-swell potential	Risk of corrosion to—	
No. 40 (0.42 mm)	No. 200 (0.074 mm)							Uncoated steel	Concrete
		Pct		*In per hr*	*In per in of soil*	*pH*			
100	95–100	51–70	25–45	<0.06	0.14–0.18	5.1–7.3	High	High	Low.
100	95–100	55–85	30–50	<0.06	0.12–0.18	5.6–7.8	High	High	Low.
100	95–100	51–70	25–45	<0.06	0.14–0.18	6.6–7.8	High	High	Low.
65–85	60–70		NP	0.6–2.0	0.15–0.20	4.5–5.5	Low	Moderate	Moderate to high.
60–80	55–75	20–40	5–15	0.6–2.0	0.14–0.19	4.5–5.5	Low	Moderate	Moderate to high.
15–65	15–60	20–40	5–20	0.06–0.2	0.04–0.12	4.5–5.5	Low	Moderate	Moderate to high.
85–95	30–65	<20	NP–3	0.06–2.0	0.11–0.15	5.1–6.0	Low	High	Moderate.
85–95	40–65	<25	NP–7	0.6–2.0	0.11–0.20	5.1–6.0	Low	High	Moderate.
60–95	20–55		NP	2.0–6.0	0.07–0.11	5.1–6.0	Low	High	Moderate.
55–95	50–95	20–35	8–20	0.6–2.0	0.12–0.20	5.6–7.3	Low to moderate.	High	Low.
80–95	75–95	51–75	20–40	<0.06	0.10–0.18	5.6–7.8	High	High	Low.

[1] These soils are subject to flooding.

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

Corrosion, as used in table 6, pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion on uncoated steel is related to such soil properties as drainage, texture, total acidity, and electrical conductivity of the soil material. The rate of corrosion on concrete is influenced mainly by the content of sodium or magnesium sulfate, but also by texture and acidity. Installations of uncoated steel that intersect soil boundaries or soil horizons are more susceptible to corrosion than installations entirely in one kind of soil or in one soil horizon. A corrosion rating of *low* indicates a low probability of soil-induced corrosion damage. A rating of *high* indicates a high probability of damage, so that protective measures for steel and more resistant concrete should be used to avoid or minimize damage.

Engineering interpretations

The estimated interpretations in table 7 are based on the engineering properties of soils shown in table 6, on test data for soils in this survey area and others nearby or adjoining, and on the experience of engineers and soil scientists with the soils of Lawrence County. In table 7, ratings are used to summarize suitability of the soils for all listed purposes other than for drainage of crops and pasture, irrigation, pond reservoir areas, embankments, and terraces and diversions. For these particular uses, table 7 lists those soil features not to be overlooked in planning, installation, and maintenance. Specific values should not be assigned to the ratings of bearing capacity given in table 7.

Soil suitability is expressed as *good*, *fair*, and *poor*.

Following are explanations of some of the columns in table 7.

Sand and gravel are used in great quantities in many kinds of construction. Because these materials of suitable quality are of limited quantity in Lawrence County, the soils are not rated as possible sources.

Topsoil is used for topdressing an area where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material, as in preparing a seedbed; the natural fertility of the material or the response of plants when fertilizer is applied; and the absence of substances toxic to plants. Texture of the soil material and its content of stone fragments are characteristics that affect suitability. Also considered in the ratings is damage that will result at the area from which topsoil is taken.

Road fill is soil material used in embankments for roads. The suitability ratings reflect the predicted performance of soil after it has been placed in an embankment that has been properly compacted and provided with adequate drainage and the relative ease of excavating the material at borrow areas.

Pond reservoirs hold water behind a dam or embankment.

TABLE 7.—*Engineering*

[An asterisk in the first column indicates that at least one mapping unit is made up of two or more kinds of soil. The soils in such mapping units

Soil series and map symbols	Suitability as source of—		Soil features affecting—
	Topsoil	Road fill	Pond reservoir areas
Agnos: AcC, AcD, AgD, AnE	Poor: coarse fragments; surface stones on AgD and AnE; slopes of more than 12 percent on AnE.	Poor: high shrink-swell; low bearing strength.	Features generally favorable
Amagon: Ao	Poor: poorly drained	Poor: poorly drained; low bearing strength.	Features generally favorable; seasonal high water table.
Beulah: BeB	Good	Fair: excessive fines; good below a depth of 36 inches.	Moderately rapid permeability
Boden: BnC, BnD, BnE	Poor: coarse fragments; slopes of more than 12 percent on BnE.	Poor: moderate shrink-swell; low bearing strength.	Moderately slow permeability; moderately deep or deep to bedrock.
Bosket: BoA, BoB	Good	Fair: low bearing strength	Rapid permeability below a depth of 37 inches.
Calhoun Mapped only with Foley soils.	Poor: poorly drained	Poor: poorly drained; moderate to low bearing strength.	Features generally favorable; seasonal high water table.
Captina: CaB, CaC, CaD	Fair: somewhat plastic material within 5 inches of surface; material below a depth of 22 inches somewhat difficult to reclaim.	Fair: low bearing strength	Features generally favorable
Clarksville: CeD, CeE	Poor: coarse fragments; slopes more than 12 percent on CeE.	Good to fair: high to moderate bearing strength; excavated area difficult to reclaim.	Moderately rapid permeability
Crowley: CoA	Poor: poorly drained; clayey below a depth of 9 inches.	Poor: poorly drained; low bearing strength; high shrink-swell potential.	Features generally favorable; seasonal high water table.
Dubbs: DeA, DeB	Good to a depth of 12 inches; fair throughout remainder of profile.	Fair: moderate bearing strength	Moderate permeability
Dundee: DvA, DvB	Good	Fair: moderate bearing strength; somewhat poorly drained.	Moderately slow permeability; seasonal high water table.
*Foley: FcA For Calhoun part, see Calhoun series.	Poor: poorly drained; high sodium content in subsoil; difficult to reclaim.	Poor: poorly drained; moderate to low bearing strength; high sodium content in subsoil; difficult or impossible to reclaim.	Features generally favorable; seasonal high water table.

interpretations

may have different properties and limitations, and for this reason it is necessary to follow the instructions in the first column of this table carefully]

Soil features affecting—Continued			
Embankments, dikes, and levees	Drainage of crops and pasture	Irrigation	Terraces and diversions
Medium to low strength; fair to poor compaction characteristics.	Well drained; slope	Slow intake rate; very slow permeability; high available water capacity; rapid runoff.	Some slopes steeper than 8 percent; erodible; very slow permeability; difficult to vegetate terrace channel; subsoil material in terrace embankment likely to crack when dry; terraces may fail.
Poor to fair compaction characteristics and stability; medium to high compressibility; unstable slopes.	Poorly drained; seasonal high water table; slow permeability; ponding on surface.	Slow intake rate; high available water capacity.	Level soil; practice not applicable.
Fair compaction characteristics; moderate permeability when compacted; subject to piping and erosion.	Somewhat excessively drained	Moderate to rapid intake rate; medium to low available water capacity.	Undulating soil on bottom land; practice not applicable.
Medium to low strength; fair to poor compaction characteristics; subject to piping unless well mixed.	Well drained; slope	Moderate intake rate; moderately slow permeability; medium available water capacity; moderate to rapid runoff.	Some slopes steeper than 8 percent; erodible; moderately slow permeability; difficult to vegetate terrace channel; subsoil material in terrace embankment likely to crack when dry; terraces may fail.
Medium to low strength; fair to good compaction characteristics; low to medium compressibility; subject to piping unless well mixed.	Well drained	Moderate intake rate; moderate permeability; medium available water capacity.	Level to undulating soil on bottom lands; practice not applicable.
Poor to fair compaction characteristics and stability; medium to high compressibility; subject to piping; vegetation difficult to establish on subsoil fill.	Poorly drained; seasonal high water table; slow permeability; ponding on surface.	Slow intake rate; high available water capacity.	Level soil; practice not applicable.
Medium to low strength; medium compressibility; fair to good compaction characteristics; subject to piping.	Moderately well drained; slope	Moderate intake rate; slow permeability; medium available water capacity.	Features generally favorable; some slopes steeper than 8 percent.
High to medium strength; low to medium compressibility; fair to good compaction characteristics; medium to low permeability; subject to piping.	Somewhat excessively drained; slope.	Rapid intake rate; moderately rapid permeability; low available water capacity.	Steep slopes; practice not applicable.
Medium to low strength; fair to poor compaction characteristics; medium to high compressibility; high shrink-swell potential.	Poorly drained; seasonal high water table; very slow permeability; ponding on surface.	Slow or very slow intake rate; high available water capacity.	Level soil; practice not applicable.
Medium to high strength; fair to good compaction characteristics; medium to high compressibility.	Well drained	Moderate intake rate; high available water capacity.	Level to nearly level soil on bottom land; practice not applicable.
Low to medium strength; poor to fair compaction characteristics; medium to high compressibility.	Somewhat poorly drained; seasonal high water table; moderately slow permeability; ponding in swales on DvB.	Slow intake rate; high available water capacity; irregular surface on DvB.	Level to undulating soil on bottom land; practice not applicable.
Medium to low strength; fair to poor compaction characteristics; medium to high compressibility; vegetation difficult to establish on subsoil fill; material is dispersed and highly erodible.	Poorly drained; seasonal high water table; very slow permeability; ponding on surface.	Very slow intake rate; medium available water capacity.	Level soil; practice not applicable.

TABLE 7.—*Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting—
	Topsoil	Road fill	Pond reservoir areas
Gepp: GpD, GpE	Poor: coarse fragments; slope more than 12 percent in GpE.	Poor: moderate shrink-swell potential; low bearing strength.	Moderate permeability
Healing: Hc	Good	Fair: moderate bearing strength	Moderate permeability
Hillemann: Hn	Fair to poor: 16 inches of good material underlain with poor material high in sodium and difficult to reclaim.	Poor: moderate to low bearing strength; low to moderate shrink-swell potential.	Features generally favorable; seasonal high water table.
Hontas: Ho	Good	Fair: moderate bearing strength	Moderate permeability
Jackport: Ja	Poor: poorly drained; plastic, clayey material.	Poor: low bearing strength; high shrink-swell potential; plastic, clayey material.	Features generally favorable; seasonal high water table.
*Lafe: LfA For Foley part, see Foley series.	Poor: high sodium content within few inches of surface.	Poor: low bearing strength; high sodium content; difficult to stabilize.	Features generally favorable; seasonal high water table.
Loring: LoC2, LoD2	Fair: somewhat plastic material within 10 inches of surface.	Fair: moderate bearing strength	Moderately slow permeability
McCrory: Mc	Poor: poorly drained; high sodium in subsoil; difficult to reclaim.	Poor: poorly drained	Slow permeability; seasonal high water table.
Patterson: Pa	Good	Fair to good: moderate bearing strength.	Moderately rapid permeability; seasonal high water table.
Peridge: PeC2	Fair: somewhat plastic material within 4 inches of surface.	Fair: low bearing strength	Moderate permeability
Portia: PoC, PoD	Good	Fair: low bearing strength; moderate shrink-swell potential.	Moderately slow permeability
Rock outcrop Mapped only with Ventris soils.	Unsuited: bedrock at or near surface.	Unsuited: bedrock at or near surface.	Bedrock at or near surface
Sharkey: Sh	Poor: poorly drained; plastic, clayey material.	Poor: poorly drained; low bearing strength; high shrink-swell potential; plastic, clayey material.	Features generally favorable; seasonal high water table.
Tonti: ToC, ToD	Poor: coarse fragments	Fair: moderate bearing strength; bedrock at a depth of 50 to 60 inches.	Bedrock at a depth of 50 to 60 inches.

interpretations—Continued

Soil features affecting—Continued			
Embankments, dikes, and levees	Drainage of crops and pasture	Irrigation	Terraces and diversions
Medium to low strength; fair to poor compaction characteristics.	Well drained; slope	Slow intake rate; high available water capacity; rapid runoff.	Steep slopes.
Medium to low strength; medium compressibility; fair to good compaction characteristics; medium to low permeability when compacted; subject to piping.	Well drained	Moderate intake rate; moderate permeability; medium to high available water capacity; subject to frequent flooding.	Level soil; practice not applicable.
Medium to low strength; fair to poor compaction characteristics; medium to high compressibility; vegetation difficult to establish on subsoil fill; material is dispersed and highly erodible.	Somewhat poorly drained; very slow permeability; seasonal high water table.	Slow intake rate; medium available water capacity.	Level soil; practice not applicable.
Medium to low strength; fair to good compaction characteristics; medium compressibility.	Moderately well drained	Moderate intake rate; moderate permeability; high available water capacity; subject to frequent flooding.	Level soil; practice not applicable.
Medium to low strength; fair to poor compaction characteristics; high compressibility; high shrink-swell potential; plastic, clayey material.	Somewhat poorly drained; very slow permeability; seasonal high water table.	Very slow intake rate; high available water capacity.	Level soil; practice not applicable.
Medium to low strength; fair to poor compaction characteristics; medium to high compressibility; vegetation difficult to establish; material is dispersed and highly erodible.	Somewhat poorly drained; very slow permeability; seasonal high water table; drainage not feasible.	Very slow intake rate; low available water capacity; irrigation generally not feasible.	Level soil; practice not applicable.
Medium to low strength; fair to good compaction characteristics; medium compressibility.	Moderately well drained; slope	Slow intake rate; high available water capacity; moderate to rapid runoff.	Features generally favorable; some slopes steeper than 8 percent.
High to medium strength; fair to poor compaction characteristics; medium permeability when compacted; subject to piping and erosion; subsoil difficult to stabilize on embankments.	Poorly drained; seasonal high water table; slow permeability; ponding on surface.	Moderate to slow intake rate; medium available water capacity.	Level soil; practice not applicable.
Fair to good compaction characteristics; medium permeability when compacted; subject to piping and erosion.	Somewhat poorly drained; seasonal high water table.	Moderately rapid intake rate; medium to low available water capacity.	Level soil; practice not applicable.
Medium to low strength and compressibility; fair to good compaction characteristics.	Well drained; slope	Moderate intake rate; moderate permeability; high available water capacity.	Features generally favorable.
Medium to low strength; fair to good compaction characteristics; medium compressibility.	Well drained; slope	Moderate or slow intake rate; moderately slow permeability; high available water capacity; moderate to rapid runoff.	Features generally favorable; not feasible on PoD because of slopes.
Bedrock at or near surface	Excessively drained; bedrock at or near surface.	Bedrock at or near surface; practice not applicable.	Bedrock at or near surface; nonarable; practice not applicable.
Medium to low strength; fair to poor compaction characteristics; high compressibility; high shrink-swell potential; plastic, clayey material.	Poorly drained; seasonal high water table; very slow permeability.	Very slow intake rate; high available water capacity.	Level soil; practice not applicable.
Medium to low strength and compressibility; fair to good compaction characteristics; bedrock at a depth of 50 to 60 inches.	Moderately well drained; slope	Slow intake rate; slow permeability; medium available water capacity; medium runoff.	Features generally favorable; some slopes steeper than 8 percent.

TABLE 7.—*Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting—
	Topsoil	Road fill	Pond reservoir areas
Tuckerman: Tu	Poor: poorly drained	Poor: poorly drained; moderate bearing strength.	Poorly drained; seasonal high water table.
*Ventris: VrD, VrF For Rock outcrop part, see Rock outcrop.	Poor: stones and coarse fragments in thin surface layer; material below is plastic, clayey; excavated area difficult to reclaim.	Poor: stony surface; bedrock at a depth of 20 to 40 inches; low bearing strength; high shrink-swell potential; excavated area difficult or impossible to reclaim.	Bedrock at a depth of 20 to 40 inches.

Soils suitable as pond reservoir areas have low seepage, which is related to their permeability and depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material resistant to seepage and piping and of favorable stability, shrink-swell potential, shear strength, and compactibility. Stones and organic material in a soil are among the features that are unfavorable.

Drainage of crops and pasture is affected by such soil properties as permeability, texture, and structure; depth to claypan, rock, or other layers that influence rate of water movement; depth to the water table; slope; stability in ditchbanks; susceptibility to stream overflow; salinity or alkalinity; and availability of outlets for drainage.

Irrigation of a soil is affected by such features as slope; susceptibility to stream overflow, water erosion, or soil blowing; texture; content of stones; accumulations of salts and alkali; depth of root zone; rate of water intake at the surface; permeability of soil layers below the surface layer and in a fragipan or another layer that restricts movement of water; amount of water held available to plants; need for drainage; and depth to the water table or bedrock.

Terraces and diversions are embankments, or ridges, constructed across the slope to intercept runoff so that it soaks into the soil or flows slowly to a prepared outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock or other unfavorable material; stones; permeability; and resistance to water erosion, soil slipping, and soil blowing. A soil suitable for these structures provides outlets for runoff and is not difficult to vegetate.

Additional interpretations of engineering uses of soils are given in the section "Town and Country Planning."

Town and Country Planning

Table 8 gives the degree and kind of limitations of the soils of Lawrence County for selected nonfarm uses. The degrees of limitation reflect all the features of the given soil, to a depth of 6 feet, that affect a particular use.

The properties considered in evaluating the limitations for the uses listed in table 8 are given in the paragraphs that follow.

Soil limitations are expressed as slight, moderate, and severe. *Slight* means that soil properties are generally favorable for the rated use, or in other words, limitations are minor and are easily overcome. *Moderate* means that some soil properties are unfavorable but can be overcome or modified by special planning and design. *Severe* indicates soil properties so unfavorable and so difficult to correct or overcome that major soil reclamation, special design, or intensive maintenance is required.

Following are explanations of some of the columns in table 8.

Dwellings, as rated in table 8, are no more than three stories high and are supported by foundation footings placed in undisturbed soil. The features that affect the rating of a soil for dwellings are those that relate to capacity to support load and resist settlement under load, and those that relate to ease of excavation. Soil properties that affect capacity to support load are wetness, susceptibility to flooding, density, plasticity, texture, and shrink-swell potential. Those that affect excavation are wetness, slope, depth to bedrock, and content of stones and rocks.

Shallow excavations are those that require digging or trenching to a depth of less than 6 feet, as for example, excavations for pipelines, sewer lines, phone and power transmission lines, basements, and open ditches. Desirable soil properties are good workability, moderate resistance to sloughing, gentle slopes, no rock outcrops or big stones, and no flooding or high water table.

Local roads and streets, as rated in table 8, have an all-weather surface expected to carry automobile traffic all year. They have a subgrade of underlying soil material; a base consisting of gravel, crushed rock, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. These roads are graded to shed water and have ordinary provisions for drainage. They are built mainly from soil at hand, and most cuts and fills are less than 6 feet deep.

Soil properties that most affect design and construction of roads and streets are load supporting capacity and stability of the subgrade, and the workability and quantity of cut and fill material available. The AASHTO and Unified classifications of the soil material, and also the shrink-swell potential, indicate traffic-supporting capacity. Wetness and flooding affect stability of the material. Slope, depth to hard rock, content of stones and rocks, and wetness affect ease of excavation and amount of cut and fill needed to reach an even grade.

Ratings for light industry are for undisturbed soils that are used to support building foundations. Emphasis is on foundations, ease of excavation for underground utilities, and corrosion potential of uncoated steel pipe. The undisturbed soil is rated for spread footing foundations for buildings less

interpretations—Continued

Soil features affecting—Continued			
Embankments, dikes, and levees	Drainage of crops and pasture	Irrigation	Terraces and diversions
Unstable fill; subject to piping; medium compressibility.	Poorly drained; seasonal high water table; cut banks cave.	Moderate intake rate; medium available capacity.	Level soil; practice not applicable.
Medium to low strength; medium to high compressibility; fair to poor compaction characteristics; high shrink-swell potential; bedrock at a depth of 20 to 40 inches.	Moderately well drained; slope--	Generally nonarable soil; practice not applicable.	Steep slopes; generally nonarable; practice not applicable.

than three stories high or foundation loads not in excess of that weight. Properties affecting load-supporting capacity and settlement under load are wetness, flooding, texture, plasticity, density, and shrink-swell behavior. Properties affecting excavation are wetness, flooding, slope, and depth to bedrock. Properties affecting corrosion of buried uncoated steel pipe are wetness, texture, total acidity, and electrical resistivity.

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

Sewage lagoons are shallow ponds constructed to hold sewage within a depth of 2 to 5 feet long enough for bacteria to decompose the solids. A lagoon has a nearly level floor and sides, or embankments, of compacted soil material. It is assumed that the embankment is compacted to medium density and the pond is protected from flooding. Properties that affect the pond floor and the embankment are considered. Those that affect the pond floor are permeability, organic matter, and slope. If the floor needs to be leveled, depth to bedrock is important. The soil properties that affect the embankment are the engineering properties of the embankment material as interpreted from the Unified soil classification and the content of stones, if any, that influences the ease of excavation and compaction of the embankment material.

Sanitary landfill is a method of disposing of refuse in dug trenches. The waste is spread in thin layers, compacted, and covered with soil throughout the disposal period. Landfill areas are subject to heavy vehicular traffic. Some soil properties that affect suitability for landfill are ease of excavation, hazard of polluting ground water, and trafficability. The best soils have moderately slow permeability, withstand heavy traffic, and are friable and easy to excavate. Unless otherwise stated, the ratings in table 8 apply only to a depth of about 6 feet. Limitation ratings of *slight* or *moderate*, therefore, may not be valid if trenches are to be much deeper than that. For some soils, reliable predictions can be made to a depth of 10 or 15 feet, but regardless of that, every site should be investigated before it is selected. For information about the use of soils for area sanitary landfills, contact the local Soil Conservation Service office.

The detailed soil map and information in table 8 are guides for evaluating areas for the specific uses. They do not eliminate the need for detailed onsite investigations before a final determination is made.

Additional information that may be useful in town and country planning is given in the sections "Engineering" and "Recreation."

Recreation

Knowledge of soils is necessary in planning, developing, and maintaining areas used for recreation. In table 9 the soils are rated according to limitations that affect their suitability for camp areas, playgrounds, picnic areas, and paths and trails.

In table 9 the soils are rated as having slight, moderate, or severe limitations for the specified uses. For all of these ratings, it is assumed that a good cover of vegetation can be established and maintained. A limitation of *slight* means that soil properties are generally favorable and limitations are so minor that they easily can be overcome. A *moderate* limitation can be overcome or modified by planning, by design, or by special maintenance. A *severe* limitation means that costly soil reclamation, special design, intense maintenance, or a combination of these, is required.

Camp areas are used intensively for tents and small camp trailers and the accompanying activities of outdoor living. Little preparation of the site is required, other than shaping and leveling for tent and parking areas. Camp areas are subject to heavy foot traffic and limited vehicular traffic. The best soils have mild slopes, good drainage, a surface free of rocks and coarse fragments, no flooding during periods of heavy use, and a surface that is firm after rain but not dusty when dry.

Playgrounds are areas used intensively for baseball, football, badminton, and similar organized games. Soils suitable for this use need to withstand intensive foot traffic. The best soils have a nearly level surface free of coarse fragments and rock outcrops, good drainage, no flooding during periods of heavy use, and a surface that is firm after rains but not dusty when dry. If grading and leveling are required, depth to rock is important.

Picnic areas are attractive natural or landscaped tracts that are subject to heavy foot traffic. Most of the vehicular traffic, however, is confined to access roads. The best soils are firm when wet but not dusty when dry; are free of flooding

TABLE 8.—*Degree and kind of limitation*

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

Soil series and map symbols	Dwellings without basements [1]	Shallow excavations	Local roads and streets [1]
Agnos: AcC, AcD, AgD, AnE	Severe: low bearing strength; small and large stones; some slopes more than 15 percent; moderate to high shrink-swell.	Severe: small and large stones; clayey below a depth of about 8 inches.	Severe: low traffic-supporting capacity; small and large stones; some slopes more than 15 percent; moderate to high shrink-swell.
Amagon: Ao	Severe: poorly drained; low bearing strength; moderate to low shrink-swell; seasonal high water table.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; low traffic-supporting capacity.
Beulah: BeB	Slight	Severe: sandy below a depth of 36 inches; sidewalls unstable.	Slight
Boden: BnC, BnD, BnE	Severe: low bearing strength; slopes more than 15 percent in some areas; moderate to low shrink-swell.	Moderate if slope is less than 15 percent; severe if more than 15 percent.	Severe: low traffic-supporting capacity; slopes more than 15 percent in some areas; bedrock at a depth of 40 to 60 inches.
Bosket: BoA, BoB	Slight	Severe: sandy material below a depth of 37 inches; sidewalls unstable.	Moderate: moderate traffic-supporting capacity.
Calhoun Mapped only with Foley soils.	Severe: poorly drained; slow permeability; moderate to low shrink-swell; seasonal high water table.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; low traffic-supporting capacity.
Captina: CaB, CaC, CaD	Moderate: low bearing strength; low shrink-swell potential.	Moderate: somewhat difficult to excavate with hand tools.	Moderate: low traffic-supporting capacity.
Clarksville: CeD, CeE	Moderate if slope is less than 15 percent; severe if more than 15 percent.	Severe: small stones; slopes more than 15 percent in some areas.	Moderate if slope is less than 15 percent; severe if more than 15 percent.
Crowley: CoA	Severe: poorly drained; high shrink-swell potential in subsoil; seasonal high water table.	Severe: poorly drained	Severe: low traffic-supporting capacity; high shrink-swell potential in subsoil.
Dubbs: DeA, DeB	Moderate: moderate bearing strength; moderate shrink-swell potential in subsoil.	Slight	Moderate: moderate traffic-supporting capacity; moderate shrink-swell potential in subsoil.
Dundee: DvA, DvB	Severe: somewhat poorly drained; seasonal high water table; moderate bearing strength.	Severe: somewhat poorly drained; seasonal high water table.	Moderate: somewhat poorly drained; moderate traffic-supporting capacity.
*Foley: FcA For Calhoun part, see Calhoun series.	Severe: poorly drained; low bearing strength; moderate shrink-swell potential in subsoil; seasonal high water table.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; low traffic-supporting capacity.
Gepp: GpD, GpE	Moderate: low bearing strength; moderate shrink-swell potential. Severe if slope is more than 15 percent.	Severe: clayey; slopes are more than 15 percent in some areas.	Moderate: low traffic-supporting capacity.
Healing: Hc	Severe: frequently flooded	Severe: frequently flooded	Severe: frequently flooded
Hillemann: Hn	Moderate: somewhat poorly drained; moderate bearing strength; seasonal high water table; moderate shrink-swell potential.	Moderate: somewhat poorly drained; seasonal high water table.	Severe: moderate traffic-supporting capacity; moderate shrink-swell potential; seasonal high water table.
Hontas: Ho	Severe: frequently flooded	Severe: frequently flooded	Severe: frequently flooded
Jackport: Ja	Severe: poorly drained; low bearing strength; high shrink-swell potential; seasonal high water table.	Severe: poorly drained; clayey; seasonal high water table.	Severe: poorly drained; low traffic-supporting capacity; high shrink-swell potential.

for town and country planning

units may have different properties and limitations, and for this reason it is necessary to follow the instructions in the first column of this table]

Light industry [1]	Septic tank absorption fields	Sewage lagoons [2]	Sanitary landfill (trench type) [3]
Severe: low bearing strength; small and large stones; some slopes more than 8 percent; moderate to high shrink-swell.	Severe: slow percolation rate; large stones on some areas: some slopes more than 15 percent.	Moderate: large and small stones. Severe if slope is more than 7 percent.	Severe: clayey below a depth of about 8 inches; large stones on some areas; low traffic-supporting capacity.
Severe: poorly drained; low strength; moderate to low shrink-swell; seasonal high water table.	Severe: poorly drained; slow percolation rate.	Slight	Severe: poorly drained; low traffic-supporting capacity.
Slight	Slight[4]	Severe: moderately rapid permeability.	Severe: rapid permeability below a depth of 36 inches.
Severe: low bearing strength; slopes more than 8 percent in some areas; bedrock at a depth of 40 to 60 inches; low shrink-swell.	Severe: slow percolation rate; bedrock at a depth of 40 to 60 inches.	Moderate: bedrock at a depth of 40 to 60 inches. Severe if slope is more than 7 percent.	Severe: bedrock at a depth of 40 to 60 inches; low traffic-supporting capacity.
Slight	Slight[4]	Moderate: moderate permeability. Severe if slope is more than 7 percent.	Severe: rapid permeability below a depth of 37 inches; moderate traffic-supporting capacity.
Severe: poorly drained; moderate to low shrink-swell; seasonal high water table.	Severe: slow percolation rate; seasonal high water table.	Moderate: seasonal high water table.	Severe: poorly drained; seasonal high water table; moderate traffic-supporting capacity.
Moderate: low bearing strength. Severe if slope is more than 7 percent: low shrink-swell potential.	Severe: slow percolation rate	Moderate: if slope is less than 7 percent; severe if more than 7 percent.	Severe: low traffic-supporting capacity.
Severe: slope is more than 8 percent.	Moderate if slope is less than 15 percent; severe if more than 15 percent.	Severe: slope is more than 15 percent; moderately rapid permeability.	Severe: cherty material; moderately rapid permeability.
Severe: poorly drained; high shrink-swell potential in subsoil; seasonal high water table.	Severe: poorly drained; very slow percolation rate.	Slight	Severe: poorly drained; seasonal high water table; low traffic-supporting capacity.
Moderate: moderate bearing strength; moderate shrink-swell potential in subsoil.	Slight	Moderate: moderate permeability.	Slight.
Severe: somewhat poorly drained; moderate bearing strength; seasonal high water table.	Severe: somewhat poorly drained; moderately slow percolation rate; seasonal high water table.	Severe: somewhat poorly drained; moderately slow permeability; seasonal high water table.	Severe: somewhat poorly drained; seasonal high water table; moderately slow permeability; moderate traffic-supporting capacity.
Severe: poorly drained; low bearing strength; moderate shrink-swell potential in subsoil; seasonal high water table.	Severe: poorly drained; very slow percolation rate.	Slight	Severe: poorly drained; low traffic-supporting capacity.
Severe: low bearing strength; moderate shrink-swell potential; slope is more than 8 percent.	Moderate: moderate percolation rate. Severe if slope is more than 15 percent.	Severe: moderate permeability; small stones; slope is more than 7 percent.	Severe: clayey subsoil; low traffic-supporting capacity.
Severe: frequently flooded	Severe: frequently flooded	Severe: frequently flooded	Severe: frequently flooded.
Moderate: somewhat poorly drained; moderate shrink-swell potential; seasonal high water table; moderate bearing strength.	Severe: somewhat poorly drained; very slow percolation rate; seasonal high water table.	Slight	Severe: somewhat poorly drained; moderate traffic-supporting capacity.
Severe: frequently flooded	Severe: frequently flooded	Severe: frequently flooded	Severe: frequently flooded.
Severe: poorly drained; low bearing strength; high shrink-swell potential; seasonal high water table.	Severe: poorly drained; very slow percolation rate; seasonal high water table.	Slight	Severe: poorly drained; low traffic-supporting capacity.

TABLE 8.—*Degree and kind of limitation*

Soil series and map symbols	Dwellings without basements [1]	Shallow excavations	Local roads and streets [1]
*Lafe: LfA For Foley part, see Foley series.	Severe: somewhat poorly drained; seasonal high water table; low bearing strength; difficult to establish vegetation because of high content of sodium and magnesium in subsoil.	Severe: somewhat poorly drained; seasonal high water table.	Severe: somewhat poorly drained; low traffic-supporting capacity.
Loring: LoC2, LoD2	Moderate: moderate bearing strength. Severe if slope is more than 15 percent.	Moderate: seasonal high water table.	Moderate: moderate traffic-supporting capacity.
McCrory: Mc	Severe: poorly drained; seasonal high water table; low bearing strength.	Severe: poorly drained	Severe: poorly drained; low traffic-supporting capacity.
Patterson: Pa	Severe: somewhat poorly drained; seasonal high water table; low bearing strength.	Severe: somewhat poorly drained; seasonal high water table.	Severe: somewhat poorly drained; moderate traffic-supporting capacity.
Peridge: PeC2	Slight	Moderate: clayey in subsoil	Moderate: low traffic-supporting capacity.
Portia: PoC, PoD	Slight. Moderate if slope is more than 8 percent.	Moderate: clayey; slope is more than 8 percent in some areas.	Moderate: low traffic-supporting capacity; moderate shrink-swell potential; slope is more than 8 percent in some areas.
Sharkey: Sh	Severe: poorly drained; high shrink-swell potential; low bearing strength; seasonal high water table.	Severe: poorly drained; clayey.	Severe: poorly drained; high shrink-swell potential; low traffic-supporting capacity.
Tonti: ToC, ToD	Slight: moderate bearing strength. Severe if slope is more than 8 percent.	Severe: coarse fragments	Moderate: moderate traffic-supporting capacity.
Tuckerman: Tu	Severe: poorly drained; seasonal high water table; low bearing strength.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; low traffic-supporting capacity.
*Ventris: VrD, VrF Rock outcrop part too variable to rate.	Severe: high shrink-swell potential; low bearing strength; bedrock at a depth of 20 to 40 inches; slope is more than 8 percent in some areas.	Severe: clayey; bedrock at a depth of 20 to 40 inches.	Severe: high shrink-swell potential; low-bearing strength; bedrock at a depth of 20 to 40 inches.

[1] Engineers and others should not apply specific values to estimated bearing capacity.
[2] For information about lagoon embankments see table 7, page 58, column "Embankments, dikes, and levees."

during the season of use; do not have slopes or stoniness that greatly increases cost of leveling sites or of building access roads.

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

Formation and Classification of the Soils

This part of the survey describes the factors that affect soil formation in Lawrence County and defines the processes of horizon differentiation. It also explains the current system of soil classification and classifies each soil series in some of the higher categories of that system. The results of physical and chemical analyses are given for representative profiles of selected soil series. Each soil series in the county, including a profile representative of each series, is described in the section "Descriptions of the Soils."

Factors of Soil Formation

Soil forms through weathering and other processes. The characteristics of the soil at any given point depend on climate, living organisms, parent material, relief, and time. Each factor acts on the soil and modifies the effect on the other four. When climate, living organisms, or any other one of the five factors is varied to a significant extent, a different soil is formed (*12*).

for town and country planning—Continued

Light industry [1]	Septic tank absorption fields	Sewage lagoons [2]	Sanitary landfill (trench type) [3]
Severe: somewhat poorly drained; low bearing strength; seasonal high water table.	Severe: somewhat poorly drained; very slow percolation rate; seasonal high water table.	Slight	Moderate: somewhat poorly drained; low traffic-supporting capacity.
Moderate: moderate bearing strength. Severe if slope is more than 8 percent.	Severe: moderately slow percolation rate.	Moderate. Severe if slope is more than 7 percent.	Moderate: seasonal high water table.
Severe: poorly drained; seasonal high water table; low bearing strength.	Severe: poorly drained; slow percolation rate; seasonal high water table.	Slight	Severe: poorly drained; low traffic-supporting capacity.
Severe: somewhat poorly drained; low bearing strength; seasonal high water table.	Severe: somewhat poorly drained; seasonal high water table; moderately rapid percolation rate.	Severe: moderately rapid permeability.	Severe: somewhat poorly drained; moderate traffic-supporting capacity; seasonal high water table.
Slight	Moderate: slow percolation rate.	Moderate: moderate permeability. Severe if slope is more than 7 percent.	Moderate: clayey; low traffic-supporting capacity.
Slight if slope is less than 4 percent; moderate if 4 to 8 percent; severe if more than 8 percent.	Severe: slow percolation rate	Slight if slope is less than 4 percent; moderate if 4 to 7 percent; severe if more than 7 percent.	Moderate: clayey; low traffic-supporting capacity.
Severe: poorly drained; high shrink-swell potential; low bearing strength; seasonal high water table.	Severe: poorly drained; very slow percolation rate; seasonal high water table.	Slight	Severe: poorly drained; clayey; low traffic-supporting capacity.
Moderate: moderate bearing strength; bedrock at a depth of 50 to 60 inches.	Severe: slow percolation rate; bedrock at a depth of 50 to 60 inches.	Moderate: coarse fragments; poor site material; bedrock at a depth of 50 to 60 inches. Severe if slope is more than 7 percent.	Severe: coarse fragments; bedrock at a depth of 50 to 60 inches.
Severe: poorly drained; low bearing strength; seasonal high water table.	Severe: poorly drained; slow percolation rate; seasonal high water table.	Slight	Severe: poorly drained; low traffic-supporting capacity.
Severe: high shrink-swell potential; low bearing strength; bedrock at a depth of 20 to 40 inches; slope is more than 8 percent in some areas.	Severe: very slow percolation rate; bedrock at a depth of 20 to 40 inches; slope is more than 15 percent in some areas.	Severe: bedrock at a depth of 20 to 40 inches; slope is more than 7 percent in some areas.	Severe: clayey; bedrock at a depth of 20 to 40 inches.

[3] Onsite study is needed of the underlying strata, the water table, and the hazards of pollution and drainage into ground water in landfill deeper than 6 feet.
[4] Hazard of aquifer pollution.

Climate and living organisms are the active forces in soil formation. Relief modifies the effects of climate and living organisms, mainly by its influence on temperature and runoff. Because climate, vegetation, parent material, and relief interact over a period of time, time is the fifth factor of soil formation. Thus, the effect of time is also reflected in the soil characteristics.

The interaction of the five factors of soil formation is more complex for some soils than for others. The five factors and how they interact to form some of the soils in the county are discussed in the following paragraphs.

Climate

The climate of Lawrence County is characterized by mild winters, warm or hot summers, and generally abundant rainfall. The generally warm temperatures and high precipitation probably are similar to the climate under which the soils in the county formed. The average temperature at Walnut Ridge during July is about 80°, and during January is about 38°. In the Ozark Highlands temperatures are generally a few degrees cooler. The total annual rainfall is about 46 inches, and is well distributed throughout the year. For additional information about the climate, refer to the section "General Nature of the County."

The warm, moist climate promotes rapid soil formation. The warm temperature permits rapid chemical reactions. Abundant rainfall makes a large amount of water available for moving dissolved or suspended material downward in the profile. As a result the remains of plants decompose rapidly, and the organic acids thus produced hasten the development of clay minerals and removal of carbonates. Because the soil is frozen to only a shallow depth and for a short period, these soil-forming processes can continue almost the year round. The climate throughout the county is relatively uniform, but

TABLE 9.—*Degree and kind of limitation for recreation*

[An asterisk in the first column indicates that at least one mapping unit is made up of two or more kinds of soil. The soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow the instructions in the first column of this table carefully]

Soil series and map symbols	Camp areas	Playgrounds	Picnic areas	Paths and trails
Agnos: AcC, AcD, AgD, AnE.	Severe: very slow permeability; slopes of more than 15 percent in some areas; small stones on AcC and AcD; large stones on AgD and AnE.	Severe: very slow permeability; slopes of more than 15 percent in some areas; small stones on AcC and AcD; large stones on AgD and AnE.	Moderate where slopes are 2 to 15 percent; small stones. Severe where slopes are more than 15 percent; large stones on AgD and AnE.	Moderate: small stones on AcC and AcD. Severe: large stones on AgD and AnE.
Amagon: Ao	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table.
Beulah: BeB	Slight	Slight: moderate where slopes are more than 2 percent.	Slight	Slight.
Boden: BnC, BnD, BnE	Slight where slopes are less than 8 percent; moderate where 8 to 15 percent; severe where more than 15 percent.	Moderate: small stones. Severe where slopes are more than 6 percent.	Slight where slopes are less than 8 percent; moderate where 8 to 15 percent; severe where more than 15 percent.	Slight: moderate where slopes are more than 15 percent.
Bosket: BoA, BoB	Slight	Slight where slopes are less than 2 percent; moderate where more than 2 percent.	Slight	Slight.
Calhoun Mapped only with Foley soils.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table.
Captina: CaB, CaC, CaD	Moderate: moderately well drained; slow permeability.	Moderate where slopes are less than 6 percent; slow permeability. Severe where slopes are more than 6 percent.	Slight where slopes are less than 8 percent; moderate where more than 8 percent.	Slight.
Clarksville: CeD, CeE	Severe: coarse fragments on surface.	Severe: slopes of more than 6 percent; coarse fragments on surface.	Severe: coarse fragments on surface; slopes of more than 15 percent in some places.	Severe: coarse fragments on surface.
Crowley: CoA	Severe: poorly drained; very slow permeability.	Severe: poorly drained; very slow permeability.	Severe: poorly drained; very slow permeability.	Moderate: poorly drained.
Dubbs: DeA, DeB	Slight	Slight where slopes are less than 2 percent; moderate where more than 2 percent.	Slight	Slight.
Dundee: DvA, DvB	Moderate: somewhat poorly drained; moderately slow permeability; seasonal high water table.	Moderate: somewhat poorly drained; slopes of more than 2 percent in some places.	Moderate: somewhat poorly drained; seasonal high water table.	Moderate: somewhat poorly drained; seasonal high water table.
*Foley: FcA For Calhoun part, see Calhoun series.	Severe: poorly drained; seasonal high water table; very slow permeability.	Severe: poorly drained; seasonal high water table; very slow permeability.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table.
Gepp: GpD, GpE	Moderate: small stones. Severe where slopes are more than 15 percent.	Severe: small stones; slopes of more than 6 percent in most areas.	Moderate: small stones. Severe where slopes are more than 15 percent.	Moderate: small stones; slopes of more than 15 percent in some areas.
Healing: Hc	Severe: subject to flooding	Severe: subject to flooding	Severe: subject to flooding	Moderate: subject to flooding.

Soil series and map symbols	Camp areas	Playgrounds	Picnic areas	Paths and trails
Hillemann: Hn	Moderate: somewhat poorly drained; seasonal high water table; very slow permeability.	Moderate: somewhat poorly drained; seasonal high water table; very slow permeability.	Moderate: somewhat poorly drained; seasonal high water table.	Moderate: somewhat poorly drained; seasonal high water table.
Hontas: Ho	Severe: subject to flooding	Severe: subject to flooding	Moderate: subject to flooding	Moderate: subject to flooding.
Jackport: Ja	Severe: poorly drained; clayey; very slow permeability; seasonal high water table.	Severe: poorly drained; clayey; very slow permeability; seasonal high water table.	Severe: poorly drained; clayey; seasonal high water table.	Severe: poorly drained; clayey; seasonal high water table.
*Lafe: LfA For Foley part, see Foley series.	Severe: somewhat poorly drained; very slow permeability; dusty when soil is dry.	Severe: somewhat poorly drained; very slow permeability; dusty when soil is dry.	Moderate: somewhat poorly drained; dusty when soil is dry.	Moderate: somewhat poorly drained; dusty when soil is dry.
Loring: LoC2, LoD2	Slight where slopes are less than 8 percent; moderate where more than 8 percent; moderately slow permeability.	Moderate where slopes are less than 6 percent; severe where more than 6 percent; moderately slow permeability.	Slight where slopes are less than 8 percent; moderate where more than 8 percent.	Slight.
McCrory: Mc	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table.
Patterson: Pa	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained.
Peridge: PeC2	Slight	Moderate where slopes are less than 6 percent; severe where more than 6 percent.	Slight	Slight.
Portia: PoC, PoD	Moderate: moderately slow permeability; slopes of more than 8 percent.	Moderate: moderately slow permeability. Severe where slopes are more than 6 percent.	Slight where slopes are less than 8 percent; moderate where more than 8 percent.	Slight.
Sharkey: Sh	Severe: poorly drained; seasonal high water table; clayey; very slow permeability.	Severe: poorly drained; seasonal high water table; clayey; very slow permeability.	Severe: poorly drained; seasonal high water table; clayey.	Severe: poorly drained; seasonal high water table; clayey.
Tonti: ToC, ToD	Moderate: slow permeability	Moderate: slow permeability; coarse fragments. Severe where slopes are more than 6 percent.	Slight where slopes are less than 8 percent; moderate where more than 8 percent.	Slight.
Tuckerman: Tu	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table.
*Ventris: VrD, VrF Rock outcrop part is too variable to be rated.	Severe: very slow permeability; slopes of more than 15 percent in some places.	Severe: very slow permeability; slopes of more than 15 percent in some places.	Moderate where slopes are less than 15 percent; severe where more than 15 percent; locally coarse fragments.	Slight where slopes are less than 15 percent; moderate where 15 to 25 percent; severe where more than 25 percent.

its effect is modified locally by runoff and slope. Climate alone does not account for differences in the soils of the county.

Living organisms

The higher plants and animals, as well as insects, bacteria, and fungi are important in the formation of soils. Among the changes they cause are gains in organic matter and addition of nitrogen to the soil, gains or losses in other plant nutrients, and changes in structure and porosity.

Before Lawrence County was settled, the native vegetation probably had more influence on soil formation than did animal activity. Hardwood forests, broken by swamps and a few canebrakes, covered the lowland part of the county. The upland part of the county had hardwood trees except in small areas dominated by Rock outcrop. Differences in native vegetation appear to have been related mainly to variations in drainage or relief, and to a lesser degree, parent material. Because the type of vegetation was relatively uniform throughout the county, differences among the soils cannot be directly related to vegetation.

Man is important to the future rate and direction of soil formation. He clears the forests, cultivates the soils, and introduces new kinds of plants. He adds fertilizers and lime, and also chemicals for insect, disease, and weed control. Building levees for flood control, improving drainage, grading and smoothing the surface, and controlling fire also affect the future formation of soils. Some results may not be evident for many centuries. Nevertheless, the complex of living organisms affecting soil formation in this county has been drastically changed by man.

Parent material

Lawrence County is on the boundary between the Ozark Highlands to the west and the broad reaches of the Southern Mississippi River Alluvium and the Southern Mississippi Valley Silty Uplands to the east. Consequently, the soils of the county formed in parent materials of considerable variety.

The Salem Plateau of the Ozark Highlands begins to rise west of the Black River flood plain. The exposed formations in this area are the Black Rock and Smithville Limestones and the Cotter and Powell Dolomites of the Lower Ordovician epoch (*3*). These formations also contain shale beds. Except for the places capped by silty loess deposits, the soils in this area formed in material derived from these or similar rocks.

Loring soils formed at a lower elevation where the loess cap was thickest along the foot slopes of the plateau adjacent to the Black River flood plain. Farther westward the loess cap becomes thinner and such soils as Captina and Tonti formed partly in loess and partly in material weathered from the sedimentary rocks of Ordovician age.

Boden and Portia soils formed in residuum primarily from the sandstone members of the limestone formations or sandy dolomitic and limestone materials.

Agnos, Clarksville, Gepp, and Ventris soils formed in residual or colluvial materials weathered from limestone or dolomite containing various quantities of chert and possibly, in part, from beds of shale. The Cotter and Powell Formations that crop out in the northwest part of the county seem to contain more chert than the Black Rock and Smithville Formations to the east. Clarksville soils are most prevalent in the Cotter and Powell Formations. Ventris soils are most prevalent in the Black Rock and Smithville Formations.

Limestone weathers more rapidly than chert. Consequently, soils such as Clarksville, that contain large quantities of chert are generally on the peaks and points of ridges. Soils, such as Agnos and Gepp, that formed in weathered material containing somewhat less chert are generally at a lower elevation. The chert is concentrated in the surface layer and few or no chert fragments are in the subsoil. Ventris soils formed in material almost free of chert, and they are high in calcium, which reflects the effects of the calcareous parent rocks. The clayey subsoil of Agnos, Gepp, and Ventris soils is a characteristic inherited from the argillaceous qualities of the parent bedrock.

Deposits from streams flowing through the Ozark Highland area are high in silt. The more readily transported sediments were washed from the upland soils or similar materials. Most of the resistant chert fragments remained in place. Most of the clay particles suspended in runoff were not deposited locally. Healing, Hontas, and Peridge soils formed in the resulting loamy, predominantly chert-free material.

In the Southern Mississippi Alluvium area the soils formed in mixed sediments deposited by large rivers. Within this area of Lawrence County, the wide range in texture of the sediments is related to differences in the site of deposition. As a river overflows its banks and spreads over the flood plain, the coarser sediments are dropped first. Thus sands, are commonly deposited in bands parallel to and near the channel. The low ridges thus formed are known as natural levees (*16*). Beulah, Bosket, McCrory, Patterson, and Tuckerman soils are the main soils in such areas. As the floodwaters continue to spread, the finer sediments, such as silt, are deposited and are generally mixed with some sand and clay. Dundee and Amagon soils formed in these sediments of intermediate texture. When the floodwaters recede and water is left standing as shallow lakes or swamps in the lowest part of the flood plain, the finest particles, the clays, settle out. The clayey Jackport and Sharkey soils formed in these beds of fine sediment.

Thousands of years ago the wide trough carved between Crowley Ridge and the Ozark Highlands was partly refilled with alluvial sediment by the Mississippi River in much the same manner as sediment of recent times is laid down. The alluvium deposited comes from the multitude of soils, rocks, and unconsolidated sediment from throughout the Mississippi River basin, which reaches from Montana to Pennsylvania (*16*). The alluvium, therefore, consists of a mixture of many kinds of minerals. The Black River flood plain is superimposed on a flood plain that the Mississippi River occupied before it breached Crowley Ridge to its present flood plain (*6*).

The Black River apparently does not transport enough sediment to effectively maintain young soils on its superimposed flood plain. Thus the soils, mainly Amagon and Dundee, continued to form mainly in older loamy sediment. Some Hontas soils formed in the more recent loamy deposits where the stream has meandered. Sharkey soils formed in the younger clayey deposits in the back swamps.

Between the Black River flood plain and the broad flats to the east is a high natural levee that was deposited by the Mississippi River. This levee consists of stratified loamy sediment that contains more sand than sediment deposited in most other places in the county. Beulah, Bosket, McCrory, Patterson, and Tuckerman soils formed in these and similar sediments in insular areas elsewhere. Where the high natural levee merges with the broad flats, the sediment contains less sand and more silt. Some Amagon, Dubbs, and Dundee soils formed in this sediment.

The Mississippi River finally abandoned the vast complex of alluvial terraces that form much of Lawrence County and some adjacent counties in favor of channels to the east (*6*). The broad, abandoned back swamps were subsequently drained by smaller, more localized streams, such as Village Creek, White Oak Slough, and Cache River, which occupy former braided channels of the Mississippi River. Such streams were inadequate to maintain broad areas as active flood plains. Those parts of the alluvial plain above overflow were progressively mantled with silty loess deposits that gradually thickens easterly. The loess deposits were probably laid down at the same time as those on Crowley Ridge. Calhoun, Lafe, and some Foley soils formed where the silt is thickest in Lawrence County. Where it is thinner over the back swamp clays, Crowley and Hillemann soils formed. Where there are lenses in the thinnest silt deposits on the broad clayey flats, Jackport soils formed. Within the broad areas of these dominant soils, there are remnants of old natural levees on which Amagon, Dubbs, and Dundee soils formed.

Relief

The relief in Lawrence County is an inequality in elevation brought about by entrenchment of streams into the land surface, by faulting, and by deposition of sediment. The highest elevation in the county, about 780 feet above sea level, is about 4 miles south of the Spring River near the Sharp County line. The lowest elevation, where the Black River leaves the county, is about 220 feet above sea level. Some of the greatest differences among the soils are caused by differences in relief through its effect on drainage, runoff, erosion, and percolation of water through the soil.

Relief in the upland area of Lawrence County ranges from steep hillsides to nearly level plateaus, hillcrests, and side slopes of valleys. Local differences in elevations range to as much as 300 feet in areas of dissected hillsides and ridges. Along the foot slopes of the Ozark Highlands, differences in local elevations predominantly range from 50 to 100 feet. Throughout this area slopes are such that excess water is removed soon after it falls on the surface. Even when precipitation is more than sufficient to saturate, the soils are saturated for only short periods during and after rainfall or snowfall. Consequently, the soils are moderately well drained to somewhat excessively drained. Some are very slowly permeable. These conditions are reflected by the dominantly brown or red colors caused by the oxidation of iron. Agnos, Boden, Captina, Clarksville, Gepp, Loring, Peridge, Portia, Tonti, and Ventris soils are in this area.

Relief in the lowland area above the flood plains of streams in Lawrence County ranges from broad flats and depressions to undulating areas of alternating swales and low ridges. Local differences in elevation range to as much as 20 feet, but are generally 5 to 10 feet in undulating areas. The highest elevation, near College City, is about 275 feet above sea level. On the broad flats and in depressed areas on flats and between ridges, differences in local elevations are negligible. Surface drainage is slow or very slow. Soils in these areas are poorly drained or somewhat poorly drained, and most are slowly permeable. They have a seasonally perched water table. They are dominantly gray or they are mottled with gray because of the reduction of iron. Amagon, Calhoun, Crowley, Dundee, Foley, Hillemann, Jackport, Lafe, McCrory, Patterson, and Tuckerman soils are in these areas.

The well drained Bosket and Dubbs soils and the somewhat excessively drained Beulah soils have been little affected by relief.

The present flood plains along streams in the county are generally level to gently undulating, but some are concave. Most are subject to occasional or frequent flooding. The relief and the runoff velocity are such that sediment deposits remain fairly static or accumulate very slowly. Amagon, Dundee, and Healing soils are in areas where deposition is relatively static on level and gently undulating relief. Hontas and Sharkey soils are in areas of level or concave relief that receive minute sediment deposits.

In contrast with deposition, geologic erosion has more than kept pace with soil formation in some upland areas and outcroppings of rock occur. In areas of strong relief overlying cherty limestone, Clarksville and Gepp soils formed. These soils contain larger quantities of chert residue, particularly on the surface, which was left over after weathering. This chert mantle has retarded geologic erosion, but weathering continues. Consequently, these soils, which are deep over bedrock, have developed a thick argillic horizon. Ventris soils do not have a protective chert mantle. They have undergone geologic erosion at a faster rate, have a thinner argillic horizon, and are moderately deep over bedrock. Agnos and Boden soils are intermediate in weathering and erosion. They have a thinner argillic horizon than Clarksville and Gepp soils, but are deeper over bedrock than Ventris soils. Some Captina and Portia soils are in areas where weathering has proceeded faster than geologic erosion. They have developed a thick argillic horizon without the protective mantle of coarse fragments.

Some foot slopes in the uplands have deep accumulations of material that washed or sloughed down in part from adjacent higher soils. Loring soils formed in these areas. Some Captina soils are in the thinner deposits left on the higher slopes.

Peridge soils are on gently sloping stream terraces. They formed in deep, loamy and clayey material washed from the uplands and deposited on stream flood plains before the streams were further entrenched.

Time

The length of time required for formation of a soil depends largely on other factors of soil formation. Less time generally is needed if the climate is warm and humid and the vegetation is luxuriant. When other factors are equal, less time also is needed for sandy or loamy parent material than for clayey parent material. In terms of geologic time and of soil formation, the soils of Lawrence County range from relatively young to old. Soil age, however, does not always coincide with geologic time.

The sediments now forming the land surface in the eastern part of the county were probably deposited during and after the advance of the continental glaciers. The last of these glaciers retreated from the North Central States about 11,000 years ago (*9, 10*). Thus in terms of geologic time, these soils are young, but in terms of soil formation, their age varies widely. On broad flats, soils are more mature. Younger soils are on natural levees and in slack-water areas within the flood plains of present streams. These younger soils receive fresh sediments very slowly and show evidence of formation but lack the evidence of translocation of clay of more mature soils. Hontas and Sharkey soils are younger, and Crowley and Foley soils are the more mature soils of this geologically young area.

The soils in most of the western part of the county formed in material weathered from rocks of Ordovician age. In terms of geologic time, these soils are old. Most of these soils show evidence of age in that they have a thick, well defined argillic horizon and are deep over bedrock. Younger soils of similar geologic age have a thinner argillic horizon and are moderately deep over bedrock because geologic erosion has been closer to equilibrium with weathering. Clarksville and Gepp soils are old, and Ventris soils are younger soils of the geologically old area. In terms of soil formation, Ventris soils are younger than many soils on young geologic deposits.

Processes of Soil Formation

The results of the many soil-forming factors can be distinguished by the differences in layers, or soil horizons, in a profile. The profile extends from the surface down to parent material that is little altered by soil-forming processes. The horizons differ in one or more properties, such as color, texture, structure, consistence, porosity, and reaction.

Most soils have three major horizons, the A, B, and C. Very young soils do not have a B horizon.

The A horizon is the surface layer. An A1 horizon is that part of the surface layer that contains the largest amount of organic matter. The A horizon is also the layer of maximum leaching or eluviation of clay and iron. If considerable leaching has taken place and organic matter has not darkened the material, the horizon is called an A2.

The B horizon underlies the A horizon and is commonly called the subsoil. It is the horizon of maximum accumulation of dissolved or suspended materials, such as iron and clay. Commonly, the B horizon has blocky structure (*15*) and is firmer than the horizons immediately above and below it.

The C horizon is below the A horizon or the B horizon. It consists of material that is little altered by the soil-forming process, but it can be materially modified by weathering. In some young soils, the C horizon immediately underlies the A horizon and has been slightly modified by living organisms as well as by weathering.

Several processes have been active in the formation of soil horizons in the soils of Lawrence County. Among these processes are the accumulation of organic matter, the leaching of calcium carbonates and bases, the reduction and transfer of iron, and the formation and translocation of silicate clay minerals. In most of the soils of the county, more than one of these processes has been active in soil formation.

The accumulation of organic matter in the upper part of the profile to form an A1 horizon is an important process of soil formation. The soils of Lawrence County range from high to low in content of organic matter.

Leaching of carbonates and bases has occurred to some degree in nearly all the soils of Lawrence County. Among soil scientists, it is generally accepted that bases are leached downward in soils before silicate clay minerals begin to move. Some soils, such as Ventris and Healing soils, are only slightly leached, but most of the soils of the county are moderately leached.

Reduction and transfer of iron has occurred to a significant degree in the somewhat poorly drained and poorly drained soils of the county. In the naturally wet soils, this process is called gleying. Gray colors in layers below the surface indicate the reduction and loss of iron. Some horizons contain reddish or yellowish mottles and concretions derived from segregated iron. Gleying is pronounced in many of the soils. Among the strongly gleyed are Amagon, Calhoun, Crowley, Foley, Jackport, Lafe, McCrory, and Tuckerman soils.

In several soils of Lawrence County, the translocation of clay minerals has contributed to the formation of horizons. In many places the eluviated A2 horizon has been destroyed by cultivation, but in areas where an A2 horizon occurs, its structure is blocky to platy; clay content is less than in the lower horizons; and the soil is lighter in color. Generally, clay films have accumulated in pores and on surfaces of peds in the B horizon. The soils were probably strongly leached of carbonates and soluble salts before translocation of silicate clay occurred, even though the content of bases is still high in many soils in the county. Agnos and Captina soils are examples of the effects of these processes.

Leaching of bases and translocation of silicate clay are among the most important processes in horizon differentiation in the soils of Lawrence County.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The narrow categories of classification, such as those used in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms, fields, and woodland; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas such as countries and continents.

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Because this system is under continual study, readers interested in developments of the current system should search the latest literature available.

The current system of classification has six categories. Beginning with broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that the soils of similar genesis, or mode of origin, are grouped. In table 10, the soil series of Lawrence County are classified in four categories of the current system. Classes of the current system are briefly defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The properties used to differentiate among soil orders are those that tend to give broad climatic groupings of soils. The two exceptions to this are the Entisols and Histosols, which occur in many different climates. Each order is identified by word of three or four syllables ending in *sol* (Ultisols).

SUBORDER. Each order is divided into suborders that are based primarily on those soil characteristics that seem to produce classes with the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of waterlogging, or soil differences resulting from the climate or vegetation. Each suborder is identified by a word of two

TABLE 10.—*Soil series classified into higher categories*

Series	Family	Subgroup	Order
Agnos	Clayey, mixed, mesic	Typic Hapludults	Ultisols.
Amagon	Fine-silty, mixed, thermic	Typic Ochraqualfs	Alfisols.
Beulah	Coarse-loamy, mixed, thermic	Typic Dystrochrepts	Inceptisols.
Boden	Clayey, mixed, mesic	Typic Hapludults	Ultisols.
Bosket	Fine-loamy, mixed, thermic	Mollic Hapludalfs	Alfisols.
Calhoun	Fine-silty, mixed, thermic	Typic Glossaqualfs	Alfisols.
Captina	Fine-silty, mixed, mesic	Typic Fragiudults	Ultisols.
Clarksville	Loamy-skeletal, siliceous, mesic	Typic Paleudults	Ultisols.
Crowley [1]	Fine, montmorillonitic, thermic	Typic Albaqualfs	Alfisols.
Dubbs	Fine-silty, mixed, thermic	Typic Hapludalfs	Alfisols.
Dundee	Fine-silty, mixed, thermic	Aeric Ochraqualfs	Alfisols.
Foley	Fine-silty, mixed, thermic	Albic Glossic Natraqualfs	Alfisols.
Gepp	Very fine, mixed, mesic	Typic Paleudalfs	Alfisols.
Healing	Fine, silty, mixed, mesic	Typic Argiudolls	Mollisols.
Hillemann	Fine-silty, mixed, thermic	Albic Glossic Natraqualfs	Alfisols.
Hontas	Fine-silty, mixed, mesic	Fluvaquentic Eutrochrepts	Inceptisols.
Jackport	Very fine, montmorillonitic, thermic	Vertic Ochraqualfs	Alfisols.
Lafe	Fine-silty, mixed, thermic	Glossic Natrudalfs	Alfisols.
Loring	Fine-silty, mixed, thermic	Typic Fragiudalfs	Alfisols.
McCrory	Fine-loamy, mixed, thermic	Albic Glossic Natraqualfs	Alfisols.
Patterson	Coarse-loamy, mixed, thermic	Aeric Ochraqualfs	Alfisols.
Peridge	Fine-silty, mixed, mesic	Typic Paleudalfs	Alfisols.
Portia	Fine-loamy, siliceous, mesic	Typic Paleudalfs	Alfisols.
Sharkey	Very fine, montmorillonitic, nonacid, thermic	Vertic Haplaquepts	Inceptisols.
Tonti	Fine-loamy, mixed, mesic	Typic Fragiudults	Ultisols.
Tuckerman	Fine-loamy, mixed, thermic	Typic Ochraqualfs	Alfisols.
Ventris	Fine, mixed, mesic	Albaquic Hapludalfs	Alfisols.

[1] The Crowley soils in this survey are taxadjuncts to the Crowley series. They lack red mottles in the B horizon and are outside the defined range of the series in this respect.

syllables. The last syllable indicates the order. An example is *Aquepts* (*Aqu*, meaning water or wet, and *epts*, from Inceptisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus have accumulated; those that have pans that interfere with growth of roots, movement of water, or both; and thick, dark-colored surface horizons. The features used are the self-mulching properties of clay, the temperature, the major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), and the dark red and dark brown colors associated with basic rocks. Each great group is identified by a word of three or four syllables; a prefix is added to the name of the suborder. An example is Ochraqualfs (*Ochra*, meaning simple horizons, *aqu* for wetness or water, and *alfs*, from Alfisols).

SUBGROUP. Each great group is divided into subgroups, one representing the central (typic) segment of the group, and others called intergrades that have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order. Each subgroup is identified by the name of the great group preceded by one or more adjectives. An example is Typic Hapludults (a typical Hapludult).

FAMILY. Soil families are established within a subgroup primarily on the basis of properties important to the growth of plants or on the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, temperature, permeability, thickness of horizons, and consistence. A family name is the subgroup name preceded by a series of adjectives, class names for texture and mineralogy, for example, that are used as family differentiae. See table 10. An example is the clayey, mixed, mesic family of Typic Hapludults.

Physical and Chemical Analyses

Physical and chemical data resulting from laboratory analyses can be useful to the soil scientists in classifying soils. These data are helpful in estimating available water capacity, acidity, cation exchange capacity, mineralogical composition, organic-matter content, and other soil characteristics that affect management needs. The data are also helpful in developing concepts of soil formation. More recently, laboratory data have proved helpful in rating soils for nonfarm uses, that is, for residential, industrial, recreation or transportation use.

Several factors are involved in selecting soils for laboratory analyses. Soils that are extensive and most important in the survey area are considered first. A review of available laboratory data is made to determine the need for additional information on those particular soils. Generally, priority is given to soils for which little or no laboratory data are available.

In Lawrence County, soils representing seven soil series were selected for laboratory analyses. Profiles of these soils are described in the section "Descriptions of the Soils." The analyses were made by the University of Arkansas in Fayetteville. Table 11 shows the results.

Silt and clay particle size distribution was determined by the hydrometer method (*5*). Sands were measured by sieving (*14*).

The total of extractable calcium, potassium, magnesium, sodium, and extractable acidity is an approximation of the cation exchange capacity of the soil. Except in soils that

TABLE 11.—*Physical and chemical*

[Analyses made by the University of Arkansas, Fayetteville, Arkansas. Dashes indicate that no analysis

Soil and pedon number	Depth from surface	Horizon	Physical			
			Very coarse through medium sand (2.0–0.25 mm)	Fine sand (0.25–0.10 mm)	Very fine sand (0.10–0.05 mm)	Total sand (2.0–0.05 mm)
	Inches		*Percent*	*Percent*	*Percent*	*Percent*
Boden gravelly sandy loam:						
S70–Ark–38–7–(1–7)	0–5	A1	32	24	6	62
	5–7	A2	30	23	6	59
	7–11	B1	29	20	5	54
	11–23	B21t	16	11	3	30
	23–32	B22t	23	14	5	42
	32–42	B3t	35	18	4	57
	42–50	C	30	34	6	70
Captina silt loam:						
S70–Ark–38–6–(1–8)	0–5	Ap	5	5	3	13
	5–14	B21t	3	4	2	9
	14–22	B22t	3	4	2	9
	22–28	Bx1	4	5	2	11
	28–41	Bx2	3	4	2	9
	41–53	Bx3	5	8	4	17
	53–63	[1] Bx4	6	10	5	21
	63–72	[1] Bx4	7	11	5	23
Clarksville cherty silt loam:						
S70–Ark–38–4–(1–7)	0–2	A1	19	6	3	28
	2–8	A2	12	7	5	24
	8–22	B1t	12	7	5	24
	22–35	[1] B21t	21	7	7	35
	35–46	[1] B21t	9	5	6	20
	46–60	B22t	6	4	5	15
	60–72	B3t	6	5	5	16
Healing silt loam:						
S70–Ark–38–2–(1–6)	0–6	Ap	----------	----------	3	3
	6–9	A12	----------	----------	2	2
	9–16	A3	----------	----------	2	2
	16–27	B21t	----------	----------	1	1
	27–49	B22t	----------	----------	1	1
	49–72	B23t	----------	----------	2	2
Hontas silt loam:						
S70–Ark–38–12–(1–8)	0–7	Ap	1	1	1	3
	7–11	A12	2	1	----------	3
	11–15	B21	2	1	----------	3
	15–21	B22	3	1	1	5
	21–31	B23	8	1	1	10
	31–38	C1	7	1	1	9
	38–49	C2	3	1	1	5
	49–56	[1] C3	2	1	1	4
	56–72	[1] C3	4	1	1	6
Peridge silt loam:						
S70–Ark–38–1–(1–8)	0–4	Ap	2	2	2	6
	4–20	[1] B21t	1	1	1	3
	20–29	[1] B21t	1	1	1	3
	29–44	B22t	1	----------	1	2
	44–54	B23t	1	----------	1	2
	54–58	B24t	1	----------	1	2
	58–66	B25t	1	1	1	3
	66–72	B26t	----------	----------	2	2

analyses of selected soils

was made or that the data resulting from analysis was insignificant. The symbol < means less than]

Physical—Continued		Chemical							
		Milliequivalents per 100 grams of soil							
		Extractable bases							
Silt (0.05–0.002 mm)	Clay (<0.002 mm)	Calcium	Magnesium	Sodium	Potassium	Extractable acidity	Base saturation	Reaction 1:1 soil-water	Organic matter
Percent	*Percent*						*Percent*	*pH*	*Percent*
31	7	0.3	0.1	0.2	0.1	4.0	15	4.9	1.7
32	9	.2	.1	.1	.1	2.8	15	5.1	1.0
28	18	.3	.2	.1	.1	4.0	15	5.1	.6
12	58	.4	.9	.2	.2	16.0	10	4.7	.5
7	51	.4	.7	.2	.2	14.6	9	4.7	.3
5	38	.3	.6	.1	.1	11.0	9	4.8	.2
9	21	.2	.4	.1	.1	5.9	12	4.6	.2
74	13	1.4	.7	.2	.1	6.6	27	5.5	1.7
63	28	1.7	.9	.2	.1	10.3	22	5.1	.7
61	30	1.1	1.0	.2	.2	14.2	15	5.0	.4
64	25	.7	.8	.2	.1	12.3	13	5.0	.3
59	32	.4	1.1	.3	.1	14.6	12	5.0	.2
44	39	.7	1.8	.5	.1	17.0	15	4.6	.2
50	29	.8	1.8	.5	.1	13.6	19	4.9	.1
48	29	1.0	2.1	.6	.1	12.1	24	4.9	.1
64	8	4.6	.8	.1	.2	6.9	45	6.4	3.7
65	11	.8	.2	.1	.1	6.3	16	5.3	2.4
63	13	1.9	.2	.1	.1	2.6	47	6.1	1.1
47	18	2.6	.9	.1	.2	2.7	58	6.1	.3
48	32	1.3	.9	.1	.1	4.2	36	5.3	.3
34	51	1.3	1.2	.1	.1	9.2	23	4.9	.3
32	52	1.3	1.0	.1	.1	10.7	19	4.9	.3
78	19	10.5	1.8	.2	.2	1.8	88	7.4	2.6
77	21	8.2	1.2	.1	.2	2.2	82	7.5	2.3
72	26	11.4	1.2	.1	.2	3.0	81	7.3	2.0
70	29	10.5	1.0	.1	.2	2.8	81	7.2	1.2
69	30	8.1	.7	.1	.2	2.3	80	7.2	.7
69	29	9.9	.9	.2	.2	3.4	77	7.0	.6
79	18	4.2	1.6	.2	.1	4.9	55	6.5	1.9
78	19	4.4	1.5	.2	.1	5.3	54	6.2	1.6
77	20	5.2	1.4	.2	.1	6.0	53	5.9	1.4
82	23	4.6	1.4	.3	.1	7.6	46	5.8	1.3
67	23	3.5	1.1	.3	.1	8.0	38	5.6	.9
71	20	2.0	.8	.3	.1	8.5	27	5.5	.5
65	30	3.4	2.1	.8	.2	8.5	43	5.7	.6
66	30	4.7	3.5	1.2	.1	4.7	67	7.3	.6
62	32	4.9	3.9	1.1	.1	4.3	70	7.7	.5
77	17	3.7	1.0	.2	.5	5.1	51	6.1	2.9
63	34	2.4	1.4	.2	.2	9.2	31	4.9	.8
63	34	1.8	1.4	.2	.2	9.1	28	4.9	.4
61	37	1.9	1.5	.2	.3	9.8	28	5.0	.3
58	40	2.8	2.1	.2	.3	10.8	33	5.0	.4
57	41	2.8	1.8	.2	.3	10.5	33	5.0	.3
50	47	4.1	2.4	.2	.4	11.5	38	4.9	.4
31	67	6.1	3.7	.2	.5	13.3	44	4.9	.4

TABLE 11.—*Physical and chemical*

Soil and pedon number	Depth from surface	Horizon	Physical			
			Very coarse through medium sand (2.0–0.25 mm)	Fine sand (0.25–0.10 mm)	Very fine sand (0.10–0.05 mm)	Total sand (2.0–0.05 mm)
	Inches		*Percent*	*Percent*	*Percent*	*Percent*
Portia fine sandy loam: S70–Ark–38–8–(1–7)	0–3	A1	20	13	2	35
	3–6	A2	20	13	3	36
	6–11	B1	20	13	3	36
	11–24	B21t	14	10	2	26
	24–32	B22t	17	11	3	31
	32–45	B23t	22	14	4	40
	45–62	B24t	19	13	3	35

[1] Horizon subdivided for sampling purposes.

contain solub'e salts, base saturation was determined by dividing this total into the sum of calcium, potassium, magnesium, and sodium, and multiplying by 100.

The bases were extracted with 1*N*, pH 7.0, ammonium acetate. Calcium, potassium, and sodium were determined with a flamephotometer and magnesium was measured by atomic absorption. The extractable acidity was determined by the barium chloride triethanolamine method (*4*, *14*).

Soil pH was determined on 1:1 soil to water mixture. Available phosphorus was extracted with the Bray No. 1 solution (0.03*N* NH4F and 0.025*N* HCl) and measured colorimetrically.

Organic matter was determined by a modified Walkey-Black method (*7*). The organic matter is digested with potassium dichromate-sulfuric acid and the quantity of chromic acid reduced is measured colorimetrically.

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Glossary

ABC soil. A soil that has a complete profile, including an A, B, and C horizon.

AC soil. A soil that has an A horizon and a C horizon but no B horizon. Commonly such soils are immature, as those developing from alluvium or those on steep, rocky slopes.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Base saturation. The degree to which material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

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

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

Climax vegetation. The stabilized plant community on a particular site; it reproduces itself and does not change so long as the environment does not change.

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

Complex, soil. A mapping unit consisting of different kinds of soils that occur in such small individual areas or in such an intricate

analyses of selected soils—Continued

Physical—Continued		Chemical							
		Milliequivalents per 100 grams of soil							
		Extractable bases				Extractable acidity	Base saturation	Reaction 1:1 soil-water	Organic matter
Silt (0.05–0.002 mm)	Clay (<0.002 mm)	Calcium	Magnesium	Sodium	Potassium				
Percent	*Percent*						*Percent*	*pH*	*Percent*
57	8	1.4	.6	.1	.2	6.1	27	5.5	2.5
54	10	1.2	.7	.1	.1	4.2	33	5.8	1.7
53	11	1.0	.5	.1	.1	4.8	26	5.2	1.1
52	22	.9	1.0	.1	.2	8.2	21	5.1	.5
48	21	1.0	1.5	.2	.2	7.9	27	5.0	.4
42	18	1.0	1.3	.2	.1	6.3	29	5.0	.3
37	28	2.4	2.7	.2	.1	8.3	39	5.2	.2

pattern that they cannot be shown separately on a publishable soil map.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

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

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

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

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

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

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

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

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

Cemented.—Hard and brittle; little affected by moistening.

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

Excessively drained soils are commonly very porous and rapidly permeable and have a low available water capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper part of the profile.

Decreaser. Any of the climax range plants most heavily grazed. Because they are the most palatable, they are first to be destroyed by overgrazing.

Deferred grazing. The practice of delaying grazing until range plants have reached a definite stage of growth, in order to increase the vigor of the forage and to allow the desirable plants to produce seed. Contrasts with continuous grazing and rotation grazing.

Diversion, or diversion terrace. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by wind (sand-blast), running water, and other geological agents.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has been allowed to drain away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic-matter content and clay but is rich in silt or very fine sand. The layer is seemingly cemented. When dry, it is hard or very hard and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Genesis, soil. The manner in which a soil originates. Refers especially to the processes initiated by climate and organisms that are responsible for the development of the solum, or true soil, from the unconsolidated parent material, as conditioned by relief and age of landform.

Gilgai. Typically, the microrelief of Vertisols—clayey soils that have a high coefficient of expansion and contraction with changes in moisture; usually a succession of microbasins and microknolls, in nearly level areas, or of microvalleys and microridges that run with the slope.

Gleization. The reduction, translocation, and segregation of soil compounds, notably of iron, usually in the lower horizons, as a result of waterlogging with poor aeration and drainage; expressed in the

soil by mottled colors dominated by gray. The soil-forming processes leading to the development of a gley soil.

Gleyed soil. A soil in which waterlogging and lack of oxygen have caused the material in one or more horizons to be neutral gray in color. The term "gleyed" is applied to soil horizons with yellow and gray mottling caused by intermittent waterlogging.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rains. The distinction between gully and rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by normal tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage. V-shaped gullies result if the material is more difficult to erode with depth; whereas U-shaped gullies result if the lower material is more easily eroded than that above it.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

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

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Increasers. Species in the climax vegetation that increase in relative amount as the more desirable plants are reduced by close grazing; increasers commonly are shorter than decreasers, and some are less palatable to livestock.

Invaders. On range, plants that come in and grow after the climax vegetation has been reduced by grazing. Generally, invader plants are those that follow disturbance of the surface. (Most weeds are "invaders").

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to relatively level plots surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops, or in orchards, to confine the flow of water to one direction.

Furrow.—Water is applied in small ditches made by cultivation implements used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Irrigation water, released at high points, flows onto the field without controlled distribution.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state. In engineering, a high liquid limit indicates that the soil has a high content of clay and a low capacity for supporting loads.

Loess. Fine-grained material, dominantly of silt-sized particles, that has been deposited by wind.

Miscellaneous land type. A mapping unit for areas of land that have little or no natural soil; or that are too nearly inaccessible for orderly examination; or that occur where, for other reasons, it is not feasible to classify the soil.

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

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

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Parent material. Disintegrated and partly weathered rock from which soil has formed.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality that enables the soil to transmit water or air. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Phase, soil. A subdivision of a soil, series, or other unit in the soil classification system made because of differences in the soil that affect its management but do not affect its classification in the natural landscape. A soil series, for example, may be divided into phases because of differences in slope, stoniness, thickness, or some other characteristic that affects its management but not its behavior in the natural landscape.

pH value. A numerical means for designating acidity and alkalinity in soils. A pH value of 7.0 indicates precise neutrality; a higher value, alkalinity; and a lower value, acidity.

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

Plow layer. The soil ordinarily moved in tillage, equivalent to surface soil.

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

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

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

Range condition. The state of health or productivity of both soil and forage in a given range, in terms of what productivity could or should be under normal climate and the best practical management. Condition classes generally recognized are—*excellent, good, fair,* and *poor.* The classification is based on the percentage of original, or climax, vegetation on the site, as compared to what ought to grow on it if management were good.

Range site. An area of range where climate, soil, and relief are sufficiently uniform to produce a distinct kind of climax vegetation.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock. Only the upper part of this, modified by organisms and other soil-building forces, is regarded by soil scientists as soil. Most American engineers speak of the whole regolith, even to great depths, as "soil."

Relief. The elevations or inequalities of a land surface, considered collectively.

Rill. A steep-sided channel resulting from accelerated erosion. A rill

normally is a few inches in depth and width and is not large enough to be an obstacle to farm machinery.

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

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

Site index. A numerical means of expressing the quality of a forest site that is based on the height of the dominant stand at an arbitrarily chosen age; for example, the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on relatively steep slopes and in swelling clays, where there is marked change in moisture content.

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

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *Very coarse sand* (2.0 to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter). The separates recognized by the International Society of Soil Science are as follows: I (2.0 to 0.2 millimeter); II (0.2 to 0.02 millimeter; III (0.02 to 0.002 millimeter); IV (less than 0.002 millimeter).

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

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

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

Substratum. Technically, the part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

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

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

Topsoil. A presumed fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which plants (specifically sunflower) wilt so much that they do not recover when placed in a dark, humid atmosphere.

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