SOIL SURVEY

Spalding County, Georgia

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with the
UNIVERSITY OF GEORGIA, COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATIONS

Series 1961, No. 10

Issued October 1964

How To Use the Soil Survey Report

THIS SOIL SURVEY of Spalding County, Georgia, will serve several groups of readers. It will help farmers in planning the kind of management that will protect their soils and provide good yields; assist engineers in selecting sites for roads, buildings, ponds, and other structures; aid foresters in managing woodlands; and add to our knowledge of soil science.

Locating Soils

Use the index to map sheets at the back of this report to locate areas on the large map. The index is a small map of the county on which numbered rectangles have been drawn to show where each sheet of the large map is located. When the correct sheet of the large map has been found, it will be seen that boundaries of the soils are outlined, and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they occur on the map. The symbol is inside the area if there is enough room; otherwise, it is outside the area and a pointer shows where the symbol belongs.

Finding Information

This report contains sections that will interest different groups of readers, as well as some sections that may be of interest to all.

Farmers and those who work with farmers can learn about the soils in the section "Descriptions of Soils" and then turn to the section "Use and Management of Soils." In this way, they first identify the soils on their farm and then learn how these soils can be managed and what yields can be expected. The "Guide to Mapping Units, Capability Units, and Woodland Suitability Groups" at the back of the report will simplify use of the map and report. This guide lists each soil and land type mapped in the county, and the page where each is described. It also lists, for each soil and land type, the capability unit and woodland suitability group, and the pages where each of these is described.

Foresters and others interested in woodland can refer to the section "Woodland." In that section the soils in the county are grouped according to their suitability for trees, and factors affecting the management of woodland are explained.

Engineers will want to refer to the section "Engineering Interpretations of Soils." Tables in that section show characteristics of the soils that affect engineering.

Scientists and others who are interested will find information about how the soils were formed and how they were classified in the section "Genesis, Classification, and Morphology of Soils."

Students, teachers, and other users will find information about soils and their management in various parts of the report, depending on their particular interest.

Newcomers in Spalding County will be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the Area," which gives additional information about the county.

* * * *

Fieldwork for this survey was completed in 1961. Unless otherwise indicated, all statements in the report refer to conditions in the county at that time. The soil survey of Spalding County was made as part of the technical assistance furnished by the Soil Conservation Service to the Towaliga Soil Conservation District.

Cover picture: Farm pond for livestock and recreation. Established bermudagrass pasture on soils in capability units IIIe-1 (foreground) and IVe-1 (background).

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C., 20402

Contents

Series 1961, No. 10

Issued October 1964

SOIL SURVEY OF SPALDING COUNTY, GEORGIA

BY HUGH T. DAVIS AND JERRY A. PILKINTON, SOIL CONSERVATION SERVICE, UNITED STATES DEPARTMENT OF AGRICULTURE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE IN COOPERATION WITH THE UNIVERSITY OF GEORGIA, COLLEGE OF AGRICULTURE, AGRICULTURAL EXPERIMENT STATIONS

SPALDING COUNTY occupies 201 square miles, or 128,640 acres, in the west-central part of Georgia (fig. 1). The county boundaries are very irregular. Line Creek and Flint Fiver form the western boundary. The county is approximately 11 miles from north to south, and 21 miles from east to west.

General Nature of the Area

This section contains information about the organization, settlement, and population of the county and describes the physiography, relief, and drainage, the water supply, and the vegetation. It also contains information about the social and industrial development, transportation, markets, agriculture, and climate of the county.

Organization, Settlement, and Population

Spalding County was organized on December 20, 1851, from parts of Fayette, Pike, and Henry Counties.

The first settlers in the area that is now Spalding County arrived about 1815. Some of them came from Virginia and North and South Carolina, but the majority came from other counties in Georgia. These settlers grew corn, wheat, and barley and raised cattle, hogs, sheep, and chickens for home use or for trading locally.

The population of the county was 35,404 in 1960. In that year about 38.6 percent of the population was classed as rural. By contrast, in 1930, 43 percent of the population was classed as rural. Since 1950, the estimated percentage of people in rural areas has declined even more as many people, formerly operating farms, have accepted industrial employment in Griffin and other nearby cities.

Physiography, Relief, and Drainage

Spalding County lies entirely within the Piedmont Plateau. The relief ranges from nearly level to steep, but it is prevailingly gently sloping to moderately steep.

Most of the larger flood plains and low stream terraces occur southwest of Griffin along Line Creek and Flint River and northwest of Griffin along Flint River, Heads Creek, and Bear Creek. The relief in these areas is mainly level to very gently sloping. The flood plains along Flint River and Line Creek range from several yards to nearly one-half mile in width. The largest area is in the extreme southwestern part near where these streams converge and leave the county. Remnants of stream terraces lie above the flood plain at two, or possibly more, levels.

The elevation is approximately 750 feet, where the Flint River enters the county, and approximately 710 feet where it leaves the county about 14 miles to the southwest. In most of the county, the elevation is about 875 feet, but it ranges from 710 to 995 feet. The elevation is 960 feet at Griffin, 929 feet at Sunnyside, 853 feet at Orchard Hill, 850 feet at Zetella, and 822 feet at Double Cabins.

That part of the Central of Georgia Railroad that runs north-southeast through the county is exactly on the natural divide separating the two main drainage patterns in the county. For about half of Spalding County, drainage is east into the Atlantic Ocean by the Towaliga and Ocmul-

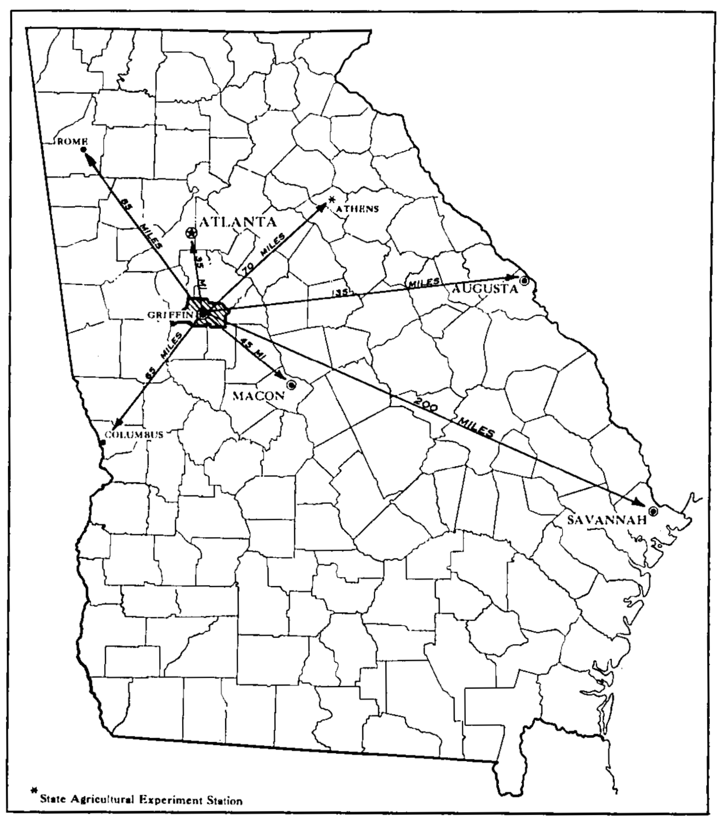

Figure 1.—**Location of Spalding County in Georgia.**

gee Rivers. For the rest, drainage is west into the Gulf of Mexico by Line Creek and Flint River. The drainage pattern is well defined throughout the uplands, and surface drainage is good nearly everywhere. The streams have eroded deep valleys into the uplands, so that the difference in elevation between the stream bottoms and hilltops is from 20 to 200 feet. Most of the first bottoms of the major streams are poorly drained and are subject to flooding several times during the year. They are generally too wet for cultivated crops but are suitable for pasture and woodland.

Water Supply

The water supply generally is adequate for farm and home use. Drilled or dug wells supply water for farm homes, and most of the wells are equipped with electric pumps. Branches, creeks, larger streams, and farm ponds are the main sources of water for cattle and other livestock. During September and October in extremely dry years, there are shortages in some areas.

Landowners in Spalding County have constructed 241 farm ponds that are used for livestock and irrigation as well as for fishing and other recreational purposes.

Water for the town of Griffin is pumped from the Flint River and a 320-acre reservoir on Heads Creek. Other incorporated towns in the county are supplied from drilled wells.

Vegetation

Nearly all of Spalding County at one time was covered by forest, but settlers began clearing the land for crops in the early 1800's. The deeper, more productive upland soils on gentle slopes and the well-drained soils on flood plains were cleared first. Commercial logging on a large scale was not begun until the late 1860's. By 1920, most of the original pine timber had been cut.

Trees now cover about 58,689 acres in the county, and if present trends continue, this acreage will increase, as pine seedlings have been set out in increasing numbers for several years. Since 1956, more than 2,393 acres have been planted to loblolly pine. The forests are mainly two major types—loblolly pine and oak-pine (*3*),[1] but almost 90 percent of the total forest acreage is in loblolly pine. The average present stand on woodland areas contains less than 2 cords of cull hardwood per acre. For information about woodland production, see the section "Woodland."

Industries

There were 50 manufacturing concerns in Spalding County on January 1, 1961. Some of the products manufactured or processed are towels and other cotton products; men's and women's wearing apparel, velveteen corduroys, and hosiery; canned fruits and vegetables; utility truck bodies; paper products; TV tubes; and snow fences.

According to an estimate in April 1959 by the Georgia Department of Labor, 7,030 people worked in manufacturing plants in the county. This estimate showed a total employment of 14,630 and of this number 620 worked in agriculture and forestry.

[1] Italic numbers in parentheses refer to Literature Cited, p. 62.

Most of the industries are in Griffin, and much of the rural population works in this city. Many of these workers own and operate farms, using hired help or tenants.

Transportation and Markets

Spalding County is served by two railway systems, two Federal highways, and many State and county roads. Almost half of the 483 miles of roads in the county are paved. The two railroads are the Southern and the Central of Georgia. The main line of the Central, from Atlanta to Macon, runs in a north-southeasterly direction, almost through the center of the county and serves Sunnyside, Caruso, Pomona, Experiment, Griffin, and Orchard Hill. A branch line of this railroad runs eastward from Griffin to Newnan. Four major motor express lines operate in the county.

Markets for farm products of all types are numerous and easily accessible. The State Farmers' Market, accessible by a four-lane highway, is 32 miles north of Griffin and provides an excellent market for all types of farm produce. Most of the livestock raised in the county is sold at auction; sale barns are located in Atlanta, Thomaston, and Jackson. Local feed and flour mills are good markets for wheat, oats, and corn.

Community Facilities

The schools of Griffin and of Spalding County were consolidated in 1953. This system has 18 grammar schools, 1 junior high school, and 2 senior high schools, and most of the schools are in Griffin. Approximately 8,500 students attend the schools under the supervision of 315 teachers. Buses transport most of the students to and from school. Many colleges and universities are within a 50-mile radius of Spalding County.

Spalding County has 110 churches; 45 of these, representing 10 denominations, are in the area of Griffin.

Electricity is available on most, if not all, farms in the county. Many farm homes are well equipped with modern conveniences. Mail service is countywide. A transcontinental gasline passes through the county and supplies natural gas to industry and to urban residents. This facility is being rapidly expanded to serve the rural areas.

The county has three radio stations and a daily newspaper. Of the more than 12,000 telephones served from the Griffin exchange, over 2,000 are in farm homes.

Agriculture

Farming has not changed greatly in Spalding County during the past few years except for a sharp reduction in the number of farms producing cotton. According to the U.S. Census of Agriculture, cotton was grown on only 71 farms in 1959 as compared with 240 farms in 1954 and 337 farms in 1949. Most of this diverted acreage has been planted to permanent pasture and hay crops.

Of the 374 farms in the county in 1959, 10 were classified as dairy farms, 21 as poultry farms, and 28 as livestock farms other than poultry and dairy. In 1959, about 57 percent of the income from the sale of farm products was from livestock and livestock products.

Table 1 shows, in specified years, the acreage of the principal field crops, the number of fruit and nut trees, and the number of grapevines. Table 2 shows the number of livestock on farms and gives information about dairy and poultry products sold.

Farm mechanization has progressed rapidly. In 1959, a total of 446 tractors was reported on 232 farms, 391 motor trucks on 241 farms, and 427 automobiles on 304 farms.

In 1959, 21 farms, as compared with 58 farms in 1949, were 10 acres or less in size, and 203 farms were 100 acres or more. A total of 278 farmers were full owners of their farms, 47 were part owners, 10 were managers, and only 39 were tenants.

TABLE 1.—*Acreage of the principal crops and number of fruit trees, nut trees, and grapevines*

Crop	1939	1949	1954	1959
	Acres	*Acres*	*Acres*	*Acres*
Corn for all purposes	15, 455	5, 737	3, 511	3, 315
Cotton harvested	9, 246	4, 948	3, 124	1, 126
Oats threshed or combined	3, 204	5, 676	6, 942	1, 680
Wheat threshed or combined	1, 699	1, 960	1, 346	569
Soybeans grown for all purposes	1, 595	361	1, 369	146
Cowpeas grown for all purposes	5, 706	498	251	645
Pimiento peppers harvested for sale	684	599	305	162
Hay crops, excluding soybeans, cowpeas, peanuts, and sorghum:				
Lespedeza	942	2, 325	1, 544	813
Small grains	90	222	1, 224	495
Alfalfa, clover, and their mixtures	(1)	263	316	133
Other hay cut	2, 279	738	1, 095	961
	Number	*Number*	*Number* [2]	*Number* [2]
Apple trees	2, 690	860	467	468
Peach trees	248, 974	207, 393	73, 336	122, 427
Pear trees	1, 030	275	236	178
Pecan trees	10, 435	6, 017	7, 987	6, 470
Grapevines	4, 695	3, 592	7, 645	3, 295

[1] Not reported.
[2] One year later than year given at head of column.

TABLE 2.—*Livestock and poultry on farms and dairy and poultry products sold*

Livestock	1940	1950	1954	1959
	Number	*Number*	*Number*	*Number*
Horses and mules	[1] 1, 552	874	511	222
Cattle and calves	[1] 2, 481	5, 568	9, 569	7, 738
Milk cows	1, 403	1, 659	1, 458	958
Hogs and pigs	[2] 2, 333	2, 172	1, 885	2, 895
Chickens	[2] 22, 680	[2] 22, 614	[2] 64, 061	[2] 36, 717
Whole milk sold (gallons)	122, 985	374, 273	569, 466	[3] 3, 190, 515
Chickens sold	12, 137	47, 033	67, 863	44, 827
Eggs sold (dozens)	(4)	68, 940	437, 696	247, 010

[1] Over 3 months old.
[2] Over 4 months old.
[3] Reported as pounds.
[4] Not reported.

Climate [2]

Because Spalding County is on a plateau at an average elevation of nearly 875 feet, it has a more moderate summer climate than might be expected from its latitude. Only about 60 summer days, on the average, have a maximum temperature as high as 90° F. According to records, a temperature of 100°, or above, occurs only about 1 year in 4. However, during an occasional hot summer the temperature may reach 100° or above on several days. The most recent hot summer was 1952, when the temperature reached or exceeded 100° on about 10 days. The highest temperature recorded in the county occurred in 1925, when the mercury reached 108° in both August and September. The highest temperature recorded since that time was 104° in July 1952. Summer nights are usually not uncomfortably warm. Minimum temperatures for the warmest months average less than 70°. Tables 3, 4, 5, 6, and 7 contain data about the climate of the county.

Winters are not severe in Spalding County, though some moderately cold weather may be expected each year. During an average winter, freezing occurs on about 40 days, and a temperature of 20° F., or lower, occurs about four times. Cold spells that drop temperatures to freezing, or below, usually last only a few days before being displaced by comparatively mild weather. Spalding County's lowest recorded temperature of 7° below zero occurred in February 1899. This is the only subzero reading on record, the next lowest temperature being 2° above zero in January 1928. Daytime temperatures usually rise above freezing even during the coldest weather.

The average dates of the last freeze in spring and first freeze in fall are March 28 and November 12, respectively, giving the county an average freeze-free growing season of about 230 days. The last freeze in spring has occurred as early as February 9 and as late as April 21. The date of the first freeze in fall has ranged from October 24 to December 10.

Spalding County has an average annual rainfall of almost 50 inches, which is usually ample for the diversified agriculture of the area. March, with an average of about 6 inches, is usually the wettest month. The driest month, on the average, is October, with about 2¼ inches. Annual rainfall has varied from almost 80 inches in 1929 to just over 30 inches in 1931. One of the wettest months of record was March 1929, when 16 inches of rain were measured at Griffin. On the other hand, during the long period on record, there have been about 4 months in which little or no rain occurred. This shows that, although rainfall usually is abundant, damaging dry spells do occur. These are most likely in autumn, when long periods of mild, sunny weather commonly occur.

Though traces of snow may be expected in the county during most winters, measurable amounts occur only about 1 year in 4. Snowfalls of as much as 5 inches have occurred only two or three times since weather records have been kept in the county.

[2] This section was written by HORACE S. CARTER, State climatologist, U.S. Weather Bureau, University of Georgia, College of Agriculture, Athens, Georgia.

TABLE 3.—*Temperature and precipitation of Spalding County, Ga.*

Month	Temperature: Average daily maximum	Temperature: Average daily minimum	Two years in 10 will have at least 4 days with— Maximum temperature equal to or higher than	Two years in 10 will have at least 4 days with— Minimum temperature equal to or lower than	Precipitation: Average monthly total	One year in 10 will have— Less than	One year in 10 will have— More than
	°F	°F	°F	°F	Inches	Inches	Inches
January	57.7	37.4	74	23	4.53	2.0	9.1
February	60.0	38.3	75	24	4.67	2.1	8.1
March	66.3	43.1	81	28	5.92	3.6	10.9
April	75.4	51.4	86	38	4.65	1.9	7.8
May	82.6	59.8	92	49	3.11	0.6	5.6
June	88.6	67.2	96	59	4.15	1.5	7.5
July	89.3	69.6	96	66	5.34	1.9	9.5
August	89.2	69.2	96	63	4.08	1.6	7.5
September	85.1	64.2	95	54	3.35	0.8	6.9
October	77.0	53.9	87	40	2.24	0.4	5.6
November	66.1	43.0	79	29	2.82	0.8	7.6
December	57.9	37.5	72	23	4.39	1.2	7.8
(1)	74.6	52.9	98	16	49.25	39.2	62.3

[1] Average maximums and minimums for the year, as indicated by column headings.

TABLE 4.—*Average number of days per year (by months) with rainfall equal to or more than the stated amounts*

[Based on 10-year period 1951 through 1960]

Rainfall equal to or more than—	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average days per year
	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days
0.10 inch	6	7	9	6	6	6	8	5	5	4	5	6	73
.25 inch	4	5	7	4	4	4	6	4	4	3	3	5	53
.50 inch	3	4	4	3	3	3	4	2	3	1	2	3	35

TABLE 5.—*Total number of days in 10 years (by months) with rainfall equal to or more than the stated amounts*

Rainfall equal to or more than—	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total days in 10 years
	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days	Days
1 inch	13	14	13	10	8	14	24	12	14	3	6	11	142
2 inches	2	1	4	4	3	3	0	2	5	1	1	2	28
3 inches	0	0	0	2	0	1	0	1	3	0	1	2	10
4 inches	0	0	0	0	0	1	0	0	1	0	0	0	2

TABLE 6.—*Total number of 2-, 4-, and 6-week periods in 10 years in which no day had precipitation of 0.25 inch or more*

Periods equal to or longer than—[1]	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total periods in 10 years
2 weeks	7	3	1	7	8	4	5	5	7	10	5	5	67
4 weeks	1	0	0	1	2	1	1	1	2	3	1	0	13
6 weeks	0	0	0	0	1	0	0	1	1	0	1	0	4

[1] Periods are listed in the month during which the greater part of the precipitation occurred.

TABLE 7.—*Probabilities of last freezing temperature in spring and first freezing temperature in fall*

[Based on records for Griffin, Ga.]

Probability	Temperature and dates for given probabilities		
	24° F.	28° F.	32° F.
Last freeze in spring:			
1 year in 10 later than	March 14	March 25	April 12.
2 years in 10 later than	March 7	March 20	April 4.
5 years in 10 later than	February 22	March 9	March 23.
First freeze in fall:			
1 year in 10 earlier than	November 23	November 11	October 31.
2 years in 10 earlier than	November 25	November 18	November 4.
5 years in 10 earlier than	December 9	November 26	November 13.

Long records of relative humidity and wind are not available for Spalding County, but average values at the Atlanta Airport, less than 40 miles away and at about the same elevation, are indicative of average conditions in the county. Average relative humidity, during early morning, ranges from 79 percent in March and April to 87 percent from July through September. Averages for early afternoon range from a low of 49 percent in April to a high of 63 percent in January. Average hourly windspeeds range from about 7 miles per hour in August to almost 12 miles per hour in March. Prevailing wind directions are northwesterly in winter and are variable, but predominantly southwesterly, in summer.

How the Soil Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Spalding County, where they are located, and how they can be used.

They went into the county knowing they likely would find many soils they had already seen, and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; 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 roots of plants.

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. To use this report efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

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. Cecil and Madison, 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 go with their behavior in the natural, untouched landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Cecil sandy loam and Cecil sandy clay loam are two soil types in the Cecil series. The difference in texture of their surface layers is apparent from their names.

Some soil types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Cecil sandy loam, 2 to 6 percent slopes, eroded, is one of several phases of Cecil sandy loam, a soil type that, in this county, ranges from very gently sloping to moderately steep.

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 greatly help in drawing boundaries accurately. The soil map in the back of this report was prepared from the aerial photographs.

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

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed, and so small in size, that it is not practical to show them separately on the map. Therefore, they show this mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major kinds of soil or land types in it, for example, Lloyd-Gullied land complex. Also, on most soil maps, areas are shown that are so rocky, so shallow, or so frequently worked by wind and water that they scarcely can be called soils. These areas are shown on a soil map like other mapping units, but they are given descriptive names, such as Gullied land or Rock outcrop and are called land types rather than soils.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are 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 soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in a way that is readily useful to different groups of readers, among them farmers, ranchers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in the soil survey reports. Based on the yield and practice tables and other data, the soil scientists set up trial groups and test them by further study and by consultation with farmers, agronomists, engineers, and others. Then, the scientists 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 present methods of use and management.

General Soil Map

After study of the soils in a locality and the way they are arranged, it is possible to make a general map that shows several main patterns of soils, called soil associations. Such a map is the colored general soil map in the back of this report. Each association, as a rule, contains a few major soils and several minor soils, in a pattern that is characteristic although not strictly uniform.

The soils within any one association are likely to differ in some or in many properties; for example, slope, depth, stoniness, or natural drainage. Thus, the general soil map shows, not the kind of soil at any particular place, but patterns of soils, in each of which there are several different kinds of soil.

Each soil association is named for the major soil series in it, but, as already noted, soils of other series may also be present. The major soils of one soil association may also be present in other associations, but in a different pattern.

The general map, which shows patterns of soils, is useful to people who want a general idea of the soils, who want to compare different parts of a county, or who want to know the possible location of good-sized areas suitable for a certain kind of farming or other land use.

The four soil associations of Spalding County are described in the following paragraphs. Three are mainly upland areas, and one is on bottom land.

1. Cecil-Madison association: Well-drained soils that have a red sandy clay loam or clay loam subsoil

This association is in broad, very gently sloping to strongly sloping areas dissected by many streams and smaller drainageways. It is widely distributed and makes up about 70 percent of the county area.

The Cecil soils are dominant and make up about 80 percent of the association. They are generally on the broad ridgetops and have formed in materials weathered from granite, gneiss, and schist. They are well drained and commonly have a dark yellowish-brown to brown sandy loam surface layer and a red sandy clay subsoil.

The Madison soils, mainly in the southeastern part of the county, have formed in materials weathered chiefly from mica schist. They resemble Cecil soils but are more micaceous throughout the profile.

Also in the association are the somewhat excessively drained Louisburg soils, which generally are on the steeper side slopes along drainageways. They have a B horizon that is less red, much thinner, and less distinct than that of the Cecil and Madison soils, and they are shallower to bedrock. Small areas of poorly drained soils at the head of drains and at the base of slopes along drainageways are also included.

Agriculturally, the soils in this association are the most important in the county. Nearly all of the farms are owner operated and are of about average size for the county or larger. Most of them are grain-livestock farms (fig. 2), but a few produce only peaches or other specialized crops.

Figure 2.—**Pastures have been improved on many farms in the Cecil-Madison soil association. These beef cattle are grazing bermudagrass, dallisgrass, and ladino clover.**

Most of the acreage of this soil association has been cultivated and is eroded to some degree. In many areas, severe erosion has removed the original surface layer and exposed the red, finer textured subsoil. Forests in this association have been severely cut over.

The soils respond well to good management and are suited to a wide range of field and forage crops. Soils of capability classes II and III are dominant in this association.

2. Lloyd-Davidson association: Well-drained soils that have a dark-red clay loam to clay subsoil

This association is on broad, very gently sloping to strongly sloping uplands dissected by many streams and smaller drainageways. It makes up about 11 percent of the county area.

The Lloyd soils, which make up more than 90 percent of the association, are generally on the broad ridgetops. They have formed in materials weathered from mixed acidic and basic rocks. They are well drained and have a reddish-brown sandy loam surface layer and a dark-red clay loam subsoil.

Also in the association are the Davidson soils, which are mainly in the north-central part of the county. They have formed in materials weathered almost entirely from basic rocks, chiefly diorite, hornblende gneiss, and diabase. Davidson soils have a dark reddish-brown loam or clay loam surface layer underlain by dark-red clay. These soils are well drained, have a thick B horizon, and are generally more than 12 feet in depth to bedrock.

Also included in this association are small areas of poorly drained soils on flood plains, at the head of drains, and at the base of slopes along drainageways.

Some of the better soils for agriculture are in this association. Most of the farms are owner operated and are the average size. The major soils are well suited to peaches, and much of the acreage is in that use.

Most of the acreage has been cultivated and is eroded to some degree. In many areas, severe erosion has removed the surface layer and exposed the dark-red clay loam or clay subsoil. Forests in this soil association have been severely cut over.

The soils respond well to good management and are suited to a wide range of field and forage crops. Soils of capability classes II and III are dominant.

3. Appling-Helena association: Well-drained to somewhat poorly drained soils that have a strong-brown to yellow sandy clay to sandy clay loam subsoil

This association is on very gently sloping and gently sloping interstream divides that are dissected by many streams and small drainageways. It makes up about 9 percent of the county. Most areas are small, but one large area is in the western part of the county between the Flint River and Line Creek.

The Appling soils, which make up about 88 percent of this association, are generally on the broad ridges. These soils have formed in materials weathered chiefly from acid granitic rocks. They are well drained and commonly have a surface layer of yellowish-brown sandy loam and a subsoil of yellowish-brown to strong brown, mottled sandy clay.

The Helena soils make up about 10 percent of the association and generally are on gentle side slopes along drainageways. These soils have formed in materials weathered chiefly from aplitic granite. They are somewhat poorly drained to moderately well drained. Their surface layer resembles that of the Appling soils, and their subsoil is plastic sandy clay loam or sandy clay, mottled with yellow to yellowish brown.

Minor areas in this association are occupied by the Colfax soil, the Worsham soil, and Alluvial lands, which together amount to about 2 percent of the association. The somewhat poorly drained to poorly drained Colfax soil and Worsham soil are at the head of drainageways and in seepage areas at the base of slopes. The poorly drained Alluvial lands are on flood plains.

Most of the farms are operated by owners and are of average size, although two of them are among the largest farms in the county. The soils generally are suited to slightly fewer crops than the soils in the Cecil-Madison and the Lloyd-Davidson associations. The soils in this association warm up later in spring, however, and in some years planting is delayed beyond normal dates for some crops. Peaches and alfalfa are not suited.

Most of the acreage has been cultivated and is eroded to some degree. On many areas severe erosion has removed the surface layer and has exposed the yellowish-brown sandy clay subsoil. The forests in this association have been severely cut over.

The soils respond well to good management, and the better drained soils are suited to most field and forage crops. Soils of capability classes II and III are dominant.

4. Alluvial land-Wehadkee association: Moderately well drained to poorly drained soils on flood plains

This association is along the larger streams throughout the county and makes up about 10 percent of its area. Most of the soils on the flood plains have a surface layer ranging from sandy loam to silty clay loam. The major soils in the association have formed in recent alluvium and frequently receive deposits of new materials. Bedrock is at a depth of more than 15 feet in most places.

Alluvial lands make up about 78 percent of this association. They are on flood plains and range from moderately well drained to wet. The texture of the soil material is mainly sandy loam, but it varies widely. Consequently, the profile varies from place to place.

The Wehadkee soil, also on flood plains, occupies about 20 percent of the association. It is poorly drained and has a gray silty clay loam surface layer, underlain by mottled silty clay.

Less extensive soils are the Chewacla, Roanoke, and Augusta. The Chewacla soil has a dark-brown silt loam surface layer, underlain by reddish-brown, mottled silty clay loam. This soil is on flood plains and is somewhat poorly drained. The Roanoke and Augusta soils are on low stream terraces that border the flood plains. The poorly drained Roanoke soil has a sandy loam surface layer, underlain by a mottled silty clay loam subsoil. The Augusta soil is somewhat poorly drained and has a sandy loam surface layer, underlain by a subsoil of mottled sandy clay loam.

About 70 percent of this soil association is wooded. Poor drainage and frequent flooding limit the suitability of the soils for cultivation. Therefore, they are suited to a narrow range of crops. The better drained soils respond to good management and produce moderate to good yields of adapted crops. Soils of capability subclasses IVw, IIIw and IIw predominate in the order named.

Descriptions of Soils

In this section the soil series are arranged in alphabetical order, and characteristics that are common to all soils in the series are described. Following each series description are definitions of the soils in the series. The first soil described in each series is considered the most typical; differences that occur in the other soils described are noted. Differences in slope and erosion, if any, are obvious in the soil name.

The section "Genesis, Classification, and Morphology of Soils" contains a brief, but more technical, description of each series in the county and detailed descriptions of soils that are representative of each series.

The approximate acreage and proportionate extent of the soils are given in table 8. The location and distribution of the soils are shown on the soil map at the back of the report. Terms that may not be familiar to some readers are defined in the Glossary.

TABLE 8.—*Approximate acreage and proportionate extent of the soils*

Mapping unit	Area	Extent
	Acres	*Percent*
Alluvial land:		
Alluvial land	2, 390	1. 9
Alluvial land, moderately wet	2, 050	1. 6
Alluvial land, wet	3, 500	2. 7
Local alluvial land	165	. 1
Altavista sandy loam, 2 to 6 percent slopes, eroded	205	. 2
Appling sandy loam, 2 to 6 percent slopes	855	. 7
Appling sandy loam, 2 to 6 percent slopes, eroded	2, 750	2. 1
Appling sandy loam, 6 to 10 percent slopes, eroded	2, 650	2. 1
Appling sandy clay loam, 2 to 6 percent slopes, severely eroded	1, 900	1. 5
Appling sandy clay loam, 6 to 10 percent slopes, severely eroded	1, 040	. 8
Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded	17, 480	13. 6
Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded	15, 685	12. 2
Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded	1, 250	1. 0
Cecil sandy loam, 2 to 6 percent slopes	985	. 8
Cecil sandy loam, 2 to 6 percent slopes, eroded	17, 690	13. 7
Cecil sandy loam, 6 to 10 percent slopes	1, 180	. 9
Cecil sandy loam, 6 to 10 percent slopes, eroded	15, 550	12. 1
Cecil sandy loam, 10 to 15 percent slopes	1, 140	. 9
Cecil sandy loam, 10 to 15 percent slopes, eroded	1, 990	1. 5
Cecil sandy loam, 15 to 25 percent slopes	895	. 7
Chewacla silt loam	790	. 6
Colfax sandy loam, 2 to 6 percent slopes	515	. 4
Davidson loam, 2 to 6 percent slopes, eroded	300	. 2
Davidson clay loam, 2 to 6 percent slopes, severely eroded	375	. 3
Davidson clay loam, 6 to 10 percent slopes, severely eroded	275	. 2
Gullied land	80	. 1
Helena sandy loam, 2 to 6 percent slopes, eroded	775	. 6
Helena sandy loam, 6 to 10 percent slopes, eroded	90	. 1
Helena sandy clay loam, 2 to 6 percent slopes, severely eroded	635	. 5
Helena sandy clay loam, 6 to 10 percent slopes, severely eroded	200	. 2
Lloyd sandy loam, 2 to 6 percent slopes, eroded	2, 090	1. 6
Lloyd sandy loam, 6 to 10 percent slopes, eroded	1, 665	1. 3
Lloyd sandy loam, 10 to 15 percent slopes, eroded	1, 325	1. 0
Lloyd sandy loam, 15 to 25 percent slopes, eroded	250	. 2
Lloyd clay loam, 2 to 6 percent slopes, severely eroded	2, 290	1. 8
Lloyd clay loam, 6 to 10 percent slopes, severely eroded	2, 300	1. 8
Lloyd clay loam, 10 to 15 percent slopes, severely eroded	1, 010	. 8
Lloyd sandy loam, compact subsoil, 2 to 6 percent slopes, eroded	835	. 6
Lloyd clay loam, compact subsoil, 2 to 6 percent slopes, severely eroded	320	. 2
Lloyd clay loam, compact subsoil, 6 to 10 percent slopes, severely eroded	230	. 2
Lloyd-Gullied land complex, 6 to 10 percent slopes	1, 175	. 9
Lloyd-Gullied land complex, 10 to 25 percent slopes	190	. 1
Louisburg sandy loam, 2 to 6 percent slopes	1, 310	1. 0
Louisburg sandy loam, 6 to 10 percent slopes	1, 170	. 9
Louisburg sandy loam, 10 to 15 percent slopes	495	. 4
Louisburg soils, 6 to 10 percent slopes, eroded	1, 370	1. 1
Louisburg soils, 10 to 15 percent slopes, eroded	765	. 6
Madison fine sandy loam, 2 to 6 percent slopes, eroded	1, 800	1. 4
Madison fine sandy loam, 6 to 10 percent slopes, eroded	1, 370	1. 1
Madison fine sandy loam, 10 to 15 percent slopes, eroded	245	. 2
Madison sandy clay loam, 2 to 6 percent slopes, severely eroded	1, 675	1. 3
Madison sandy clay loam, 6 to 10 percent slopes, severely eroded	1, 610	1. 3
Molena loamy sand, 2 to 10 percent slopes	250	. 2
Roanoke and Augusta sandy loams	285	. 2
Rock outcrop	35	(1)
Wehadkee and Roanoke silty clay loams	2, 600	2. 0
Wilkes sandy loam, 2 to 6 percent slopes, eroded	305	. 2
Wilkes sandy loam, 10 to 15 percent slopes, eroded	125	. 1
Worsham sandy loam, 2 to 6 percent slopes	120	. 1
Unclassified city land	2, 445	1. 9
Water	1, 600	1. 2
Total	128, 640	100. 0

[1] Less than 0.1 percent.

Alluvial Land

Alluvial land consists of stratified alluvium that has been deposited recently on nearly level and level flood plains. Because additional sediments are deposited when the streams overflow, this land type has varied drainage and texture. In most places the soil materials have remained in place long enough for plants to become established, but not long enough for soil horizons to develop.

Alluvial land (0 to 2 percent slopes) (Alm).—This miscellaneous land type consists of deep, moderately well drained, recent alluvium deposited on nearly level flood plains along many streams in the county. These deposits commonly are brown or grayish brown. They vary greatly in texture. Stratified layers of silt, clay, and sand are in many places. Floodwaters occasionally scour the surface, and deposits of sandy materials are common.

Alluvial land generally is sandier near the streambanks than in other parts of the flood plain.

This land type is low to medium in natural fertility and content of organic matter and is strongly acid. Runoff is slow. Water moves into and through the soil at a moderate rate. The available water capacity is high. Tilth is good, and the root zone is thick.

Areas of Alluvial land are likely to be flooded in winter and other unusually wet periods, but the excess water subsides rather quickly. Because of the flooding, this land type is best suited to crops that grow during summer. Most of the acreage is cleared and used for such crops as corn, vegetables, hay, and pasture. Because of the high available water capacity, and other favorable characteristics of Alluvial land, crops respond well enough to justify heavy applications of fertilizer. Yields of suitable crops are high to very high. (Capability unit IIw-2; woodland suitability group 1)

Alluvial land, moderately wet (0 to 2 percent slopes) (Alp).—This miscellaneous land type consists of deep, somewhat poorly drained, recent alluvium deposited on nearly level flood plains. It is similar to the moderately well drained alluvial land in surface texture and color but is more poorly drained and has a higher water table. It also is flooded more frequently and for longer periods and has a greater number of mottles near the surface. Alluvial land, moderately wet, is along most streams in the county.

This land type is low to medium in natural fertility and in content of organic matter and is strongly acid. Runoff is slow, and water moves slowly into and through the profile. The available water capacity is high. Tilth generally is good except in the wetter spots. Drainage is required to remove excess surface water and to improve internal soil drainage. Erosion generally is not a hazard, but some damage to crops results from scouring by floodwaters.

This land type has limited suitability for cultivated crops, because it is frequently and regularly flooded, but it is suited to pasture. About half the acreage is wooded, and most of the rest is in pasture. Some small areas are cultivated, mainly for corn and vegetables. (Capability unit IIIw-2; woodland suitability group 9)

Alluvial land, wet (0 to 2 percent slopes) (Avp).—This nearly level land consists of moderately deep, very poorly drained, recent alluvium deposited on flood plains of the larger streams in the county. It has a higher water table and is much wetter than the moderately well drained Alluvial land. The deposits of Alluvial land, wet, are unconsolidated and generally are stratified. They are commonly dark brown to dark gray. The surface layer ranges from fine sandy loam to silty clay loam. Streams flood this land frequently for long periods, and areas of it are ponded much of the time.

This land type is low in natural fertility, contains a moderate amount of organic matter, and is strongly acid. Runoff is very slow, and internal drainage is very slow or nonexistent. Draining this land is difficult because natural outlets for excess water are generally lacking.

Nearly all of this land is covered with undesirable hardwoods. Because this land is frequently and irregularly flooded, its use for cultivated crops or pasture is too uncertain to be practicable. (Capability unit IVw-1; woodland suitability group 9)

Local alluvial land (0 to 2 percent slopes) (Lcm).—This miscellaneous land type consists of nearly level, well-drained, recent deposits in slight upland depressions and along small streams. The surface layer, to a depth of more than 20 inches, ranges in color from gray to dark reddish brown and in texture from sandy loam to loam. The underlying layers vary greatly in color but are friable sandy loam to sandy clay loam in most places.

This is the most productive land in the county. It is high in natural fertility, contains a moderate amount of organic matter, and is medium to strongly acid. Surface runoff is slow, permeability is moderate, and the available water capacity is high. The effective root zone is thick, and tilth is good. This land type is well suited to a wide range of crops, and most of it is cultivated. (Capability unit I-1; woodland suitability group 1)

Altavista Series

The Altavista series consists of deep, moderately well drained soils that have formed in old alluvium. In uneroded areas the surface layer is light olive-brown sandy loam. The subsoil is yellowish-brown to olive-yellow sandy clay loam that is mottled about 26 inches below the surface. These soils are low in organic matter and natural fertility and are medium to strongly acid.

The Altavista soils occur with Augusta and Roanoke soils but are deeper and better drained. They also are yellower and less mottled.

The Altavista soils occur mainly in small areas along the larger streams in the county. The native vegetation was mainly white, post, and red oaks, blackgum, sweetgum, hickory, elm, and some loblolly pine. Most of the acreage has been cleared and is used for such locally grown crops as corn, cotton, and small grains, and for hay and pasture. The rest of the acreage is idle or in forest.

Altavista sandy loam, 2 to 6 percent slopes, eroded (AlB2).—This is a moderately well drained soil on stream terraces. A profile description follows:

0 to 12 inches, light olive-brown, very friable sandy loam that is yellowish brown in the lower half.

12 to 42 inches, olive-yellow, friable sandy clay loam; mottled with yellow at a depth below 26 inches; weak, subangular blocky structure.

42 to 58 inches +, very pale brown sandy clay loam mottled with reddish yellow.

In some cultivated areas the plow layer is yellowish brown. The color of the subsoil ranges from yellowish brown to olive yellow. Rounded quartz gravel is on the surface in many places, and stratified sand and gravel are at a depth of 4 to 8 feet in some areas. Included in mapping are some areas that have a fine sandy loam or loamy sand surface layer.

This soil is medium to strongly acid, is low in natural fertility, and contains little organic matter. Runoff is slow to medium. Permeability is moderate, and the available water capacity is moderate to high. Tilth of the surface soil is good, and the root zone is thick.

This soil is suited to a fairly wide range of crops and pasture grasses, but erosion is a moderate hazard if the soil is cultivated. It is well suited to permanent pasture and woodland. (Capability unit IIe-2; woodland suitability group 3)

Appling Series

The soils in the Appling series are very gently sloping and well drained. They are on uplands and have formed in materials weathered from gneiss and granitoid gneiss that, in places, are mixed with schist. Where they are not severely eroded, these soils have a yellowish-brown sandy loam surface layer. The subsoil is sandy clay to sandy clay loam that is mottled with yellowish brown or strong brown. These soils are medium to low in natural fertility, contain little organic matter, and are strongly acid.

The Appling soils occur with the Helena soils on very gently undulating uplands. Adjoining the Appling soils, but on stronger slopes, are the Cecil and Madison soils. The Appling soils are better drained and more friable than the Helena soils, and have a less compact subsoil. They are less red than the Cecil and Madison soils and are mottled in the lower part of the profile. Also, they contain less mica than the Madison soils.

The Appling soils cover a rather large area in the southwestern part of the county, but small areas occur throughout the county. The native vegetation was hardwoods, mainly red, white, and post oaks, and hickory, blackgum, and maple. About three-fourths of the acreage is cultivated or in pasture, and the rest is wooded. The less sloping areas of these soils are well suited to a wide range of crops, grasses, and legumes.

Appling sandy loam, 2 to 6 percent slopes, eroded (AmB2).—This well-drained soil is on the Piedmont Upland. A profile description follows:

0 to 5 inches, yellowish-brown, very friable sandy loam.

5 to 32 inches, yellowish-brown to strong-brown, firm to friable sandy clay loam to sandy clay; coarse, subangular blocky structure; mottled in the lower part; contains some quartz gravel.

32 to 58 inches +, brownish-yellow and yellowish-red material weathered from gneiss and schist.

The surface layer is 5 to 8 inches thick and ranges from yellowish brown to light yellowish brown. Included in mapping are small areas that have a coarse sandy loam or loamy sand surface layer. Also included are some severely eroded patches that have a surface layer of strong-brown sandy clay.

This soil is medium to low in natural fertility, contains little organic matter, and is strongly acid. Surface runoff is medium, and infiltration is moderate to moderately rapid. The tilth of the surface soil generally is good, and the root zone is moderately thick to thick. The available water capacity is moderate. Permeability is moderate.

This soil is well suited to a wide range of crops, but if it is cultivated, erosion is a moderate hazard. It is well suited to pasture and woodland. (Capability unit IIe–2; woodland suitability group 2)

Appling sandy loam, 2 to 6 percent slopes (AmB).—This well-drained soil has a thicker surface layer than Appling sandy loam, 2 to 6 percent slopes, eroded. The soil occurs mostly in small, uneroded, wooded areas, and its total acreage is small. The surface layer, which contains a moderate amount of organic matter, is dark grayish brown to yellowish brown and is 6 to 10 inches thick. Mottled brown, yellowish-brown, and red sandy clay is about 20 inches from the surface.

Infiltration is moderate to rapid, runoff is medium to slow, and permeability is moderate. The available water capacity is moderate. Tilth of the surface layer is good, and the root zone is moderately thick to thick.

This soil is well suited to most locally grown crops and to pasture and woodland. Erosion, however, is a moderate hazard in cultivated areas. (Capability unit IIe–2; woodland suitability group 2)

Appling sandy loam, 6 to 10 percent slopes, eroded (AmC2).—This well-drained soil has a thinner surface layer than Appling sandy loam, 2 to 6 percent slopes, eroded. The surface layer is yellowish-brown to brown sandy loam, about 3 to 6 inches thick. Below this layer, about 14 inches from the surface, is mottled yellow and brown sandy clay. Included in mapping are some severely eroded patches where material from the strong-brown to yellowish-brown subsoil is at the surface.

Water runs off this soil at a medium to rapid rate. The soil is moderately permeable, has a moderate available water capacity, and has a moderately thick to thick root zone. In the severely eroded patches, however, infiltration is slow and tilth is poor.

This soil is well suited to most locally grown crops and to pasture and woodland. In cultivated areas, however, erosion is a moderate to severe hazard. (Capability unit IIIe–2; woodland suitability group 2)

Appling sandy clay loam, 2 to 6 percent slopes, severely eroded (AnB3).—In most places the surface layer of this soil is more variable, finer textured, and thinner than that of Appling sandy loam, 2 to 6 percent slopes, eroded. The plow layer of sandy clay loam to sandy clay is strong brown to yellowish brown and 8 to 16 inches thick. Below this layer is mottled sandy clay.

This soil has poor tilth, slow infiltration, and moderate to slow permeability. Its root zone is thick to moderately thick. Runoff is rapid, and erosion is severe if the soil is cultivated.

Nearly all of the acreage has been cultivated at some time, but much of it has reverted to pine forest. In cultivated areas, yields are moderate to good if the soil is properly managed. This soil is well suited to permanent pasture and woodland. (Capability unit IIIe–2; woodland suitability group 4)

Appling sandy clay loam, 6 to 10 percent slopes, severely eroded (AnC3).—The surface layer is strong-brown to yellowish-brown sandy clay loam to sandy clay, and in most places, it is 3 to 6 inches thinner than that of Appling sandy loam, 2 to 6 percent slopes, eroded. Below the surface layer is brown, friable sandy clay. Galled areas are numerous on this soil, and shallow gullies are common.

Tilth is poor, infiltration is slow, and permeability is moderate to slow. The root zone is moderately thick. Runoff is rapid to very rapid; therefore, further erosion is likely to be severe in cultivated areas. The available water capacity is moderate to low.

Most of the acreage has been cultivated, but much of it has reverted to pine forest. This soil is not suited to continuous cultivation but can be safely cultivated occasionally. It is best suited to permanent pasture or woodland. (Capability unit IVe–1; woodland suitability group 4)

Augusta Series

The soils of the Augusta series are on low stream terraces and are somewhat poorly drained. These soils have developed in terrace sediments derived mostly from areas underlain by igneous and metamorphic rocks. The surface layer ranges from silt loam to loamy sand and from dark grayish brown to light brownish gray. The subsoil ranges from sandy clay loam to sandy clay and from light yellowish brown to light brownish gray or pale brown. These soils are strongly acid.

Augusta soils occur with Altavista and Roanoke soils on stream terraces and, to some extent, with Chewacla and Wehadkee soils of the first bottoms. They are on slightly higher elevations than the Roanoke soils and have a coarser textured, less plastic subsoil.

Augusta soils have a high water table, and part of their acreage is frequently flooded. They are therefore suited to a narrow range of crops. If they are cultivated, they need extensive drainage. Drainage is difficult, however, because of the lack of natural outlets. These soils are best suited to permanent pasture and woodland.

In Spalding County the Augusta soils have been mapped in an undifferentiated unit with Roanoke soils. A profile description of Augusta sandy loam is included with the description of Roanoke and Augusta sandy loams.

Cecil Series

The Cecil series is the dominant series in the county. The soils of this series are deep and well drained and are on very gently sloping to strongly sloping uplands. These soils have formed in material weathered mainly from gneiss, which in places is mixed with schist, granite, quartzite, and basic material. In uneroded areas the soils have a friable sandy loam surface layer that is dark yellowish brown to dark grayish brown. In most places, the subsoil is red to reddish-brown sandy clay to sandy clay loam. These soils are moderate to low in natural fertility, contain little organic matter, and are strongly acid.

The Cecil soils commonly adjoin or are near the Appling soils on gentle slopes and the Madison and Lloyd soils on stronger slopes. The subsoil of the Cecil is redder than that of the Appling soils and is less red and more friable than that of the Lloyd soils. The Cecil soils are less micaceous throughout their profile than the Madison soils.

The Cecil soils are extensive throughout the county and are some of the most important soils for agriculture. The native vegetation was hardwoods and loblolly and shortleaf pine. The hardwoods were mainly white, red, post, and blackjack oaks, hickory, and some dogwood, sourwood, sweetgum, and yellow-poplar. More than half of the total acreage is cultivated. The rest is used about equally for pasture and woodland.

Cecil sandy loam, 2 to 6 percent slopes, eroded (CYB2).—This well-drained soil on uplands has a red sandy clay to sandy clay loam subsoil. A profile description follows:

0 to 5 inches, dark yellowish-brown, friable sandy loam.
5 to 32 inches, red, firm to friable sandy clay to sandy clay loam; moderate, subangular blocky structure.
32 to 60 inches, red sandy clay loam; mixed with partly disintegrated rock materials.

The surface layer is 4 to 10 inches thick and ranges from dark yellowish brown to reddish brown. In places the subsoil is clay. Included in mapping are small areas that have a gravelly sandy loam or sandy clay loam surface layer. Also included are some severely eroded patches that have a reddish-brown or red sandy clay loam surface layer.

This soil is the most extensive in the county and one of the most important for agriculture. It is moderate to low in natural fertility, contains little organic matter, and is strongly acid. Runoff is medium, infiltration and permeability are moderate, and the available water capacity is moderate. Tilth is generally good, and the root zone is thick.

This soil is well suited to cultivation, but erosion is a moderate hazard. It is well suited to pasture and woodland. (Capability unit IIe–1; woodland suitability group 2)

Cecil sandy loam, 2 to 6 percent slopes (CYB).—This soil has a thicker surface layer than Cecil sandy loam, 2 to 6 percent slopes, eroded. It is mostly in small, uneroded, wooded areas and the total acreage is small. The surface layer contains a moderate amount of organic matter and ranges from dark yellowish brown to dark brown in color and from 7 to 12 inches in thickness. Below this layer is red, firm to friable sandy clay to sandy clay loam.

Infiltration is moderate, runoff is medium to slow, and the available water capacity is moderate to high. Permeability is moderate. The tilth of the surface layer is good, and the root zone is thick.

This soil is well suited to most locally grown crops, but in cultivated areas erosion is a moderate hazard. The soil is well suited to pasture and woodland. (Capability unit IIe–1; woodland suitability group 2)

Cecil sandy loam, 6 to 10 percent slopes (CYC).—This soil has a thicker surface layer than Cecil sandy loam, 2 to 6 percent slopes, eroded. Most of this soil is in uneroded woodland areas, and the total acreage is small. The surface layer is dark yellowish-brown to brown sandy loam, 4 to 8 inches thick. Below this layer is red, firm to friable sandy clay to sandy clay loam.

Infiltration is slow to moderate, runoff is medium to rapid, and the available water capacity is moderate to high. The tilth of the surface layer is good, and the root zone is thick. Permeability is moderate.

This soil is well suited to most locally grown crops, but in cultivated areas, erosion is a moderate to severe hazard. The soil is well suited to pasture and woodland. (Capability unit IIIe–1; woodland suitability group 2)

Cecil sandy loam, 6 to 10 percent slopes, eroded (CYC2).—This soil has a thinner surface layer than Cecil sandy loam, 2 to 6 percent slopes, eroded. The surface layer is dark yellowish-brown to brown sandy loam, 4 to 6 inches thick. Below this layer is red, firm to friable sandy clay to sandy clay loam. Some severely eroded patches are included in which the surface layer is red sandy clay loam. In these patches infiltration is slow, and tilth is poor.

The available water capacity is moderate, permeability is moderate, and runoff is medium to rapid. Tilth generally is good, and the root zone is thick.

This soil is well suited to most locally grown crops, but if it is cultivated, erosion is a moderate to severe hazard.

It is well suited to pasture and woodland. (Capability unit IIIe–1; woodland suitability group 2)

Cecil sandy loam, 10 to 15 percent slopes (CYD).—This soil has a thicker surface layer than Cecil sandy loam, 2 to 6 percent slopes, eroded. Nearly all of it is in uneroded woodland areas, and the total acreage is small. The 6- to 8-inch sandy loam surface layer contains a moderate amount of organic matter and is dark yellowish brown to brown. Below this layer is firm to friable sandy clay to sandy clay loam that is reddish brown to red.

Infiltration is slow, runoff is rapid, and permeability is moderate. The available water capacity is moderate, and the tilth of the surface layer is good. This soil has a moderately thick root zone. In cultivated areas the erosion hazard is commonly high.

Because of the strong slopes and great hazard of erosion, this soil is poorly suited to continuous cultivation. It can, however, be used safely for cultivated crops 1 year in 4. It is best suited to permanent pasture and woodland. (Capability unit IVe–1; woodland suitability group 2)

Cecil sandy loam, 10 to 15 percent slopes, eroded (CYD2).—This soil has a thinner surface layer than Cecil sandy loam, 2 to 6 percent slopes, eroded. The 2- to 4-inch sandy loam surface layer is dark yellowish brown to brown. Below this layer is reddish-brown to red, friable sandy clay to sandy clay loam. Most of this soil has been cultivated or used for pasture, and it includes some severely eroded patches in which the red clay subsoil is exposed. In these places runoff is very rapid, infiltration is slow, and tilth is poor.

This soil is moderate in available water capacity and in permeability. It has a moderately thick root zone. In cultivated areas the erosion hazard is commonly high.

Because of the strong slopes and great erosion hazard, this soil is poorly suited to regular cultivation. It can, however, be used safely for cultivated crops 1 year in 4. It is best suited to permanent pasture and woodland. (Capability unit IVe–1; woodland suitability group 2)

Cecil sandy loam, 15 to 25 percent slopes (CYE).—This soil has a thicker surface layer than Cecil sandy loam, 2 to 6 percent slopes, eroded. The 4- to 8-inch sandy loam surface layer contains a moderate amount of organic matter and is dark yellowish brown to brown. Beneath this layer is reddish-brown to red, firm to friable sandy clay to sandy clay loam. Some gravelly areas are included in mapping.

This soil has a moderately thick root zone and is generally in fair tilth. Infiltration is very slow, runoff is very rapid, and the available water capacity is moderate to low. Permeability is moderate. In cultivated areas the erosion hazard is very high.

Because of its steep slopes, this soil generally is not suited to cultivation. It is best suited to permanent pasture and woodland. (Capability unit VIe–2; woodland suitability group 2)

Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded (CZB3).—The surface layer of this soil is more variable, finer textured, and 4 to 6 inches thinner than that of Cecil sandy loam, 2 to 6 percent slopes, eroded. The plow layer in cultivated areas is reddish-brown sandy clay loam that is a mixture of the original surface soil and the upper subsoil. Below this layer is red, firm to friable sandy clay to sandy clay loam.

This soil has poor tilth, slow infiltration, and moderate permeability. It has a moderate available water capacity and a thick to moderately thick root zone. Runoff is rapid, and erosion is severe where the soil is cultivated. Under good management, however, yields are moderate to good.

Nearly all the acreage has been cultivated at some time, but much of it has reverted to pine forest. This soil is well suited to permanent pasture and woodland. (Capability unit IIIe–1; woodland suitability group 4)

Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded (CZC3).—The surface layer is reddish-brown to red sandy clay loam and, in most places, is 4 to 6 inches thinner than that of Cecil sandy loam, 2 to 6 percent slopes, eroded. Below the surface layer is red, firm to friable sandy clay to sandy clay loam. Galled areas are numerous on this soil, and shallow gullies are common.

Tilth is poor, infiltration is slow, and permeability is moderate to slow. Runoff is rapid to very rapid, and erosion is severe where the soil is cultivated. The available water capacity is moderate to low. This soil has a moderately thick root zone.

Nearly all the acreage has been cultivated, but many of the areas have reverted to pine forest. This soil is not suited to continuous cultivation, but it can be used safely for cultivated crops 1 year in 4. The best use is permanent pasture or woodland. (Capability unit IVe–1; woodland suitability group 4)

Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded (CZD3).—In most places the surface layer of this soil is 5 to 8 inches thinner than that of Cecil sandy loam, 2 to 6 percent slopes, eroded. The plow layer is reddish-brown to red sandy clay loam. Below this layer is red, firm to friable sandy clay to sandy clay loam. Galled areas are numerous, and shallow gullies are common.

This soil has poor tilth, very slow infiltration, and moderate to slow permeability. Runoff is very rapid, and erosion is very severe where this soil is cultivated. The available water capacity is low.

Most of the acreage has been cultivated, but nearly all of it has reverted to pine forest. This soil is not suited to cultivation. It is best suited to permanent pasture or woodland. (Capability unit VIe–2; woodland suitability group 4)

Chewacla Series

The Chewacla series consists of nearly level, somewhat poorly drained soils on low first bottoms along many streams in the Piedmont Upland. These soils have formed in recent alluvium. They have a brown to dark-brown silt loam surface layer over reddish-brown to dark-brown silty clay loam or silty clay that is mottled at a depth of about 12 inches from the surface. Dark-gray, mottled silty clay is at a depth below 28 inches. These soils are medium in natural fertility and organic matter and are medium to strongly acid.

The Chewacla soils occur with the Wehadkee soils on first bottoms. They have a browner surface layer and are better drained than the Wehadkee soils, which are mottled near the surface.

The Chewacla soils occur in small to fairly large areas along the larger streams in the county. Their native vegetation was mainly water-tolerant hardwoods, such as water oaks, blackgum, sweetgum, elm, alder, and some yellow-poplar. Most of the acreage has been cleared and is used for pasture or is cultivated. Some areas of these soils are subject to frequent flooding of short duration, but otherwise, they are well suited to a fairly wide range of crops, grasses, and legumes.

Chewacla silt loam (0 to 2 percent slopes) (Csl).—This somewhat poorly drained soil is on first bottoms. A profile description follows:

0 to 6 inches, brown to dark-brown, friable silt loam.
6 to 36 inches, reddish-brown to dark-brown silty clay loam to silty clay, mottled at a depth of about 12 inches from the surface; dark-gray silty clay below 28 inches.

The surface layer ranges in thickness from 6 to 10 inches and in color from brown to dark brown. Included in mapping are areas that have a fine sandy loam surface layer.

This soil is medium in natural fertility, contains a moderate amount of organic matter, and is strongly acid. The surface soil has good tilth except in the wetter areas. Runoff is very slow, the water table is seasonally high, and internal drainage is slow. The available water capacity is moderate to high.

If this soil is adequately drained, it is well suited to cultivation. It is also well suited to pasture and woodland. (Capability unit IIIw–2; woodland suitability group 9)

Colfax Series

In the Colfax series are very gently sloping, somewhat poorly drained, gray soils on the Piedmont Upland. These soils have formed in materials that weathered from light-colored granite and gneiss and that included local alluvium in places. These soils are not eroded. They have a gray to dark grayish-brown sandy loam surface layer. Below this layer, at a depth of about 16 inches from the surface, is yellow to yellowish-brown, mottled silty clay loam that is moderately plastic. These soils are low in natural fertility, contain little organic matter, and are strongly acid.

The Colfax soils commonly adjoin the Worsham soils, which are in slight depresions and around the head of drainageways. On the stronger slopes adjoining the Colfax soils are the Helena and Appling soils. Compared with the Worsham soils, the Colfax soils are better drained, are not as gray throughout, and have a finer textured subsoil. They are generally similar to the Helena soils in color but have a coarser textured and less compact B horizon. The Colfax soils are more poorly drained, less brown, and less friable than the Appling soils.

The Colfax soils are mainly in very small areas widely distributed in the county. The native vegetation was mostly mixed hardwoods and pines; the understory was shrubs and vines. About half the acreage is cultivated or in pasture, and the rest is in woods. The somewhat poor drainage of these soils and their low content of available plant nutrients limit the range of suitable crops.

Colfax sandy loam, 2 to 6 percent slopes (CiB).—This somewhat poorly drained soil is around the head of drainageways. It generally has a mottled yellowish-brown silty clay loam subsoil. A profile description follows:

0 to 8 inches, gray, very friable sandy loam that contains small quartz gravel.
8 to 14 inches, yellow, firm to friable very fine sandy loam that contains small quartz gravel.
14 to 24 inches, mottled, yellowish-brown, very firm silty clay loam; coarse, subangular blocky structure; contains small quartz gravel.
24 to 40 inches, yellowish-brown sandy clay, prominently mottled with light reddish brown.

The surface layer ranges from 6 to 10 inches, or more, in thickness and from gray to dark grayish brown. Depth from the surface to the mottled silty clay loam subsoil commonly ranges from 12 to 16 inches. Included in mapping are small areas that have a fine sandy loam or coarse sandy loam surface layer.

This soil is low in natural fertility, contains little organic matter, and is strongly acid. Runoff is medium to slow and permeability is slow. The available water capacity is moderate. The surface soil generally has good tilth. Erosion is commonly not a hazard because this soil has very gentle slopes or is in slight depressions.

Because of its fairly shallow root zone and somewhat poor drainage, this soil is only fair for cultivation. Its best use is pasture or woodland. (Capability unit IIIw–3; woodland suitability group 6)

Davidson Series

In the Davidson series are very gently sloping to gently sloping, well-drained, dark-red soils of the Piedmont Upland. These soils have formed in material weathered from basic rock, chiefly hornblende gneiss and diorite. Where they are not eroded, these soils have a dark reddish-brown loam surface layer. The subsoil is dark-red clay. These soils are medium to high in natural fertility, contain a moderate amount of organic matter, and are medium to strongly acid.

The Davidson soils occur with the Lloyd and Cecil soils and, to a lesser extent, with the Madison soils on very gently sloping to sloping uplands. The Davidson soils are more uniform in color, are thicker, and contain more clay than the Lloyd soils. They are deeper, darker, and more clayey than the Cecil and Madison soils. They also lack the high mica content of the Madison soils.

The Davidson soils occur in rather large areas, mainly in the north-central part of the county. Smaller areas are in other parts of the county, except west of Flint River. The native vegetation was hardwoods, including mainly white, black, post, and red oaks, and some hickory, yellow-poplar, elm, locust, and walnut. Most of the acreage is cultivated or in pasture, and the rest is idle or in woods. The less sloping areas of these soils are well suited to a wide range of crops, grasses, and legumes.

Davidson clay loam, 2 to 6 percent slopes, severely eroded (DhB3).—This is a deep, well-drained soil of the uplands. It is a highly oxidized, dark-red soil that formed in materials weathered from basic rocks. A profile description follows:

0 to 5 inches, dark reddish-brown, firm clay loam.
5 to 47 inches, dark-red, firm clay; moderate to strong, subangular blocky structure.
47 to 100 inches, dark-red clay loam.

The surface layer is 5 to 7 inches thick and generally has a uniform, dark reddish-brown color. In places the subsoil is clay loam. Included in mapping are small areas that have a fine sandy loam or loam surface layer.

This soil is medium in natural fertility, contains little organic matter, and is medium to strongly acid. The surface soil has fair tilth, and the root zone is thick. Runoff is moderately rapid, and infiltration and permeability are moderate. The available water capacity is moderate.

This soil is well suited to cultivation, but erosion is a moderate hazard. The soil is well suited to pasture and woodland. (Capability unit IIIe-1; woodland suitability group 4)

Davidson loam, 2 to 6 percent slopes, eroded (DgB2).—This soil has a thicker surface layer than Davidson clay loam, 2 to 6 percent slopes, severely eroded. The surface layer is a uniform, dark reddish-brown loam, 8 to 12 inches thick. The subsoil is dark-red clay. Included in mapping are small areas that have a fine sandy loam surface layer. Also included are some severely eroded patches that have a surface layer of dark-red clay or clay loam.

This soil is medium to high in natural fertility, contains a moderate amount of organic matter, and is medium to strongly acid. The surface soil has good tilth, and the root zone is thick. Runoff is medium, and infiltration and permeability are moderate. The available water capacity is moderately high.

This soil is well suited to cultivation, but erosion is a moderate hazard. It is well suited to pasture and woodland. (Capability unit IIe-1; woodland suitability group 2)

Davidson clay loam, 6 to 10 percent slopes, severely eroded (DhC3).—The surface layer is dark-red clay loam, 4 to 7 inches thick, and the subsoil is firm, dark-red clay to clay loam. The root zone is thick.

This soil has poor tilth, slow infiltration, and moderate permeability. Because runoff is rapid to very rapid, erosion is severe in cultivated areas.

Most of the acreage has been cultivated at some time, but much of it has reverted to pine forest. This soil is best suited to permanent pasture and woodland, but it can be used safely for cultivated crops 1 year in 4. (Capability unit IVe-1; woodland suitability group 4)

Gullied Land

Gullied land (Gul) consists mainly of small areas from which nearly all of the surface layer and much of the subsoil have been removed. In most places it is dissected by an intricate pattern of deep and shallow gullies that have cut into the weathered parent material. The soil between the gullies is commonly sandy clay or clay.

The acreage of gullied land is very small. It consists mainly of "borrow" areas that have been abandoned after the soil material was taken for roads and other purposes. Other areas are on sloping hillsides where concentrated runoff has cut into the soil.

This land type is not suitable for agriculture, but it can be managed to provide watershed protection or produce a small amount of food and cover for wildlife. Stabilizing this land type, however, would require intensive management and reclamation. (Capability unit VIIe-4)

Helena Series

In the Helena series are very gently sloping and gently sloping soils that are moderately well drained to somewhat poorly drained. These soils are on the Piedmont Upland and have formed mainly in materials weathered from aplitic granite, gneiss, and other acid igneous and metamorphic rocks. Where not eroded, these soils have a light olive-gray sandy loam surface layer. The subsoil is plastic sandy clay loam or sandy clay that is mottled yellow with yellowish brown. These soils are low in natural fertility, contain little organic matter, and are strongly acid.

The Helena soils commonly adjoin the Colfax soils, which are in slight depressions around the head of drainageways. They are better drained than the Colfax soils. They also adjoin the Appling and Cecil soils, which are on stronger slopes. The Helena soils have a firmer, yellower subsoil than the Appling soils and are not so well drained. They are less red, contain more clay, and are less thick than the Cecil soils.

Helena soils generally are in very small areas that are widely distributed in the county. The native vegetation was mainly white, post, red, and willow oaks, and some hickory, sweetgum, yellow-poplar, and dogwood. About one-third of the acreage is cultivated or in pasture, and most of the rest is in woods. The less sloping areas of these soils are fairly well suited to a limited range of crops and pasture plants.

Helena sandy loam, 2 to 6 percent slopes, eroded (HYB2).—This somewhat poorly drained to moderately well drained soil has a plastic subsoil. A profile description follows:

0 to 7 inches, light olive-gray, very friable sandy loam.
7 to 20 inches, mottled yellow to brownish-yellow, firm sandy clay loam; moderate blocky structure.
20 to 32 inches, yellowish-brown, very firm sandy clay to clay, prominently mottled with red; coarse blocky structure.
32 inches +, mottled light-gray and red, partly weathered material from granite and gneiss.

In cultivated areas the plow layer is 6 to 9 inches thick and ranges from light olive gray to grayish brown. Included in mapping are small areas that have a fine sandy loam or coarse sandy loam surface layer. Also included are severely eroded patches that have a surface layer of yellow sandy clay loam.

This soil is low in natural fertility, contains little organic matter, and is strongly acid. The surface soil has good tilth, and the root zone is moderately thick.

Runoff is slow to medium, infiltration is moderately rapid, and permeability is moderately slow. The available water capacity is moderate. This soil is fairly well suited to cultivation, but if cultivated, erosion is a moderate hazard. The soil is well suited to pasture and woodland. (Capability unit IIe-3; woodland suitability group 6)

Helena sandy loam, 6 to 10 percent slopes, eroded (HYC2).—The surface layer of this soil is thinner than that of Helena sandy loam, 2 to 6 percent slopes, eroded. It is light olive-gray sandy loam, 3 to 5 inches thick. Below this layer is mottled brownish-yellow sandy clay loam or sandy clay. Included in mapping are some severely eroded patches that have a surface layer of brownish-yellow sandy clay loam.

The soil has poor tilth but a moderately thick root zone. Runoff is medium to rapid, and infiltration is slow.

This soil is fairly well suited to a limited number of locally grown crops, but erosion is a moderate to severe hazard in cultivated areas. The soil is well suited to pasture and woodland. (Capability unit IVe–2; woodland suitability group 6)

Helena sandy clay loam, 2 to 6 percent slopes, severely eroded (HZB3).—The surface layer of this soil is more variable, finer textured, and 3 to 6 inches thinner than that of Helena sandy loam, 2 to 6 percent slopes, eroded. In cultivated areas the plow layer is yellow to brownish-yellow sandy clay loam. Below this layer is mottled, yellowish-brown, very firm sandy clay.

This soil has poor tilth, slow infiltration, and moderately slow to slow permeability. The root zone is moderately thick. Runoff is rapid, and erosion is severe where this soil is cultivated.

Most of the acreage has been cultivated, but much of it has reverted to pine forest. Yields of most row crops are only fair or poor. This soil is moderately well suited to permanent pasture and woodland. (Capability unit IVe–2; woodland suitability group 7)

Helena sandy clay loam, 6 to 10 percent slopes, severely eroded (HZC3).—In most places the surface layer of this soil is 3 to 5 inches thinner than that of Helena sandy loam, 2 to 6 percent slopes, eroded. The plow layer is yellow to brownish-yellow sandy clay loam, and the subsoil is mottled yellowish-brown sandy clay.

This soil has poor tilth, slow to very slow infiltration, and moderately slow to slow permeability. The root zone is moderately thick. Runoff is very rapid, and erosion is very severe in cultivated areas.

Much of the acreage has been cultivated, but most of it has reverted to pine forest. This soil is not suitable for regular cultivation. It is fairly well suited to permanent pasture but is best suited to woodland. (Capability unit VIe–4; woodland suitability group 7)

Lloyd Series

The Lloyd series consists of very gently sloping to strongly sloping, well-drained, red soils of the Piedmont Upland. These soils have formed in material weathered from mixed acidic and basic rock. In areas that are not severely eroded, the Lloyd soils have a reddish-brown to brown sandy loam surface layer. Below this layer is dark-red sandy clay to clay loam that is friable to very friable. These soils are medium in natural fertility, contain little organic matter, and are strongly acid.

The Lloyd soils occur with Appling soils on very gently undulating uplands. On the stronger slopes adjoining the Lloyd soils are the Davidson, Cecil, and Madison soils. They are redder than the Appling soils and lack the mottling common to those soils. The Lloyd soils are similar to Davidson soils in color but are not so deep and are coarser textured. They are darker colored, less sandy, and contain less mica than the Cecil and Madison soils.

The Lloyd soils occur mainly in rather large areas in the southwest-central part of the county. Their native vegetation was mainly red, white, scarlet, post, and chestnut oaks, and hickory, walnut, pine, yellow-poplar, and dogwood. Most of the acreage is cultivated or in pasture, and the rest is in woods. The less sloping areas of these soils are well suited to a wide range of crops, grasses, and legumes.

Lloyd sandy loam, 2 to 6 percent slopes, eroded (LdB2).—This deep, well-drained, dark-red soil on uplands developed from mixed acidic and basic rocks. A profile description follows:

0 to 10 inches, reddish-brown, very friable sandy loam in the upper part and dark-red sandy clay loam in the lower part.
10 to 33 inches, dark-red, friable clay loam; moderate, subangular blocky structure.
33 to 48 inches +, dark-red, very micaceous clay loam.

In cultivated areas the plow layer ranges from brown to reddish brown. The subsoil ranges from sandy clay to clay loam, and in most places it is red to dark red. Included in mapping are small areas that have a fine sandy loam or loam surface layer and some severely eroded patches that have a dark-red clay loam surface layer.

This soil is medium in natural fertility, contains little organic matter, and is strongly acid. The surface soil has good tilth, and the root zone is thick. Runoff is medium and infiltration, permeability, and available water capacity are moderate.

This soil is well suited to a wide range of crops, but in cultivated areas erosion is a moderate hazard. The soil is well suited to pasture and woodland. (Capability unit IIe–1; woodland suitability group 2)

Lloyd sandy loam, 6 to 10 percent slopes, eroded (LdC2).—The surface layer of this soil is reddish-brown sandy loam and is about 4 inches thick. It is underlain by dark-red sandy clay loam or clay loam. This material is about 44 inches thick. Some severely eroded patches are included in mapping.

Tilth is generally fair to good, and the root zone is thick. The available water capacity is moderate, and runoff is medium to rapid.

This soil is well suited to most locally grown crops, but in cultivated areas erosion is a moderate to severe hazard. The soil is well suited to pasture and woodland. (Capability unit IIIe–1; woodland suitability group 2)

Lloyd sandy loam, 10 to 15 percent slopes, eroded (LdD2).—Most of the soil has been cultivated or used for pasture. The surface layer is brown to reddish-brown sandy loam that is 3 to 6 inches thick and has good tilth. Below this is dark-red, friable clay loam. Included in mapping are severely eroded patches in which the surface layer is dark-red clay loam.

Runoff is rapid, and infiltration is slow. The root zone is thick. In cultivated areas the erosion hazard is commonly high, and the soil is therefore poorly suited to continuous cultivation. Under good management, however, it can be safely cultivated occasionally. The soil is best suited to permanent pasture and woodland. (Capability unit IVe–1; woodland suitability group 2)

Lloyd sandy loam, 15 to 25 percent slopes, eroded (LdE2).—The surface layer of this soil is brown to reddish-brown sandy loam and is 3 to 5 inches thick. Below this is dark-red, friable clay loam. Included in mapping are some severely eroded patches in which the surface layer is dark-red clay loam. A few V-shaped gullies 2 to 6 feet deep are in some areas.

This soil has a moderate available water capacity and a moderately thick root zone. Runoff is very rapid, and infiltration is very slow. In cultivated areas the erosion hazard is very high. Because of the steep slopes and great hazard of erosion, this soil is unsuited to cultivation. It is best suited to permanent pasture and woodland. (Capability unit VIe–2; woodland suitability group 2)

Lloyd clay loam, 2 to 6 percent slopes, severely eroded (LeB3).—In most places the surface layer of this soil is finer textured and 4 to 6 inches thinner than that of Lloyd sandy loam, 2 to 6 percent slopes, eroded. The present surface layer consists mainly of dark-red sandy clay loam. Underlying this is a layer of dark-red clay loam that is about 40 inches thick or more. Some small gullies have formed.

This soil has a thick root zone but generally poor tilth. Infiltration is slow, permeability is moderate, and runoff is rapid. Erosion is severe in cultivated areas.

Nearly all of the acreage has been cultivated at some time, but much of it has reverted to pine forest. Under good management yields of cultivated crops are moderate to good. This soil is well suited to permanent pasture and woodland. (Capability unit IIIe–1; woodland suitability group 4)

Lloyd clay loam, 6 to 10 percent slopes, severely eroded (LeC3).—In most places the surface layer of this soil is finer textured and 4 to 6 inches thinner than that of Lloyd sandy loam, 2 to 6 percent slopes, eroded. The plow layer, in cultivated areas, is dark-red sandy clay loam or clay loam. Beneath this layer is dark-red, friable clay loam.

Infiltration is slow, and permeability is moderate to slow. Runoff is rapid, and erosion is severe where this soil is cultivated. In many areas there are a few shallow gullies and a few deeper V-shaped gullies. The root zone is thick, but this soil generally has poor tilth.

Most of the acreage has been cultivated, but much of it has reverted to pine forest. This soil is best suited to permanent pasture and woodland, but occasionally it can be used safely for cultivated crops. (Capability unit IVe–1; woodland suitability group 4)

Lloyd clay loam, 10 to 15 percent slopes, severely eroded (LeD3).—This soil has a finer textured surface layer and, in most places, is 6 to 8 inches thinner than Lloyd sandy loam, 2 to 6 percent slopes, eroded. The surface layer is underlain by dark-red clay loam or clay.

The root zone is moderately thick, but tilth is generally poor. Infiltration is slow to very slow, and permeability is moderate to slow. Runoff is very rapid, and erosion is very severe in cultivated areas. Numerous shallow gullies and a few V-shaped, deeper ones are in many areas.

Much of the acreage has been cultivated, but most of it has reverted to pine forest. This soil is best suited to permanent pasture and woodland, but occasionally it can be used safely for a cultivated crop. (Capability unit IVe–1; woodland suitability group 4)

Lloyd sandy loam, compact subsoil, 2 to 6 percent slopes, eroded (LGB2).—This soil has a compact subsoil of very firm clay loam to clay, 6 to 29 inches thick, that distinguishes it from Lloyd sandy loam, 2 to 6 percent slopes, eroded. A profile description follows:

0 to 6 inches, brown, very friable sandy loam.
6 to 29 inches, red to dark-red, compact, very firm, clay loam to clay; coarse, subangular blocky structure.
29 to 40 inches +, red to dark-red, firm clay loam.

The surface layer ranges from brown to light reddish brown. The clayey subsoil ranges from red to dark red and permeability is moderately slow. Included in mapping are small areas that have a fine sandy loam or loam surface layer.

This soil is low in natural fertility, contains little organic matter, and is strongly acid. Tilth is generally fair to good. Although the root zone is thick, root penetration is restricted somewhat by the very firm compact layer, 6 to 8 inches from the surface. The available water capacity is moderate to low, and runoff is medium. Erosion is a slight to moderate hazard if the soil is cultivated.

This soil is well suited to a fairly wide range of crops and to pasture and woodland. (Capability unit IIe–3; woodland suitability group 2)

Lloyd clay loam, compact subsoil, 2 to 6 percent slopes, severely eroded (LFB3).—In most places the surface layer is finer textured and 4 to 6 inches thinner than that of Lloyd sandy loam, compact subsoil, 2 to 6 percent slopes, eroded. It consists mainly of red to dark-red, heavy clay material brought up from the subsoil. Some small gullies have formed.

This soil is low in natural fertility, contains little organic matter, and is strongly acid. Tilth is generally poor. Infiltration is slow, permeability is moderate to slow, and runoff is medium. The available water capacity is moderate to low.

The root zone is thick, but root penetration is somewhat restricted by the very firm, compact layer that is 4 to 6 inches from the surface. Erosion is a moderate to severe hazard in cultivated areas.

Yields are moderate to good if this soil is well managed. It is well suited to permanent pasture and woodland. (Capability unit IIIe–3, woodland suitability group 4)

Lloyd clay loam, compact subsoil, 6 to 10 percent slopes, severely eroded (LFC3).—The upper 2 to 4 inches of this soil are mainly red to dark-red, heavy clay loam. This material is underlain by clay loam to clay that is compact, very firm, and red to dark red. Many small gullies have formed.

This soil is low in natural fertility, contains little organic matter, and is strongly acid. Tilth is poor. Runoff is rapid, and infiltration is slow. The available water capacity is moderate to low. Although the root zone is thick, root penetration is somewhat restricted by the compact, very firm layer that is 4 to 6 inches from the surface. Erosion is a severe hazard.

This soil responds fairly well to good management. Because of the severe erosion hazard, however, it should be kept in close-growing crops at least 3 years in 4. It is well suited to permanent pasture and woodland. (Capability unit IVe–2; woodland suitability group 4)

Lloyd-Gullied land complex, 6 to 10 percent slopes (LeC4).—This mapping unit consists of very severely eroded Lloyd soils that are dissected by many shallow gullies and a few V-shaped, deep ones. Between the gullies the surface layer is mainly dark-red clay. It is very poor in tilth and is shallow to bedrock in many places. The material in the bottom of the gullies is, in many places, partly weathered, mixed basic and acidic rocks.

Because of the low available water capacity, the thin root zone, and the high erosion hazard, the soil in this mapping unit generally is not suitable for cultivation. (Capability unit VIe–2; woodland suitability group 4)

Lloyd-Gullied land complex, 10 to 25 percent slopes (LeE4).—This steep, very severely eroded mapping unit consists of Lloyd soils that are dissected by many shallow and deep gullies. Partly weathered, mixed basic and acidic rocks are at the surface in many places.

Because of the very rapid runoff, low available water capacity, thin root zone, and very high erosion hazard, this mapping unit is not suitable for cultivation. It is best suited to trees and is mostly in trees. (Capability unit VIIe-1; woodland suitability group 4)

Louisburg Series

The Louisburg series consists of very gently sloping to sloping, shallow soils that are somewhat excessively drained. These soils have formed in materials weathered from light-colored granite, gneiss, and quartzite. They have an olive to gray, very friable sandy loam surface layer in uneroded areas. Below this layer is strong-brown to yellowish-red, friable sandy clay loam. Yellowish-red soft material weathered from rock is at a depth of about 18 inches. These soils are low in natural fertility, contain little organic matter, and are strongly acid.

The Louisburg soils occur with the Appling soils on very gently undulating uplands. On the stronger slopes adjoining Louisburg soils are the Cecil and Madison soils. The Louisburg soils are shallower than the Appling, Cecil, and Madison soils and have a much thinner B horizon. They also are less red than Cecil and Madison soils.

Louisburg soils are in rather small areas scattered throughout the county. The native vegetation was mixed oaks, hickory, pine, sweetgum, and some yellow-poplar. About half of the acreage is cultivated or in pasture, and the rest is in woods.

Louisburg sandy loam, 2 to 6 percent slopes (LnB).—This is a shallow, somewhat excessively drained soil on uplands. A profile description follows:

0 to 9 inches, olive to gray, very friable sandy loam.
9 to 18 inches, strong-brown to yellowish-red, friable sandy clay loam.
18 inches +, yellowish-red, soft material from disintegrated granite.

The surface layer is 6 to 14 inches thick and ranges from light gray to dark grayish brown. In some places the B horizon is absent; in others it is as thick as 6 inches. Small areas that have a gravelly sandy loam or loamy sand surface layer are included in mapping. Some severely eroded patches that have disintegrated rock material at the surface are also included. There are a few rock outcrops.

The soil is low in natural fertility, contains little organic matter, and is strongly acid. The surface soil has good tilth, except in the gravelly or eroded areas. Runoff is rapid, and infiltration and permeability are moderate. The available water capacity is moderately low.

This soil can be used for cultivation, but because it has a shallow root zone, is somewhat droughty, and is likely to erode, it is better suited to pasture and woodland. (Capability unit IIIe-5; woodland suitability group 5)

Louisburg sandy loam, 6 to 10 percent slopes (LnC).—This shallow soil has a somewhat thinner surface layer than Louisburg sandy loam, 2 to 6 percent slopes. The surface layer is olive to gray sandy loam, 5 to 8 inches thick. Below this layer, at a depth of about 4 to 16 inches, is friable, disintegrated material from light-colored granite. Severely eroded patches that have disintegrated material at the surface are included in mapping.

Runoff is medium to rapid on this soil, and infiltration is slow. Because of the shallow root zone, low available water capacity, and great hazard of erosion, this soil is poorly suited to continuous cultivation. It is best suited to permanent pasture and woodland. (Capability unit IVe-4; woodland suitability group 5)

Louisburg sandy loam, 10 to 15 percent slopes (LnD).—In most areas this shallow soil has a thinner surface layer than Louisburg sandy loam, 2 to 6 percent slopes. The 3- to 5-inch sandy loam surface layer contains a moderate amount of organic matter and is gray to dark grayish brown. Below this layer, at a depth of about 14 to 18 inches, is friable disintegrated material from light-colored granite. Rock outcrops are common.

The total acreage of this soil is small and nearly all of it is in uneroded woodland. Runoff is rapid, and infiltration is slow. Because this soil is strongly sloping, has a shallow root zone, and is droughty, it is unsuitable for cultivation. It is fairly well suited to permanent pasture but best suited to woodland. (Capability unit VIe-3; woodland suitability group 5)

Louisburg soils, 6 to 10 percent slopes, eroded (LlC2).—In most areas these soils have a thin sandy loam to fine sandy loam surface layer. This layer is underlain by brown to yellowish-red sandy clay loam. In some of the more eroded areas, the surface layer is sandy clay or clay.

These soils have rapid runoff, slow infiltration, and moderate to low available water capacity. Because of their shallow root zone and the great hazard of erosion, these soils are poorly suited to cultivation. They are best suited to permanent pasture and woodland. (Capability unit IVe-4; woodland suitability group 5)

Louisburg soils, 10 to 15 percent slopes, eroded (LlD2).—In most areas these soils have a thinner surface layer than Louisburg soils, 6 to 10 percent slopes, eroded. Included in mapping are severely eroded areas that have a surface layer of sandy clay or clay. There are many shallow gullies, and a few deeper ones.

Runoff is very rapid on this soil and infiltration is very slow. The available water capacity is low. Tilth is poor, and the root zone is thin. Because of the strong slopes and severe hazard of erosion, these soils are not suited to cultivated crops. They are best suited to permanent pasture or woodland. (Capability unit VIe-3; woodland suitability group 5)

Madison Series

The Madison series consists of very gently sloping to sloping, well-drained, red, highly micaceous soils on the Piedmont Upland. These soils have formed in material weathered from quartz mica schist and mica schist. In areas that are not more than moderately eroded, these soils commonly have a surface layer of dark yellowish-brown fine sandy loam. Below this layer is red clay loam. These soils are medium in natural fertility, contain little organic matter, and are strongly acid.

Madison soils occur with Appling soils on very gently undulating uplands. They are redder and contain more mica than the Appling soils. On the stronger slopes adjoining the Madison soils are the Cecil and Lloyd soils. The Madison soils contain more mica than the Cecil soils. They are less red, contain more mica, and are less thick than the Lloyd soils.

Madison soils occur chiefly in the southeastern part of the county. The native vegetation was hardwoods, including mainly white, black, post, and red oaks and some hickory, maple, dogwood, and elm. About half the acreage is cultivated or in pasture, and the rest is in woods. Most of the acreage is well suited to a wide range of crops, grasses, and legumes.

Madison fine sandy loam, 2 to 6 percent slopes, eroded (MjB2).—This is a well-drained, red, highly micaceous soil on the Piedmont Upland. A profile description follows:

0 to 7 inches, dark yellowish-brown, friable fine sandy loam.
7 to 35 inches, red, firm to friable, micaceous clay loam; medium, subangular blocky structure.
35 inches +, red, friable, weathered mica schist.

The surface layer is 6 to 10 inches thick and contains many mica flakes. It ranges in color from dark yellowish brown to reddish brown. Included in mapping are small areas that have a gravelly sandy loam surface layer. Also included are some severely eroded patches that have a red sandy clay loam surface layer.

This soil is medium in natural fertility, contains little organic matter, and is strongly acid. The tilth of the surface layer generally is good. The root zone is moderately thick to thick. Runoff is medium, and infiltration and permeability are moderate. The available water capacity is moderate.

This soil is well suited to cultivation, but erosion is a moderate hazard. The soil is well suited to pasture and woodland. (Capability unit IIe–1; woodland suitability group 2)

Madison fine sandy loam, 6 to 10 percent slopes, eroded (MjC2).—The surface layer of this soil is thinner than that of Madison fine sandy loam, 2 to 6 percent slopes, eroded. It is yellowish-brown to reddish-brown fine sandy loam, 4 to 6 inches thick. Below this layer is red, friable, micaceous clay loam. Included in mapping are some severely eroded patches in which the surface layer is red clay loam. In these patches infiltration is slow, and tilth is poor.

The root zone is moderately thick to thick. The available water capacity is moderate, and runoff is medium to rapid.

This soil is well suited to most locally grown crops. Erosion is a moderate to severe hazard, however, if the soil is cultivated. The soil is well suited to pasture and woodland. (Capability unit IIIe–1; woodland suitability group 2)

Madison fine sandy loam, 10 to 15 percent slopes, eroded (MjD2).—The surface layer of this soil is yellowish-brown to reddish-brown fine sandy loam, 2 to 5 inches thick. Below this layer is red, micaceous, friable clay loam. Included in mapping are severely eroded patches in which the red, micaceous clay loam is exposed.

This soil has good tilth and a moderately thick root zone. Runoff is rapid, and infiltration is slow.

Much of this soil has been cultivated or used for pasture. Because of the strong slopes and severe hazard of erosion, this soil is poorly suited to continuous cultivation, but with good management it can be used safely for cultivated crops 1 year in 4. It is best suited to permanent pasture and woodland. (Capability unit IVe–1; woodland suitability group 2.)

Madison sandy clay loam, 2 to 6 percent slopes, severely eroded (MlB3).—This soil has lost through erosion most or all of the original surface soil and part of the subsoil. The present surface layer is red sandy clay loam; it is about 4 to 8 inches thick. Below this layer is red, micaceous clay loam. Many small gullies have formed in some areas.

This soil generally has poor tilth, but the root zone is moderately thick. The available water capacity is moderate, infiltration is slow, and permeability is moderate to slow. Runoff is rapid, and in cultivated areas, erosion is severe. However, if managed properly, this soil produces moderate to good yields of crops. It is well suited to permanent pasture and woodland. (Capability unit IIIe–1; woodland suitability group 4.)

Madison sandy clay loam, 6 to 10 percent slopes, severely eroded (MlC3).—This soil has lost through erosion most or all of the original surface soil and some of the subsoil. The present surface layer is red sandy clay loam; it is about 4 to 6 inches thick. Below this layer is red, micaceous clay loam. Many small gullies have formed in some areas.

The tilth of this soil is generally poor, but the root zone is moderately thick. The available water capacity is moderate to low, runoff is rapid to very rapid, and in cultivated areas, erosion is severe.

Most of the acreage has been cultivated, but much of it has reverted to pine forest. Because of the great hazard of erosion, this soil is best suited to permanent pasture and woodland, but under good management it can be used safely for cultivated crops 1 year in 4. (Capability unit IVe–1; woodland suitability group 4)

Molena Series

The Molena series consists of deep, very gently and gently sloping soils that are somewhat excessively drained and have a texture of loamy sand throughout the profile. These soils have formed in old alluvium on high stream terraces. They have a dark reddish-brown to brown loamy sand surface layer over several feet of yellowish-red loamy sand. These soils are low in natural fertility, contain little organic matter, and are strongly acid.

The Molena soils commonly adjoin the Appling soils on very gentle slopes. On the adjoining stronger slopes are the Louisburg and Cecil soils. The Molena soils are very friable to loose. They contain more sand, have less distinct horizons, and are more droughty than any of the adjoining soils.

The Molena soils are in small areas along the western boundary of the county. The native vegetation was mainly red, scarlet, post, white, and blackjack oaks; loblolly, shortleaf, and longleaf pines; and hickory and dogwood. Most of the acreage is cultivated or in pasture, and the rest is in woods. Most locally grown crops can be grown on these soils, but the low available water capacity usually limits yields.

Molena loamy sand, 2 to 10 percent slopes (MtC).—This is a somewhat excessively drained sandy soil on stream terraces along the Flint River. A profile description follows:

0 to 14 inches, dark reddish-brown, very friable loamy sand.
14 to 70 inches +, yellowish-red, loose loamy sand.

In cultivated areas the surface layer is 10 to 20 inches thick and ranges from dark grayish brown to dark reddish brown. It is underlain by layers of yellowish-red loamy sand that range from 6 to 15 feet in thickness.

This soil is low in natural fertility, contains little organic matter, and is strongly acid. The surface soil has good tilth. Runoff is slow to medium, and infiltration and permeability are rapid. The available water capacity is low to very low.

Because this soil is sandy and droughty, it can be used for only a few crops and is poorly suited to continuous cultivation. It is better suited to permanent pasture and woodland. (Capability unit IVs–1; woodland suitability group 5)

Roanoke Series

The Roanoke series consists of nearly level, poorly drained soils that developed on low stream terraces in general alluvium. In uneroded areas, these soils have a dark yellowish-brown sandy loam surface layer. Below this layer is streaked and mottled, grayish-brown to light brownish-gray silty clay loam. Gray, mottled, clayey material is at a depth of about 16 inches from the surface. These soils are low in natural fertility, contain a moderate amount of organic matter, and are strongly acid.

The Roanoke soils occur with Altavista and Augusta soils on low stream terraces and, to a lesser extent, with the Wehadkee soils on adjoining first bottoms. The Roanoke soils have a finer textured, more plastic subsoil than the Altavista and Augusta soils and are less well drained. They are somewhat better drained and have more distinct horizons than the Wehadkee soils.

Roanoke soils are mainly in small areas in the western part of the county. The native vegetation was mostly willow, water, and white oak and maple, sweetgum, elm, hickory, dogwood, sourwood, and pine. Nearly all of the acreage is wooded, but some open areas are used for pasture. The shallow depth to the plastic clayey material restricts the root zone and limits the suitability of these soils for cultivated crops.

In this county about half the acreage of the Roanoke soils is mapped in an undifferentiated unit with the Augusta soils and the other half is mapped in an undifferentiated unit with Wehadkee soils.

Roanoke and Augusta sandy loams (0 to 2 percent slopes) (Rol).—These nearly level, poorly drained, and somewhat poorly drained soils are on low stream terraces. The Roanoke soils are poorly drained and occur on the terraces adjoining the first bottoms. The Augusta soils are somewhat poorly drained and occur on slightly higher elevations. The Roanoke soils have a finer textured and more plastic subsoil than the Augusta soils.

Because these soils are somewhat similar, occur together in an intricate pattern, and have a dense forest cover, it was not considered feasible to map them separately. The two soils are about equal in acreage. A profile description of Roanoke sandy loam follows:

0 to 5 inches, dark yellowish-brown, friable sandy loam.
5 to 16 inches, grayish-brown to light brownish-gray, firm silty clay loam; moderate blocky structure; distinctly mottled in the lower half.
16 to 36 inches, gray, firm silty clay; strong blocky structure.
36 inches +, gray, very firm clay, mottled with red and yellow.

In cleared areas, the surface layer of Roanoke sandy loam ranges from gray to dark brownish gray. The subsoil ranges from silty clay loam to clay. Some areas that have a silt loam surface layer are included in mapping. A profile description of Augusta sandy loam follows:

0 to 7 inches, grayish-brown, friable sandy loam.
7 to 36 inches, light yellowish-brown to pale-olive, friable sandy clay loam; moderate, subangular blocky structure; mottled below 20 inches.
36 to 40 inches +, grayish-brown sandy clay, mottled with light olive brown.

In cultivated areas the plow layer of Augusta sandy loam commonly is grayish brown. The subsoil ranges from sandy clay loam to sandy clay. The depth from the surface to the mottling ranges from 18 to 30 inches. Some areas that have a silt loam surface layer are included in mapping.

The soils of this mapping unit are low in natural fertility, contain a moderate amount of organic matter, and are strongly acid. Runoff and permeability are slow to very slow.

Because of these features, plus a high water table and frequent flooding of part of the acreage, these soils are suited to only a narrow range of crops. If the soils are cultivated, they require extensive drainage. They are difficult to drain, however, because they lack suitable natural outlets. They are best suited to permanent pasture and woodland. (Capability unit IVw–2; woodland suitability group 9)

Rock Outcrop

Rock outcrop (Rok) is a miscellaneous land type that consists mainly of outcrops of granite bedrock. In places boulders rest upon the bedrock. Rock outcrop occurs in areas of 1 to 3 acres, mostly on gentle slopes. These areas are usually associated with Louisburg and Cecil soils.

Rock outcrop supports few plants. Lichens, mosses, and cacti grow on the rock faces and in the thin patches of soil material. A few small trees, shrubs, and bushes grow in crevices where loose materials are thickest.

This land type has a very small total acreage and is unsuitable for agriculture. It can, however, be developed to a limited extent for recreation and for food and cover for wildlife. (Capability unit VIIIs–1)

Wehadkee Series

In the Wehadkee series are deep, nearly level, poorly drained soils that have developed on flood plains in recent alluvium. These soils have a gray silty clay loam surface layer over gray, fine-textured, prominently mottled material. They are low in natural fertility, contain moderate to high amounts of organic matter, and are strongly acid.

The Wehadkee soils adjoin the Chewacla soils on flood plains and the Roanoke soils on low stream terraces. The Wehadkee soils are grayer, have mottles much closer to the surface, and are more poorly drained than the Chewacla soils. They have less distinct horizons, are more likely to be flooded, and are more poorly drained than the Roanoke soils.

The Wehadkee soils are in relatively large areas along Line Creek and Flint River in the western part of the county. Their native vegetation was mainly water oaks, blackgum, sweetgum, ash, poplar, hickory, beech, elm, and alder. Nearly all the acreage is in cutover hardwoods. A high water table, frequent flooding, and lack of adequate natural drainage outlets limit these soils to a narrow range of crops. Extensive drainage is needed if the soils are to be used for cultivated crops.

In this county all of the acreage of Wehadkee soils is mapped in an undifferentiated unit with Roanoke soils.

Wehadkee and Roanoke silty clay loams (0 to 2 percent slopes) (Wer).—The Wehadkee soil in this unit is on the lower part of first bottoms, and the Roanoke soil is on low stream terraces. The Wehadkee soil is more subject to flooding, has less distinct horizons, and is a little more poorly drained than the Roanoke soil. Both soils, however, are classified as poorly drained, and both have a mottled subsoil.

Because these soils are somewhat similar, occur together in an intricate pattern, and have a dense forest cover, it was not considered feasible to map them separately. The two soils are about equal in acreage. A profile description of Wehadkee silty clay loam follows:

0 to 4 inches, gray, firm to friable silty clay loam.
4 to 44 inches, gray, firm silty clay to silty clay loam, prominently mottled with brownish yellow and strong brown.

The surface layer of Wehadkee silty clay loam is 3 to 6 inches thick and ranges from gray to very dark gray. The subsoil ranges from mottled gray to yellowish brown. The depth from the surface to the mottling is 3 to 8 inches. Some areas that have a silt loam or fine sandy loam surface layer are included in mapping.

The Roanoke soil is similar to the soil described in the Roanoke series, except that the surface layer is silty clay loam.

These soils are low in natural fertility, contain a moderate to high amount of organic matter, and are strongly acid. Tilth is generally poor. Because of the high water table, the root zone is restricted. Runoff is slow, and infiltration and permeability are very slow. The available water capacity is high.

Nearly all the acreage supports undesirable hardwoods. Because of frequent and irregular flooding, these soils are limited in their suitability for cultivation or pasture. (Capability unit IVw–1; woodland suitability group 9)

Wilkes Series

The Wilkes series consists of very gently sloping to sloping, well-drained to somewhat excessively drained soils of the uplands. These soils are shallow over bedrock. They have formed in materials weathered from mixed acidic and basic igneous and metamorphic rocks. Where these soils are not eroded, they have an olive to brownish-gray sandy loam surface layer. Below this layer is a thin layer of yellowish-brown to pale-brown, mottled sandy clay loam or clay. This material is underlain by partly disintegrated rocks at a depth of 9 to 20 inches. These soils are low in natural fertility, contain little organic matter, and are strongly acid.

The Wilkes soils occur with the Appling and Helena soils on very gently undulating uplands. The Louisburg and Cecil soils are on the stronger slopes adjacent to the Wilkes soils. The Wilkes soils are shallow and have a thin, discontinuous B horizon; whereas, the Appling, Cecil, and Helena soils are deep and have a distinct B horizon. The Wilkes soils resemble the Louisburg in the surface layer but have a more variable and less red subsoil.

Wilkes soils are mainly in small areas in the western-central part of the county. The native vegetation was mainly mixed oaks, hickory, redcedar, and pine. About half the acreage is cultivated or in pasture, and the rest is in woods. The less sloping areas of these soils are fairly well suited to cultivated crops and pasture.

Wilkes sandy loam, 2 to 6 percent slopes, eroded (WiB2).—This is a shallow, droughty, well-drained to somewhat excessively drained soil of the uplands. A profile description follows:

0 to 6 inches, olive, very friable sandy loam.
6 to 9 inches, mottled yellowish-brown, firm sandy clay loam to clay; moderate, subangular blocky structure.
9 to 20 inches, pale-brown, partly decomposed granite and basic rocks.

The surface layer is 4 to 6 inches thick and ranges from light brownish gray to brown. The B horizon is 0 to 6 inches thick. Included in mapping are small areas that have a gravelly sandy loam surface layer. Also included are some severely eroded patches in which the partly disintegrated rock material is at the surface.

This soil is low in natural fertility, contains little organic matter, and is strongly acid. The surface soil generally has good tilth except in the gravelly or eroded areas. Runoff is rapid and infiltration and permeability are moderate to slow. The available water capacity is low.

Because this soil has a shallow root zone and is droughty, it is only fair for cultivated crops. Erosion is a moderate hazard in cultivated areas. The soil is best suited to permanent pasture and woodland. (Capability unit IIIe–5; woodland suitability group 8)

Wilkes sandy loam, 10 to 15 percent slopes, eroded (WiD2).—Most of this shallow soil has a surface layer that is 2 to 4 inches thinner than that of Wilkes sandy loam, 2 to 6 percent slopes, eroded. The soil has a very small total acreage and is mainly in woods. Shallow gullies are in many places.

Runoff is very rapid, and infiltration is slow to very slow. Because of the strong slopes, shallow root zone, and low available water capacity, this soil is not suited to cultivation and is only fairly well suited to permanent pasture. It is best suited to woodland. (Capability unit VIe–3; woodland suitability group 8)

Worsham Series

The Worsham series consists of very gently sloping, poorly drained, gray soils on the Piedmont Upland. These soils have formed in material weathered from granite, gneiss, and schist. Where not eroded, they have a light olive-gray sandy loam surface layer. Below this layer is pale-brown to light-gray, mottled sandy clay loam to clay. These soils are low in natural fertility, contain little organic matter, and are strongly acid.

Worsham soils are in seepage areas and around the head of drainageways. The Colfax soils adjoin them on very gently undulating upland areas. The Cecil, Appling, and Helena soils are on the stronger slopes. Worsham soils are more poorly drained and have a lighter colored subsoil than Colfax soils. They are distinguished from Cecil, Appling, and Helena soils by their poor drainage and predominantly gray, rather than red or yellow, subsoil.

The Worsham soils are mainly in small areas widely scattered over the county. The native vegetation consisted mainly of mixed oaks, sweetgum, blackgum, maple, yellow-poplar, and pine. Most of the acreage is wooded, but some is in pasture. These soils, because of their wetness, are poorly suited to cultivated crops and are only fairly well suited to pasture. They are best suited to woodland.

Worsham sandy loam, 2 to 6 percent slopes (WkB).—This poorly drained soil is in seepage areas at the base of slopes and around the head of drainageways. A brief profile description follows:

0 to 6 inches, light olive-gray, very friable sandy loam.
6 to 18 inches, mottled pale-brown, firm sandy clay loam; moderate, subangular blocky structure.
18 to 30 inches, mottled light-gray, firm clay loam to clay; coarse, subangular blocky structure.
30 to 36 inches +, white, weathered rock material, mottled with pink.

The surface layer is 4 to 8 inches thick and in most places contains small stones and many pebbles of quartz. This layer ranges from light to dark gray. Included in mapping are small areas that have a coarse sandy loam surface layer.

This soil is low in natural fertility, contains little organic matter, and is strongly acid. The surface soil has poor to fair tilth. Runoff is slow, and infiltration and permeability are very slow. The available water capacity is high.

Because of the wetness, this soil is poorly suited to cultivated crops and is only fairly well suited to pasture. Its best use is for woodland. (Capability unit Vw–1; woodland suitability group 7)

Use and Management of Soils

This section describes the use and management of soils for crops and pasture, woodland, wildlife, and engineering work.

Use and Management of Soils for Crops and Pasture

This section explains the system of capability classification used by the Soil Conservation Service, describes each capability unit and lists the soils in each, and gives for each soil in the county the estimated yields of selected crops under different levels of fertilization.

Capability grouping of soils

The capability classification is a grouping of soils that shows, in a general way, how suitable they are for most kinds of farming. It is a practical grouping based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment.

In this system all the kinds of soil are grouped at three levels—the capability class, subclass, and unit. In the broadest grouping, the eight capability classes are designated by Roman numerals I through VIII. In class I are the soils that have few 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 subclasses indicate major kinds of limitations within the classes. Within most of the classes there can be up to four subclasses. The subclass is 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 will interfere with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the country, indicates that the chief limitation is climate that is too cold or too dry.

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

Within the subclasses are the capability units, which are groups of soils enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping of soils for many statements about their management. Capability units are generally identified by numbers assigned locally, for example, IIe–1; or IIIe–2. In this report, the capability units are not numbered consecutively because they are part of a statewide system, and all of the units in the system are not applicable to the soils of Spalding County.

Soils are classified in capability classes, subclasses, and units according to their degree and kind of permanent limitations; but without consideration of major, and generally expensive, landforming or reclamation projects that would change the slope, depth, or other characteristics of the soil.

The eight classes in the capability system, and the subclasses and units in this county, are described in the list that follows.

Class I. Soils that have few limitations that restrict their use.

Unit I–1.—Nearly level, well-drained soils in slight upland depressions or along small drainageways.

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

Subclass IIe. Soils subject to moderate erosion if they are cultivated and not protected.

Unit IIe–1.—Very gently sloping, slightly eroded to moderately eroded soils that have a sandy loam or loam surface layer and a red or dark-red clay loam to clay subsoil.

Unit IIe–2.—Very gently sloping, slightly eroded to moderately eroded soils that have a sandy loam surface layer and a sandy clay loam to sandy clay subsoil that is mottled yellowish brown to yellow.

Unit IIe-3.—Very gently sloping, moderately eroded soils that have a sandy loam surface layer and a sandy clay loam to clay subsoil that is dusky red to brownish yellow and firm to very firm.

Subclass IIw. Soils moderately limited by excess water.

Unit IIw-2.—Moderately well drained soils that are on bottom land and are occasionally flooded.

Class III. Soils that 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.—Very gently sloping to sloping soils that are slightly to severely eroded and have a fine sandy loam to clay loam surface layer and a red or dark-red clay loam to clay subsoil.

Unit IIIe-2.—Very gently sloping and gently sloping, eroded to severely eroded soils that have a sandy loam or sandy clay loam surface layer and a sandy clay loam to sandy clay subsoil that is yellowish brown to mottled strong brown.

Unit IIIe-3.—Very gently sloping, severely eroded soils that have a clay loam surface layer, and a compact, very firm clay loam to clay subsoil that is dark red to dusky red.

Unit IIIe-5.—Shallow, slightly eroded to eroded soils that have a sandy loam surface layer and a thin, discontinuous B horizon.

Subclass IIIw. Soils severely limited by excess water.

Unit IIIw-2.—Medium-textured to fine-textured soils that are on first bottoms and are subject to overflow.

Unit IIIw-3.—Somewhat poorly drained, slightly eroded soils that have a sandy loam surface layer and a mottled, very firm silty clay loam subsoil.

Class IV. Soils that have very severe limitations that restrict 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.—Gently sloping and sloping, slightly to severely eroded soils that have a sandy loam to clay loam surface layer and a yellowish-brown to dark-red sandy clay or clay subsoil.

Unit IVe-2.—Very gently sloping and gently sloping, eroded to severely eroded soils that have a very firm or compact subsoil that restricts the depth to which plant roots can penetrate.

Unit IVe-4.—Gently sloping, slightly eroded to eroded, shallow soils that have a sandy loam surface layer over a thin, discontinuous B horizon.

Subclass IVw. Soils that have very severe limitations for cultivation because of excess water.

Unit IVw-1.—Poorly drained to very poorly drained soils on first bottoms and low stream terraces subject to frequent flooding.

Unit IVw-2.—Somewhat poorly drained to poorly drained soils on low stream terraces subject to flooding.

Subclass IVs. Soils very severely limited by shallow depth or low available water capacity.

Unit IVs-1.—Deep, somewhat excessively drained sandy soils on high stream terraces.

Class V. Soils that are susceptible to little or no erosion but have other limitations that restrict their use to pasture, range, woodland, or wildlife habitats.

Subclass Vw. Excessively wet soils around the head of drainageways.

Unit Vw-1.—Very gently sloping, poorly drained soils.

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

Subclass VIe. Gently to strongly sloping, slightly to severely eroded soils that have a sandy loam to clay surface layer and sandy clay loam or clay subsoil.

Unit VIe-2.—Well-drained, gently to strongly sloping soils that are slightly to severely eroded.

Unit VIe-3.—Moderately shallow, sloping, slightly eroded or moderately eroded soils that have a thin and discontinuous subsoil underlain by mixed granitic and basic rocks.

Unit VIe-4.—Gently sloping, severely eroded soils that have a very firm sandy clay or clay subsoil at a depth of about 16 inches.

Class VII. Soils that have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife habitats.

Subclass VIIe. Soils very severely limited by the risk of erosion if they are not protected.

Unit VIIe-1.—Sloping to strongly sloping, very severely eroded soils.

Unit VIIe-4.—Gullied land.

Class VIII. Soils and land types that have limitations that preclude their use, without major reclamation, for commercial production of plants and that restrict their use to recreation, wildlife, water supply, or esthetic purposes.

Subclass VIIIs. Soils or land types that support little vegetation.

Unit VIIIs-1.—Rock outcrop.

Management by capability units

The soils in Spalding County are in 24 capability units. The soils in a given capability unit have about the same limitations and risks of damage, need about the same management, and respond to management in about the same way. In the following pages each capability unit is described, the soils in it are named, and management for the group is discussed.

CAPABILITY UNIT I-1

Local alluvial land is the only mapping unit in this capability unit. This land type is deep, well drained, medium textured, and friable. It is in slight upland depressions or along small drainageways. Slopes range from 0 to 2 percent.

The surface layer, to a depth of more than 20 inches, is friable sandy loam to loam. Beneath this the layers vary but commonly are friable sandy loam to sandy clay loam. Plant roots can penetrate effectively to a depth of 36 inches or more. In most places bedrock is at a depth exceeding 10 feet.

This land type is high in natural fertility, contains a moderate amount of organic matter, and is medium to strongly acid. Runoff is slow, and water moves through the soil material at a moderate to moderately rapid rate. The available water capacity is high. This land type generally is in good tilth. Crops respond well to fertilizer.

Use and management.—Local alluvial land comprises about 0.1 percent of the county area, and most of the acreage is cultivated. Many kinds of crops are suited to this soil, and yields generally are high. Garden and truck crops are especially well suited, and most of the acreage is used for these crops.

This land type has no significant limitations. It is generally not subject to erosion and can be used intensively. Row crops can be grown almost continuously if a cover crop is grown occasionally. Even without fertilization this soil produces fair yields. If the soil is used intensively, however, it must be fertilized to maintain high yields.

CAPABILITY UNIT IIe-1

In this unit are deep, well-drained, very gently sloping soils of the uplands. Most of the soils are slightly to moderately eroded. The soils are—

Cecil sandy loam, 2 to 6 percent slopes.
Cecil sandy loam, 2 to 6 percent slopes, eroded.
Davidson loam, 2 to 6 percent slopes, eroded.
Lloyd sandy loam, 2 to 6 percent slopes, eroded.
Madison fine sandy loam, 2 to 6 percent slopes, eroded.

The surface layer ranges from sandy loam to loam. The subsoil is thick, red or dark-red clay loam to clay that is firm to friable. Plant roots can penetrate effectively to a depth of 40 inches or more. Depth to bedrock commonly ranges from 6 to 20 feet.

Much of the acreage is medium to low in natural fertility, contains little organic matter, and is medium acid to strongly acid. The Davidson soil, however, is medium to high in natural fertility and contains a moderate amount of organic matter. Water moves into and through the soils of this unit at a moderate rate, and the available water capacity is moderate to high. These soils generally have good tilth in the surface layer. Crops respond well to fertilizer.

Use and management.—These soils make up about 17.7 percent of the county area and are among the most important in the county. More than 85 percent of their acreage is used for crops and pasture and most of the rest is in woods.

All locally grown crops are suited to these soils. Some of the important crops are cotton, corn, small grain, peaches, and pimiento pepper. Suitable pasture and hay plants are Coastal bermudagrass, common bermudagrass, alfalfa, tall fescue, dallisgrass, ryegrass, crimson clover, white clover, Kobe lespedeza, sericea lespedeza, starr millet, and browntop millet. Figure 3 shows pasture grown on these soils. Because of the erosion hazard, the cropping system should include a close-growing crop at least 2 years in 4. Examples of suitable cropping systems are—

1. *First year*, cotton; drill oats in the cotton stubble that has been mowed, disked, and ripped. *Second year*, harvest oats for grain or hay; overseed with lespedeza. *Third year*, plant corn, use shallow cultivation and lay by early; after harvest, mow the stubble and leave it unplowed throughout the winter.
2. *First year*, cotton, followed by crimson clover or vetch drilled in mowed cotton stubble. *Second year*, clover or vetch turned under in March; plant corn about April 15; use shallow cultivation and lay by early; drill oats in corn stubble that has been mowed, disked, and ripped. *Third year*, use oats for grain, hay, or grazing; in February overseed with annual lespedeza. *Fourth year*, use volunteer lespedeza for seed, hay or grazing.

Figure 3.—Tall fescue and ladino clover on soils in capability unit IIe-1 in foreground. The more strongly sloping soil in the background is in capability unit IIIe-1.

Annual applications of phosphate and potash are required to maintain high yields of most crops, and in addition, nitrogen is required for nonlegumes. Some crops, especially legumes, respond to the addition of lime. Turning under an occasional cover crop and residue from row crops helps maintain a fairly adequate amount of organic matter.

These soils, except the Lloyd and Davidson, are easily worked. The Lloyd and Davidson soils clod if cultivated when too wet and become hard or very hard when dry.

Runoff is the main hazard where the soils are cultivated. Erosion can be controlled by (1) tilling on the contour, (2) using adequately fertilized, close-growing crops in the cropping system, (3) stripcropping, (4) terracing, and (5) establishing grassed waterways. Figure 4 shows examples of contour tillage and stripcropping.

Figure 4.—Soils in capability unit IIe-1. *Left,* soil plowed and planted on the contour. *Right,* corn and tall fescue in a parallel strip rotation on Lloyd sandy loam, 2 to 6 percent slopes, eroded.

CAPABILITY UNIT IIe-2

In this unit are deep, moderately well drained to well drained soils on uplands and stream terraces. Most of these soils are slightly to moderately eroded. The soils are—

Appling sandy loam, 2 to 6 percent slopes.
Appling sandy loam, 2 to 6 percent slopes, eroded.
Altavista sandy loam, 2 to 6 percent slopes, eroded.

The surface layer is sandy loam. The subsoil is thick, firm to friable sandy clay or sandy clay loam that is mottled yellowish brown to yellow. Plant roots can penetrate effectively to a depth of 30 inches or more. Depth to bedrock commonly ranges from 6 to 12 feet.

Most of the acreage is medium to low in natural fertility, contains little organic matter, and is strongly acid. Water moves into and through these soils at a moderate rate, and the available water capacity is moderate to high. These soils generally have good tilth in the surface layer. Crops respond well to fertilizer.

Use and management.—These soils make up about 3.0 percent of the county. More than 80 percent of their acreage is used for crops and pasture, and most of the rest is in woods.

Most locally grown crops are suited to the soils of this unit. Some of the more important are corn, cotton, pimiento pepper, grain sorghum, and small grain. Suitable pasture and hay plants are bermudagrass, tall fescue, ryegrass, white clover, crimson clover, Kobe lespedeza, sericea lespedeza, starr millet, and browntop millet.

These soils are suited to a somewhat narrower range of crops and produce slightly lower yields than the soils of capability unit IIe-1. Because they are at lower elevations, these soils receive more frost and are therefore not well suited to peaches. Planting is often delayed because the soils warm up slowly in spring. The soils in this unit are not well suited to alfalfa and wheat.

In cultivated areas the erosion hazard is great enough to require a close-growing crop at least 2 years in 4. Examples of suitable cropping systems are—

1. *First year*, corn or grain sorghum; use shallow cultivation and lay by early; after the corn or sorghum has been harvested, mow the stubble and leave it unplowed throughout the winter. *Second year*, truck crops or cotton, followed by oats or rye drilled in the stubble that has been mowed or disked. *Third year*, oats or rye overseeded with lespedeza; follow lespedeza with oats or rye drilled in the unplowed stubble. *Fourth year*, oats or rye, followed by volunteer lespedeza; after the lespedeza has been harvested, leave the stubble unplowed throughout the winter.
2. *First year*, establish Coastal bermudagrass for grazing or hay. *Second year*, early corn; late in summer, after the corn has been harvested, graze or mow the stubble.

Annual applications of phosphate and potash are required to maintain high yields of most crops, and in addition, nitrogen is required for nonlegumes. Turning under residue from row crops and an occasional cover crop helps maintain a fairly adequate amount of organic matter. These soils are easily worked and are suitable for sprinkler irrigation if a supply of water is nearby.

Runoff is the chief hazard where these soils are cultivated, but erosion can be controlled by (1) tilling on the contour, (2) using adequately fertilized, close-growing crops in the cropping system, (3) stripcropping, (4) terracing, and (5) establishing grassed waterways.

CAPABILITY UNIT IIe-3

In this unit are deep to moderately deep, well-drained to somewhat poorly drained soils of the uplands. These soils are moderately eroded. The soils are—

Helena sandy loam, 2 to 6 percent slopes, eroded.
Lloyd sandy loam, compact subsoil, 2 to 6 percent slopes, eroded.

The surface layer is sandy loam. The subsoil is moderately thick sandy clay loam to clay that is dusky red to brownish yellow and firm to very firm. Plant roots can penetrate effectively to a depth of about 15 inches. Depth to bedrock commonly ranges from 6 to 10 feet.

Most of the acreage is low in natural fertility, contains little organic matter, and is strongly acid. The movement of water into and through these soils is moderately slow, and the available water capacity is moderate to low. These soils generally have good tilth in the surface layer. Crops respond well to fertilizer.

Use and management.—These soils make up about 1.2 percent of the county area. About half of their acreage is in pasture or crops, and the rest is in woods or used for some other purpose.

Locally grown crops are only fairly well suited to these soils. Some of the more important are corn, small grain, and vegetables and other truck crops. Suitable pasture and hay plants are Coastal bermudagrass, common bermudagrass, tall fescue, dallisgrass, Kobe lespedeza, sericea lespedeza, starr millet, and browntop millet.

Because of the heavy, compact subsoil, root penetration is somewhat restricted and yields of most crops are slightly lower than yields in capability unit IIe–2.

In cultivated areas, the erosion hazard is great enough to require a close-growing crop at least 2 years in 4. An example of a suitable cropping system is—

1. *First year*, corn; use shallow cultivation and lay by early. Drill oats in the corn stubble that has been mowed, disked, and ripped. *Second year*, harvest oats for hay or seed; plant grain sorghum in the oat stubble that has been mowed, disked, and ripped; after the grain sorghum has been harvested, drill oats in the sorghum stubble that has been mowed, disked, and ripped. *Third year*, oats overseeded with lespedeza. *Fourth year*, oats followed by volunteer lespedeza; after the lespedeza has been harvested, leave the stubble unplowed throughout the winter.

Annual applications of phosphate and potash are required to maintain high yields of most crops, and in addition, nitrogen is required for nonlegumes. Some crops, especially legumes, respond well to the addition of lime. Turning under residue from row crops and an occasional cover crop helps maintain a fairly adequate amount of organic matter.

These soils are not easily worked because the heavy clay subsoil, at a depth of about 15 inches, interferes with normal tillage. They clod if cultivated when too wet, and they become hard when dry.

Runoff is the main hazard where these soils are cultivated. Erosion can be controlled, however, by (1) tilling on the contour, (2) using adequately fertilized, close-growing crops in the cropping system, (3) stripcropping, (4) terracing, and (5) establishing grassed waterways.

CAPABILITY UNIT IIw–2

Alluvial land is the only mapping unit in this capability unit. This land type occurs on flood plains and is moderately well drained. Slopes range from 0 to 2 percent.

The surface layer varies greatly in texture but commonly is fine sandy loam or sandy loam. Beneath this, in many places, are stratified layers of silt, clay, and sand. Floodwaters occasionally scour the surface, and deposits of sandy material are common. Plant roots can penetrate effectively to a depth of 30 inches or more. In most places depth to bedrock exceeds 10 feet.

This land type is low to medium in natural fertility and in content of organic matter and is strongly acid. Runoff is slow, and water moves into and through the soil at a moderate rate. The available water capacity is high. Tilth is good. Crops respond well to fertilizer.

Use and management.—Alluvial land comprises about 1.9 percent of the county area, and most of the acreage is cultivated or used for pasture. Because of its favorable physical characteristics and high available water capacity, this land type responds well to heavy applications of fertilizer, and yields of suitable crops are good to very good.

This land type generally is not subject to erosion, but it is occasionally scoured by floodwaters. Row crops can be grown almost continuously if a cover crop is grown occasionally. A simple system of ditches is needed to remove excess surface water during some months of the year. Alluvial land is generally well suited to sprinkler irrigation, and the nearby streams furnish a source of water. Examples of suitable cropping systems are—

1. Corn, planted each year; use shallow cultivation and lay by early; the first year, after the corn is harvested, drill reseeding crimson clover in the mowed corn stubble; leave the clover in the field until the seed matures the first year and each third year thereafter to assure a volunteer crop of crimson clover every year; each year, after the corn has been harvested, mow the stubble; 3 or 4 weeks before corn is again planted, turn the green clover under; allow clover seed to mature 1 out of 3 years.
2. *First year*, corn or truck crops; drill oats in the stubble that has been disked and ripped. *Second year*, oats harvested for grain; leave stubble unplowed throughout the winter.

Annual applications of phosphate and potash are required to maintain high yields of most crops, and in addition, nitrogen is required for nonlegumes. Some crops, especially legumes, respond well to the addition of lime. Turning under residue of row crops and an occasional cover crop helps maintain a fairly adequate amount of organic matter.

CAPABILITY UNIT IIIe–1

In this unit are deep, well-drained soils that are slightly to severely eroded. These soils are in the uplands. Slopes range from 2 to 10 percent. The soils are—

Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded.
Cecil sandy loam, 6 to 10 percent slopes.
Cecil sandy loam, 6 to 10 percent slopes, eroded.
Davidson clay loam, 2 to 6 percent slopes, severely eroded.
Lloyd sandy loam, 6 to 10 percent slopes, eroded.
Lloyd clay loam, 2 to 6 percent slopes, severely eroded.
Madison fine sandy loam, 6 to 10 percent slopes, eroded.
Madison sandy clay loam, 2 to 6 percent slopes, severely eroded.

The surface layer ranges from fine sandy loam to clay loam. The subsoil is thick clay loam to clay that is red to dark red and firm to friable. Plant roots can penetrate effectively to a depth of 40 inches or more. Depth to bedrock commonly ranges from 6 to 20 feet.

Most of the acreage is medium to low in natural fertility, contains little organic matter, and is medium to strongly acid. Water moves into and through these soils at a moderate rate, and the available water capacity is moderate to high. These soils have good tilth in the surface layer, except in the severely eroded areas. Here, the plow layer consists chiefly of material from the subsoil. Tillage is difficult in these severely eroded areas, and the soil can be cultivated only within a narrow range of moisture content. Crops respond well to fertilizer.

Use and management.—These soils make up about 32 percent of the county area. They are agriculturally important. More than half of the acreage is in crops and pasture, and the rest is in woods or is used for some other purpose.

These soils are suited to all crops commonly grown in the county. Some of the more important are cotton, corn, small grain, peaches, and pimiento pepper. Among the more suitable forage plants are Coastal bermudagrass, common bermudagrass, dallisgrass, tall fescue, ryegrass, alfalfa, crimson clover, white clover, Kobe lespedeza, sericea lespedeza, cowpeas, starr millet, and browntop millet.

In cultivated areas the erosion hazard is great enough to require a close-growing crop 2 years in 3. Examples of suitable cropping systems are—

1. *First year*, corn; use shallow cultivation and lay by early; mow stubble after harvest and leave residue on surface through winter. *Second year*, small grain planted for seed and followed by tall fescue for grazing.
2. *First year*, cotton or pimiento pepper, followed by small grain drilled through the mowed stubble; seed with lespedeza in spring. *Second and third years*, annual lespedeza seeded for hay.

Annual applications of phosphate and potash are required to maintain high yields of most crops, and in addition, nitrogen is required for nonlegumes. Some crops, especially legumes, respond to the addition of lime. Annually turning under residue from row crops and stubble from close-growing crops helps maintain an adequate amount of organic matter.

Runoff is the main hazard, and good water control practices are required if these soils are cultivated. Effective practices that control erosion are (1) tilling on the contour, (2) using adequately fertilized close-growing crops in the cropping system, (3) stripcropping, (4) terracing, and (5) establishing grassed waterways. Figure 5 shows an example of stripcropping on these soils.

***Figure 5.*—Corn and tall fescue in parallel strip rotation on Lloyd clay loam, 2 to 6 percent slopes, severely eroded, in capability unit IIIe-1.**

CAPABILITY UNIT IIIe-2

This capability unit consists of well-drained, very gently sloping and gently sloping soils that are moderately to severely eroded. The soils are—

Appling sandy loam, 6 to 10 percent slopes, eroded.
Appling sandy clay loam, 2 to 6 percent slopes, severely eroded.

The surface layer ranges from sandy loam to sandy clay loam. The subsoil is sandy clay loam to sandy clay that, in places, slightly restricts the movement of water. It is mottled with yellowish brown or strong brown. Plant roots can penetrate effectively to a depth of 32 inches or more. Depth to bedrock commonly ranges from 6 to 10 feet.

Most of the acreage is low in natural fertility, contains little organic matter, and is strongly acid. The movement of water into and through these soils is moderate to moderately slow, and the available water capacity is moderate. The tilth of the surface layer is good, except in severely eroded areas. Here, the plow layer consists mostly of subsoil material. Tillage is difficult in these severely eroded areas, and the soils can be cultivated only within a narrow range of moisture content. Crops respond well to fertilizer.

Use and management.—These soils make up about 3.6 percent of the county area, and about 55 percent of the acreage is used for crops and pasture. The rest is in woods or is used for some other purpose.

If fertility and organic matter are maintained, these soils are suited to most locally grown crops. Some of the more important crops are cotton, corn, small grain, and pimiento pepper. Suitable pasture and hay plants are bermudagrass, tall fescue, ryegrass, crimson clover, white clover, Kobe lespedeza, sericea lespedeza, field peas, starr millet, and browntop millet. Alfalfa is not suited.

Because of the slightly restricted water movement in their subsoil, these soils generally have slightly lower yields of most crops than the soils of capability unit IIIe-1.

In cultivated areas, the erosion hazard is great enough to require a close-growing crop 2 years in 3. An example of a suitable cropping system is—

First year, corn; use shallow cultivation and lay by early; mow stubble after harvest and leave the residue on the surface all winter. *Second year*, corn, followed by oats and tall fescue. *Third year*, oats for seed and tall fescue for hay. *Fourth year*, tall fescue for hay, grazing or seed.

Annual applications of phosphate and potash are required to maintain high yields of most crops, and in addition, nitrogen is required for nonlegumes. Some crops, especially legumes, respond well to the addition of lime. Annually turning under residue from row crops and stubble from close-growing crops helps maintain an adequate amount of organic matter.

Runoff is the main hazard, and good water control is required if these soils are cultivated. Effective practices that control erosion are (1) tilling on the contour, (2) using adequately fertilized, close-growing crops in the cropping system, (3) stripcropping, (4) terracing, and (5) establishing grassed waterways.

CAPABILITY UNIT IIIe-3

The only soil in this unit is Lloyd clay loam, compact subsoil, 2 to 6 percent slopes, severely eroded. This fine-textured, very firm soil is on uplands.

The surface layer is clay loam, and the subsoil is thick, dark-red to dusky-red, very firm clay loam to clay. Plant roots penetrate the compact subsoil slowly. The depth to bedrock commonly ranges from 6 to 12 feet.

Most of the acreage is medium to low in natural fertility, contains little organic matter, and is strongly acid. The movement of water into and through this soil is slow to very slow, and the available water capacity is low. This soil has poor tilth in the surface layer. Crops respond well to fertilizer.

Use and management.—This soil is very inextensive. About 40 percent of it is in crops and pasture, and nearly all of the rest is in woods. Most locally grown crops are fairly well suited to this soil. Some of the more important are cotton, corn, small grain, and pimiento pepper. Suitable plants for pasture and hay are bermudagrass, dallisgrass, tall fescue, field peas, Kobe lespedeza, sericea lespedeza, starr millet, and browntop millet. Alfalfa is fairly well suited.

Because of the heavy, compact subsoil, which restricts root penetration and water movement, this soil generally has lower yields than the soils in capability unit IIIe-1.

In cultivated areas, the erosion hazard is great enough to require a close-growing crop 2 years in 3. A suitable cropping system is—

> *First year*, pimiento pepper or corn, followed by small grain drilled through the mowed stubble; seed with lespedeza in the spring. *Second and third years*, annual lespedeza for hay or seed.

For production of high yields on this soil, most crops require annual applications of phosphate and potash, and in addition, nonlegumes require nitrogen. Some crops, especially legumes, respond to the addition of lime. Annually turning under residue from row crops and stubble from close-growing crops helps maintain adequate amounts of organic matter.

Runoff is the chief hazard, and good water control practices are required if these soils are cultivated. Erosion can be controlled effectively by (1) tilling on the contour, (2) using adequately fertilized, close-growing crops in the cropping system, (3) stripcropping, (4) terracing, and (5) establishing grassed waterways.

CAPABILITY UNIT IIIe-5

In this unit are shallow, well-drained to excessively drained soils of the uplands. Most of them are slightly eroded to eroded. The soils are—

Louisburg sandy loam, 2 to 6 percent slopes.
Wilkes sandy loam, 2 to 6 percent slopes, eroded.

The surface layer is sandy loam. The B horizon, which is discontinuous and thin, is yellowish-brown to strong-brown, friable to firm sandy clay loam or clay. Plant roots can penetrate effectively to a depth of only 12 to 20 inches. The depth to bedrock commonly ranges from 12 inches to 2 feet.

Most of the acreage is low in natural fertility, contains little organic matter, and is strongly acid. The movement of water into and through these soils is moderate to rapid, and the available water capacity is low. Except in a few shallow, gravelly areas, tilth of the surface layer is fair to good. Crops respond fairly well to fertilizer.

Use and management.—These inextensive soils make up about 1.2 percent of the county area. About 25 percent of the acreage is used for crops and pasture, and most of the rest is in woods.

Row crops are fairly well suited to these soils. Suitable crops are corn, oats, truck and vegetable crops, and occasionally cotton and pimiento pepper can be grown. Suitable pasture and hay plants are bermudagrass, tall fescue, crimson clover, white clover, Kobe lespedeza, and sericea lespedeza. Alfalfa and wheat are not suited.

Because these soils have a shallow root zone and are somewhat droughty, they produce lower yields than the soils in capability unit IIIe-1.

In cultivated areas the erosion hazard is great enough to require a close-growing crop 2 years in 3. An example of a suitable cropping system is—

> *First through third year*, sericea lespedeza or tall fescue. *Fourth year*, corn or pimiento pepper.

Annual applications of phosphate and potash are required to maintain high yields of most crops, and in addition, nitrogen is required for nonlegumes.

Legumes and some other crops respond to the addition of lime. Annually turning under residue from row crops and stubble from close-growing crops helps maintain an adequate amount of organic matter.

Runoff is the main hazard, and good water-control practices are required if these soils are cultivated. Erosion can be controlled effectively by (1) tilling on the contour, (2) using adequately fertilized, close-growing crops in the cropping system, (3) stripcropping, (4) terracing, and (5) establishing grassed waterways.

CAPABILITY UNIT IIIw-2

The soils in this capability unit are deep, somewhat poorly drained, friable, and medium to fine textured. They occur on flood plains and are subject to frequent floods of short duration. Their slopes range from 0 to 2 percent. The soils are—

Alluvial land, moderately wet.
Chewacla silt loam.

The surface layer ranges from sandy loam to silt loam. Beneath this layer, in many places, are stratified layers of brown to dark-brown silt, clay, and sand. The shallow depth to the water table, commonly about 24 inches, limits the depth of the root zone. Depth to bedrock exceeds 10 feet in most places.

These soils are medium to low in natural fertility, contain a moderate amount of organic matter, and are medium to strongly acid. Runoff is slow, and water moves into and through these soils at a moderately slow rate. The available water capacity is high. Tilth is generally good, but these soils are sometimes difficult to work because of wetness.

Use and management.—These inextensive soils make up about 2.2 percent of the county area. About 55 percent of the acreage is in crops and pasture, and most of the rest is in woods. If these soils are adequately drained, they can be cropped continuously. Corn and tall fescue are best suited to these soils, but oats, soybeans, peas, and truck crops are also grown. Suitable plants for pasture and hay are Coastal bermudagrass, common bermudagrass, dallisgrass, crimson clover, white clover, ryegrass, and annual lespedeza. Alfalfa and wheat are not well suited.

The significant limitations in using these soils are a high water table and occasional flooding. A system of ditches is required to remove excess surface water and to improve internal soil drainage (fig. 6). Examples of suitable cropping systems are—

1. *First year*, corn or grain sorghum, followed by tall fescue and white clover drilled in the corn or sorghum stubble that has been mowed, disked, and ripped. *Second and third years*, use tall fescue and white clover for seed and grazing.
2. *First year*, corn or grain sorghum; use shallow cultivation and lay by early; drill oats and fescue together in the corn or sorghum stubble that has been mowed, disked, and ripped. *Second year*, oats for seed, hay, or grazing; tall fescue for seed or grazing. *Third and fourth years*, tall fescue for seed or grazing.

Annual applications of phosphate and potash are required to maintain high yields of most crops, and in addition, nitrogen is required for nonlegumes. Some crops, especially legumes, respond well to the addition of lime. Turning under residue from row crops and an occasional cover crop helps maintain an adequate amount of organic matter.

CAPABILITY UNIT IIIw-3

The only soil in this capability unit is Colfax sandy loam, 2 to 6 percent slopes. This soil is medium textured, friable to firm, and somewhat poorly drained. It is in slight upland depressions and low saddles around the head of drainageways.

The surface layer, to a depth of about 8 inches, is friable sandy loam. The subsoil is mottled, yellowish-brown, very firm silty clay loam. Plant roots can penetrate effectively to a depth of 20 inches or more. In most places bedrock is at a depth exceeding 8 feet.

This soil is low in natural fertility, contains a moderate amount of organic matter, and is strongly acid. Runoff is slow, the movement of water through the soil is slow to moderately slow, and the available water capacity is moderate to high. Tilth is poor. The response to fertilizer is good to fair.

Use and management.—This soil comprises about 0.4 percent of the county area. Much of it is in pasture, but some is in crops. The moisture content often remains high until late spring and delays planting in some years. A system of ditches is needed to remove excess surface water and improve internal soil drainage.

Row crops are only fairly well suited to this soil. Corn and sorghum, as well as vegetables and other truck crops are suited, but cotton, small grain, serica lespedeza, and alfalfa are not. Suitable plants for pasture and hay are

Figure 6.—Tall fescue and white clover established on drained soil in capability unit IIIw-2.

common bermudagrass, dallisgrass, tall fescue, white clover, and annual lespedeza. An example of a suitable cropping system is—

First year, corn or sorghum, followed by tall fescue and white clover drilled in the corn or sorghum stubble that has been mowed, disked, and ripped. *Second and third year*, tall fescue and white clover for seed or grazing.

Annual applications of phosphate and potash are required to maintain high yields of most crops, and in addition, nitrogen is required for nonlegumes.

Most crops, especially legumes, respond to the addition of lime. Turning under residue from row crops and an occasional cover crop helps maintain a fairly adequate amount of organic matter.

Because this soil commonly occurs in low, protected areas, it is not generally subject to erosion. Contour tillage and the use of adequately fertilized, close-growing crops in the cropping system are effective measures for erosion control.

CAPABILITY UNIT IVe-1

In this unit are deep to moderately deep, well-drained soils of the uplands. Most of these soils are eroded to severely eroded. Slopes range from 6 to 15 percent. The soils are—

- Appling sandy clay loam, 6 to 10 percent slopes, severely eroded.
- Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded.
- Cecil sandy loam, 10 to 15 percent slopes.
- Cecil sandy loam, 10 to 15 percent slopes, eroded.
- Davidson clay loam, 6 to 10 percent slopes, severely eroded.
- Lloyd clay loam, 6 to 10 percent slopes, severely eroded.
- Lloyd sandy loam, 10 to 15 percent slopes, eroded.
- Lloyd clay loam, 10 to 15 percent slopes, severely eroded.
- Madison fine sandy loam, 10 to 15 percent slopes, eroded.
- Madison sandy clay loam, 6 to 10 percent slopes, severely eroded.

The surface layer ranges from sandy loam to clay loam. The subsoil is thick, red or dark-red sandy clay loam to clay loam, or is sandy clay loam that is mottled red and yellow. Plant roots can penetrate to a depth of 30 inches or more. Depth to bedrock commonly ranges from 6 to more than 20 feet.

Most of the acreage is medium to low in natural fertility, contains little organic matter, and is medium to strongly acid. Water moves into and through these soils at a moderate rate, and the available water capacity is moderate to high. Tilth is good, except where the soils are severely eroded. The plow layer in eroded areas is mostly material that was formerly subsoil. Tillage is difficult in these severely eroded areas, and the soils can be safely cultivated only within a narrow range of moisture content. Crops respond moderately well to well if the soils are fertilized.

Use and management.—These soils make up about 21 percent of the county area. About 30 percent of their acreage is in pasture and crops and the rest is in woods or is used for other purposes.

Deep-rooted perennials are better suited to these soils than row crops. If managed well, these soils can be safely used occasionally for corn, cotton, small grain, peaches, or pecans. Suitable plants for pasture or hay are Coastal bermudagrass, common bermudagrass, kudzu, tall fescue, sericea lespedeza, annual lespedeza, crimson clover, and white clover.

If these soils are cultivated, row crops or clean-tilled crops should not be grown more than 1 year in 4 or 2 years in 5. Examples of suitable cropping systems are—

1. *First year*, corn or cotton; after harvest, mow the stubble and leave unplowed throughout the winter. *Second through sixth year*, sericea lespedeza.
2. *First year*, corn; after harvest, mow the stubble and leave unplowed throughout the winter. *Second year*, cotton, followed by tall fescue and white clover drilled in stubble that has been mowed, disked, and ripped. *Third through fifth year*, tall fescue and white clover (fig. 7).

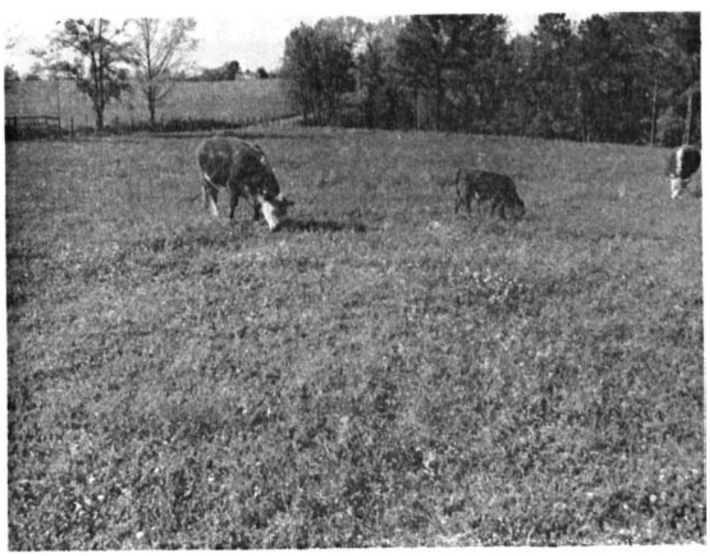

Figure 7.—**Tall fescue and white clover on soils in capability unit IVe–1.**

Annual applications of phosphate and potash are required to maintain high yields of most crops, and in addition, nitrogen is required for nonlegumes. Some crops, especially legumes, respond to the addition of lime. If these soils are cultivated, runoff is the chief hazard. Erosion can be controlled by (1) tilling on the contour, (2) stripcropping, (3) using a perennial crop in the cropping system, (4) terracing, and (5) establishing grassed waterways.

CAPABILITY UNIT IVe–2

In this unit are moderately deep to deep, somewhat poorly drained to moderately well drained soils of the uplands. Most of them are eroded or severely eroded. Slopes range from 2 to 10 percent. The soils are—

Helena sandy loam, 6 to 10 percent slopes, eroded.
Helena sandy clay loam, 2 to 6 percent slopes, severely eroded.
Lloyd clay loam, compact subsoil, 6 to 10 percent slopes, severely eroded.

The surface layer ranges from sandy loam to clay loam. Very firm sandy clay or clay is at a depth of 15 to 20 inches in the Helena soils. The Lloyd soil has a compact, very firm clay loam to clay subsoil. Plant roots can penetrate to a depth of 15 inches or more in most places. Depth to bedrock commonly ranges from 5 to 10 feet.

Most of the acreage is low in natural fertility, contains little organic matter, and is strongly acid. The movement of water into and through these soils is moderate to moderately slow, and the available water capacity is moderate to moderately low. These soils generally have good tilth in the surface layer except in severely eroded areas. In these areas the plow layer is mostly material that was formerly subsoil; consequently, tillage is difficult and cultivation is best done within a narrow range of moisture content. The response of crops to fertilizer is fair to good on these soils.

Use and management.—These soils are inextensive. About 20 percent of their acreage is used for pasture or crops, and the rest is in woods or is used for other purposes.

Only a few kinds of crops are suited to these soils; deep-rooted perennials are better suited than row crops. If managed well, the soils can be safely used occasionally for corn, cotton, and small grain. Suitable plants for pasture or hay are bermudagrass, tall fescue, sericea lespedeza, and white clover.

Row crops can be grown as often as 1 year in 4 or 2 years in 6 if perennial crops are grown the rest of the time. An example of a suitable cropping system is—

> *First year*, corn or pimiento pepper. *Second through fourth or fifth year*, sericea lespedeza for hay, grazing, or seed.

Annual applications of phosphate and potash are required to maintain high yields of most crops, and in addition, nitrogen is required for nonlegumes. Some crops, especially legumes, respond to the addition of lime.

If the soils are cultivated, runoff is the chief hazard. Erosion can be controlled by (1) tilling on the contour, (2) stripcropping, (3) including perennials in the cropping system, (4) terracing, and (5) establishing grassed waterways.

CAPABILITY UNIT IVe-4

In this unit are shallow, well-drained to excessively drained soils of the uplands. The soils are—

Louisburg sandy loam, 6 to 10 percent slopes.
Louisburg soils, 6 to 10 percent slopes, eroded.

Part of the acreage of these soils has a sandy loam surface layer 6 to 9 inches thick, over a thin layer of friable sandy clay loam. Plant roots can penetrate effectively to a depth of 12 to 20 inches. In some of the more eroded areas, however, the surface layer is clay loam to clay that is 2 to 4 inches thick. In these areas bedrock is at a shallow depth, tilth is poor, and the root zone is thin.

Most of the acreage is low in natural fertility, contains little organic matter, and is strongly acid. The movement of water into and through these soils is moderate to rapid, and the available water capacity is low. Except in a few eroded or gravelly areas, the tilth of the surface layer is generally good. Crops respond well to fertilizer.

Use and management.—These soils make up about 1.3 percent of the county. About 15 percent of the acreage is used for crops or pasture, and the rest is in woods or is used for other purposes.

Deep-rooted perennials are better suited to these soils than row crops. Occasionally, the soils can be safely used for crops if perennials are grown the rest of the time. Suitable perennials for pasture or hay are bermudagrass, tall fescue, and sericea lespedeza.

If it is necessary to cultivate these soils, examples of suitable cropping systems are—

1. *First year*, corn or grain sorghum, followed by tall fescue. *Second, third, and fourth years*, tall fescue for grazing, seed, or hay.
2. *First year*, cotton or oats, followed by sericea lespedeza. *Second, third, and fourth years*, sericea lespedeza for grazing, seed, or hay.

Annual applications of phosphate and potash are required to maintain high yields of most crops, and in addition, nitrogen is required for nonlegumes. Some crops, especially legumes, respond to the addition of lime.

Where these soils are cultivated, runoff is the chief hazard. Erosion can be controlled by (1) tilling on the contour, (2) stripcropping, (3) including perennials in the cropping system, (4) terracing, and (5) establishing grassed waterways.

CAPABILITY UNIT IVw-1

This unit consists of deep, poorly drained to very poorly drained soils that are friable and fine to very fine textured. They are on flood plains and low stream terraces and are frequently flooded for long periods. Slopes range from 0 to 2 percent. The soils are—

Alluvial land, wet.
Wehadkee and Roanoke silty clay loams.

The dark-brown to gray surface layer ranges from fine sandy loam to silty clay loam. Beneath this layer, in many places, are gray or brown stratified layers of silt, clay, and sand. Shallowness to the water table (commonly at about 8 inches from the surface) limits the depth to which plant roots can penetrate effectively. In most places bedrock is at a depth exceeding 15 feet.

These soils are medium to low in natural fertility, contain a moderately high amount of organic matter, and are strongly acid. Runoff is very slow, and the movement of water into and through these soils is very slow. The available water capacity is high. Tilth is generally poor because of wetness.

Use and management.—These soils make up about 4.8 percent of the county. About 10 percent of their acreage is used for pasture, and most of the rest is in woods. Unless a complete drainage system is established and the soils are protected from flooding, they are generally not suited to cultivated crops (fig. 8). These soils are difficult to drain, however, because they lack adequate natural drainage outlets.

If the soils are drained, they are suited to bermudagrass, tall fescue, dallisgrass, white clover, and annual lespedeza. Drained areas are moderately well suited to corn and sorghum. A high water table and frequent flooding are the major limitations. The soils of this unit are not generally susceptible to erosion. An example of a suitable cropping system is—

First year, corn. *Second through fourth year*, tall fescue for hay, seed, and grazing.

Annual applications of phosphate and potash are required to maintain high yields of most crops, and in addition, nitrogen is required for nonlegumes. Legumes respond to the addition of lime.

CAPABILITY UNIT IVw-2

Only one mapping unit, Roanoke and Augusta sandy loams, is in this capability unit. These soils are deep, nearly level, and somewhat poorly drained to poorly drained. They are on low stream terraces, and most areas are not eroded. Slopes range from 0 to 2 percent.

The surface layer is sandy loam that overlies grayish-brown to light yellowish-brown, mottled silty clay loam or sandy clay loam. Plant roots can penetrate to a depth of 5 to 20 inches. Depth to bedrock exceeds 10 feet in most places.

Figure 8.—Channel excavation in soil of capability unit IVw-1.

Most of the acreage is low in natural fertility, contains a moderately high amount of organic matter, and is strongly acid. The movement of water, into and through these soils is slow to moderately slow, and the available water capacity is high. These soils generally have fair tilth in the surface layer, except in the wetter areas. The response of crops to fertilizer is fair to good.

Use and management.—These soils are inextensive. About 85 percent of their acreage is wooded, and the rest is used for pasture and crops. A high water table and frequent flooding are the chief limitations of these soils. If cultivated, these soils need a system of ditches to remove excess water and to improve internal drainage. Much of the acreage, unless drained, is not suitable for cultivated crops. Forage plants such as bermudagrass, tall fescue, dallisgrass, ryegrass, annual lespedeza, and white clover are best suited to these soils. Drained fields are moderately well suited to corn and grain sorghum, as well as vegetables and other truck crops, and can be cropped intensively.

Annual applications of phosphate and potash are required to maintain high yields of most crops, and in addition, nitrogen is required for nonlegumes.

CAPABILITY UNIT IVs-1

Only one soil, Molena loamy sand, 2 to 10 percent slopes, is in this capability unit. It is deep, somewhat excessively drained, and for the most part not eroded. This soil is on high stream terraces.

The surface layer is dark reddish-brown, very friable loamy sand. Beneath this layer is dark reddish-brown to yellowish-red, structureless loamy sand that extends to a depth of more than 15 feet in many places. Plant roots can penetrate effectively to a depth of more than 42 inches. Bedrock commonly is at a depth of 12 to 30 feet.

Most of this soil is low to very low in natural fertility, contains little organic matter, and is strongly acid. The movement of water into and through the soil is rapid to moderately rapid, and the available water capacity is low. This soil is generally in good tilth and can be worked within a wide range of moisture content. Crops respond well to fertilizer, but in much of the acreage, the moisture supply is too low to justify heavy applications.

Use and management.—This soil is inextensive. About 70 percent of the acreage is used for crops and pasture, and the rest is in woods or is used for other purposes. Because the soil is sandy and somewhat droughty, it produces only fair yields of many crops. Deep-rooted perennials are better suited to this soil than row crops, but corn, cotton, small grain, grain sorghum, pimiento pepper, and vegetables and other truck crops can be grown. Suitable for pasture and hay are bermudagrass, tall fescue, sericea lespedeza, kudzu, crimson clover, white clover, annual lespedeza, and browntop millet.

If this soil is cultivated, row crops or clean-tilled crops should be grown no more than 1 year in 4 or 2 years in 5. An example of a suitable cropping system is—

> *First year*, cotton or corn; after the cotton or corn has been harvested, mow the stubble and leave unplowed throughout the winter. *Second through sixth year*, sericea lespedeza for hay, grazing, or seed.

713-800—64——3

Annual applications of phosphate and potash are required to maintain high yields of most crops, and in addition, nitrogen is required for nonlegumes. Some crops, especially legumes, respond to the addition of lime. If the steeper areas are cultivated, there is enough runoff to cause erosion. Erosion can be controlled, however, by (1) tilling on the contour, (2) stripcropping, (3) including perennials in the cropping system, (4) terracing, and (5) establishing grassed waterways.

CAPABILITY UNIT Vw-1

Only one soil, Worsham sandy loam, 2 to 6 percent slopes, is in this capability unit. This is a moderately deep, poorly drained soil around the head of drainageways and seepage areas in uplands.

The surface layer is light olive-gray sandy loam. The subsoil is pale-brown to light-gray, compact, mottled sandy clay loam to clay. Plant roots can penetrate effectively to a depth of more than 18 inches. Depth to bedrock commonly ranges from 5 to 8 feet.

Most of the acreage is low to very low in natural fertility, contains little organic matter, and is strongly acid. The movement of water into and through this soil is slow to very slow, and the available water capacity is high. This soil is generally in poor tilth. Because the soil is wet for long periods, row crops are not suitable and pasture is only fairly suitable.

Use and management.—This soil is inextensive. About half of it is in native pasture and most of the rest is in woods or is used for other purposes. If this soil is drained, limed, and heavily fertilized, it produces fair to good yields of bermudagrass, tall fescue, dallisgrass, and white clover for grazing and hay.

CAPABILITY UNIT VIe-2

In this unit are deep to moderately deep, well-drained soils on uplands. Most of these soils are slightly to severely eroded. Slopes range from 6 to 25 percent. The soils are—

- Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded.
- Cecil sandy loam, 15 to 25 percent slopes.
- Lloyd sandy loam, 15 to 25 percent slopes, eroded.
- Lloyd-Gullied land complex, 6 to 10 percent slopes.

The surface layer ranges from sandy loam to clay loam. The subsoil is thick to moderately thick, red to dark-red sandy clay loam to clay. Plant roots can penetrate effectively to a depth of 24 inches or more. Depth to bedrock commonly ranges from 6 to more than 12 feet.

Most of the acreage is medium to low in natural fertility, contains little organic matter, and is strongly acid. The movement of water into and through these soils is moderate to moderately slow, and the availabe water capacity is moderate to moderately low. Tilth is generally good except in the more severely eroded areas where the plow layer is made up of former subsoil material. In these areas tillage is difficult, and the soils can be safely worked only within a narrow range of moisture content. If row crops are grown on these soils, the response to fertilizer is only fair.

Use and management.—These soils make up about 2.7 percent of the county. About 8 percent of the acreage is used for pasture or crops; most of the rest is in woods.

Because they are steep or are susceptible to severe erosion, these soils generally are not suitable for cultivation. They are more suitable for growing trees and deep rooted perennials. Suitable plants for pasture or hay are bermudagrass, tall fescue, sericea lespedeza, kudzu, dallisgrass, crimson clover, white clover, and annual lespedeza.

When pastures are established on these soils, all tillage and planting should be on the contour. The soils should be protected at all times by a layer of mulch, plant residue, or other suitable cover. Grazing should be controlled to prevent damage to the pasture.

Annual applications of phosphate and potash are required to maintain high yields of most crops, and in addition, nitrogen is required for nonlegumes. Legumes respond to the application of lime. These soils are well suited to loblolly and shortleaf pines.

CAPABILITY UNIT VIe-3

In this unit are shallow to moderately shallow, somewhat excessively drained soils, most of which are slightly eroded. These soils are in uplands. They are—

Louisburg sandy loam, 10 to 15 percent slopes.
Louisburg soils, 10 to 15 percent slopes, eroded.
Wilkes sandy loam, 10 to 15 percent slopes, eroded.

The very friable surface layer is mostly sandy loam. The thin, friable to firm subsoil is yellowish-brown to strong-brown sandy clay loam or clay. Plant roots can penetrate effectively to a depth of 12 to 18 inches. Depth to bedrock commonly ranges from 18 inches to 2 feet.

Most of the acreage is very low to low in natural fertility, contains little organic matter, and is strongly acid. The movement of water into and through these soils is rapid to moderately rapid, and the available water capacity is low. Tilth is generally fair.

Use and management.—These soils make up about 0.9 percent of the county. About 10 percent of the acreage is in native pasture and crops, and most of the rest is in woods. Because these soils are strongly sloping, have a shallow root zone, and are droughty, they generally are not suitable for cultivation. They are more suitable for trees and deep-rooted perennials. Suitable pasture plants are bermudagrass, tall fescue, sericea lespedeza, kudzu, dallisgrass, crimson clover, white clover, and annual lespedeza.

When pastures are established on these soils, all tillage and planting should be on the contour. The soils should be protected at all times by a layer of mulch, plant residue, or other suitable cover. Grazing should be controlled to prevent damage to the pasture.

Annual applications of phosphate and potash are required to maintain moderate yields of all plants on these soils. Legumes respond to the application of lime. These soils are suited to loblolly and shortleaf pines.

CAPABILITY UNIT VIe-4

Helena sandy clay loam, 6 to 10 percent slopes, severely eroded, is the only soil in this capability unit. This is a moderately deep, moderately well drained to somewhat poorly drained soil on uplands. Most of it is severely eroded.

The surface layer is yellow, friable sandy clay loam, 4 to 6 inches thick. Very firm, mottled yellowish-brown sandy clay or clay is at a depth of about 16 inches and restricts the penetration of plant roots. Depth to bedrock commonly ranges from 32 inches to 5 feet.

Most of this soil is low in natural fertility, contains little organic matter, and is strongly acid. The movement of water into and through this soil is moderately slow to slow, and the available water capacity is moderately low to low. This soil is in poor to fair tilth. Crops make a fair response to fertilizer.

Use and management.—This soil is inextensive. About 15 percent is used for pasture or crops, and most of the rest is in woods or used for other purposes. Because of the slopes, poor tilth, and very high erosion hazard, this soil is more suitable for trees and deep-rooted perennials than for cultivated crops. Suitable pasture plants are bermudagrass, tall fescue, sericea lespedeza, and kudzu. Loblolly and shortleaf pines are suited to this soil.

When pasture is established on this soil, all tillage and planting should be on the contour. The soil should be protected at all times by a layer of mulch, plant residue, or other suitable cover. Grazing should be controlled to prevent damage to the pasture.

CAPABILITY UNIT VIIe-1

The Lloyd-Gullied land complex, 10 to 25 percent slopes, is the only mapping unit in this capability unit. The soils and gullied land in this unit are shallow to moderately deep and are well-drained to excessively drained. They are on uplands, and most of the areas are very severely eroded.

The thin surface layer is dark-red clay loam or clay. Weathered basic mica schist is at the surface in some places. Plant roots can penetrate effectively to a depth of 36 inches. Depth to bedrock commonly ranges from 3 to 8 feet.

Most of the acreage is very low in natural fertility, contains litle organic matter, and is strongly acid. The movement of water into and through this soil material is slow, and the available water capacity is low. Tilth is very poor, and crops respond poorly to fertilizer.

Use and management.—This mapping unit is inextensive. About 4 percent of it is used for pasture and crops, and most of the rest is in woods. Because this complex is steep, difficult to work, and susceptible to severe erosion, it is not suitable for crops or pasture. Loblolly and shortleaf pines are moderately well suited to it. All forestry operations, such as planting seedlings, establishing firebreaks, and constructing logging roads, should follow the contour to reduce the risk of erosion.

CAPABILITY UNIT VIIe-4

Gullied land is the only mapping unit in this capability unit. This land type is made up of small, very severely eroded areas of Madison, Cecil, Lloyd, Davidson, and Appling soils that are scattered over the county.

In most places all of the surface soil has been removed, and gullies of various depths form an intricate pattern. The soil symbol, Gul, does not indicate the slope.

Use and management.—This land type is not suitable for agriculture. It can be managed, however, to provide watershed protection or to produce a small amount of food and cover for wildlife. Special practices are required to stabilize this land.

CAPABILITY UNIT VIIIs-1

Rock outcrop is the only mapping unit in this capability unit. It occurs in very small areas that consist mainly of outcropping granite bedrock. Large boulders rest upon the bedrock in some places. Rock outcrop is scattered over the county, generally on gentle slopes and among the Cecil and Louisburg soils. It supports few higher plants. Lichens, mosses, and cacti grow on the rock surfaces. A few small trees, shrubs, and bushes grow in crevices where loose materials are thickest.

Use and management.—Rock outcrop is unsuitable for agriculture. It can be developed to a limited extend for recreational use and for some food and cover for wildlife.

Estimated yields [3]

The fertilizer-yield relationship of the important crops of Spalding County are given in table 9. These relationships were determined by the use of standard yield curves, which reflect the principle of diminishing returns. According to this principle, as fertilizer is increased successively by fixed amounts, the yield of the crop will increase by decreasing amounts when other conditions remain the same. Consequently, it will be profitable to increase the amount of fertilizer as long as the cost of an increment of fertilizer is less than the value of the corresponding increment in yield. The point on the curve where the cost of the latest increment of fertilizer and the increased crop value that it produces are equal indicates the most profitable rate of fertilizer application; a higher rate would decrease the net returns per acre. A lower rate of fertilization will give lower yields and less than the maximum net returns per acre; however, returns per dollar spent for fertilizer will be greater.

The principle of diminishing returns in use of fertilizer operates when other conditions remain the same. The soils of Spalding County, however, are variable in type, degree of erosion, natural fertility, and productivity. A field, or even a part of a field, can contain more than one kind of soil. A farmer should know the fertilizer-yield relationship of the different soils for alternative crops, so that he may choose the proper crop and fertilizer rate. The 59 mapping units listed in table 9 differ from one another in some physical characteristic. Each of these soil units is distinct and affects to some degree the operation of the principle of diminishing returns.

In this analysis, the key soil mapping units of the county were placed into five groups, which were regarded as sufficiently similar for curve-fitting purposes. For each of the major crops, a standard yield curve was drawn for each of the five important groups of soils. Thus, five curves were plotted on a chart for each crop. The top curve was for the most productive group of soils, and the bottom curve for the least productive. First, estimates were made of yields that could be expected if no fertilizer was used for several years. A second estimate was made of yields that could be expected if a high amount of fertilizer were used, especially nitrogen. A standard yield curve was then drawn through these two points; the shape of the curve between the points was influenced by similar yield responses from experimental data. Expected yields from any fertilizer rate, especially nitrogen, were then read from the curve. Several important conclusions are apparent. The same amount of fertilizer is more efficient in the production of yields on productive soils than on unproductive ones. The optimum, or most profitable, rate of fertilizer application also is higher on productive soils than on unproductive ones.

The general level of fertility and productivity of soils can usually be improved to some extent by management practices. Plowing under crop residues, cover crops, and barnyard manure will add organic matter and some fertilizer elements to the soil. The application of fertilizer in greater amounts than those removed by the harvested crop and by leaching, builds up plant nutrients in the soil; the build-up possibilities are greatest for phosphate, somewhat less for potash, and least for nitrogen. The cost of practices that improve the soil is a longtime investment rather than an annual operating expense. Yields for an improved, or built-up, soil that was not fertilized would be higher than the yields shown in table 9 for soils not fertilized.

The productivity of a soil may be improved, but because of inherent physical differences in soils, it is probably impossible to make an unproductive soil the equal of a productive one. However, an improved poor soil might be more productive than an unimproved better soil.

Following is a discussion of the practices assumed necessary to obtain the yields estimated in table 9.

Corn.—In preparing the seedbed, the soil should be turned deeply to cover residues. Seed of a locally adapted hybrid or of an open polinated variety of good quality and germination should be used. The planting rate should provide stands of 8,000 to 12,000 plants if the soil is fertilized at the lower rate and stands of 12,000 to 18,000 plants if at the higher rate; thus, the density of the plants would be lowest on the less productive soils. The minimum amount of cultivation should be used. It should be shallow and primarily for control of weeds. If herbicides are used, fewer cultivations should be necessary.

The rate of fertilization should be related to the productivity of the soil. Considering prices of corn and fertilizer at the time of the survey, the optimum, or most profitable, rate of fertilization on the best soils is 150 pounds of nitrogen and 75 pounds each of P_2O_5 and K_2O, which produces 85 bushels of corn. As indicated by the asterisks in table 9, the optimum yield decreases to 22 bushels on some of the soils when a rate of 60 pounds of nitrogen and 30 pounds each of P_2O_5 and K_2O is used. In estimating the optimum rate, only the fertilizer cost is considered. The other costs are not considered. It is also assumed that corn production is profitable at all levels of fertilization, but this assumption is not true for all classes of soils in Spalding County. A yield of about 30 or 35 bushels is probably necessary to cover all costs of corn production. If so, corn should not be grown on soils that produce less with the most profitable rate of fertilization. Also, corn can be grown with varying amounts of profit on the better soils by using only 30 pounds of nitrogen. Profit will be increased on those soils by using more than 30 pounds of nitrogen up to the rate indicated by the asterisks. On some farms the cost of fertilizer may not permit the use of the high optimum rate. A lower rate

[3] OSCAR STEANSON, associate agricultural economist, Georgia Agricultural Experiment Stations, assisted in the preparation of this subsection.

will be profitable, and the return per dollar actually spent for fertilizer will be higher than the return would have been at the higher optimum rate. Another factor in favor of less than optimum rates is the risk of lower yields caused by critical drought periods, although the yields in table 9 are average.

Cotton.—A good seedbed should be prepared for cotton as well as for corn. The seed should be a locally adapted variety with a high rate of germination. The density of stand should range from 25,000 to 35,000 plants, depending on the expected yield. Chopping and hoeing should be done where necessary for stand and weed control. Cultivation should be shallow and primarily for weed control. Use of a herbicide may reduce the number of cultivations. If mechanical picking is contemplated, all cultural practices should be designed so as to leave the land favorable for machine operation.

As indicated by the asterisks in table 9, the most profitable rate of fertilization is higher on the better soils than on the poorer soils. In contrast to corn yields, cotton yields on all the soils rated for it are sufficiently high (300 pounds of lint or better) to provide gross returns that will cover all costs of production and give a small profit. This wide adaptability has made cotton an outstanding cash crop throughout the history of the South. Like corn and other crops, cotton will have higher yields and will use fertilizer more efficiently on the better soils. For this reason, farmers have usually selected their better fields for cotton. Some farmers have grown cotton continuously in the same fields for many years if there was not comparable land for rotation purposes.

The precise relationship of the rate of fertilization to yields is difficult to determine because costs other than fertilizer also affect yields. Most important among these other costs are insect control and weed control. Fertilizer cannot do what is expected without these controls and a good job of tillage. The value of the cotton crop must cover all costs; the proportion of the cost allocated to fertilizer must be determined by judgment and experience.

Oats and wheat.—Small grains are usually regarded as extensive or low value-per-acre crops. Consequently, acre costs must be kept low if a profit is to be realized. Seedbeds can be prepared adequately with disks, and the total labor and machinery costs can be reduced by using larger machinery. Good seed treated for disease should be planted.

The rate of fertilization for small grains, as for other crops, should be related to the productivity of the soil. Small grains, however, will probably return a small profit even on most of the less productive soils. At prices current at the time of the survey, the return above fertilizer costs is higher for wheat than for oats because of the extremely low price of oats.

For all crops the most profitable rate of fertilization changes with changes in either the price of the crop or the price of fertilizer. Higher rates of fertilization will be profitable if the price of the crop increases or the price of fertilizer decreases. Lower crop prices and higher fertilizer prices will lower the most profitable rate of fertilization. Under prices current at the time of the survey, wheat should probably be planted on the more productive soils and oats on the less productive ones.

Small grains have other advantages in a farming system besides their net returns. They are close growing and winter growing, and therefore help to control soil erosion and runoff during the winter and spring. Also their early harvest permits the growing of a second crop, such as lespedeza, soybeans, or grain sorghum, which can add to the net returns of the small grain. Another advantage is that they may be grazed during the winter without much, if any, reduction in yields.

Tall fescue and white or ladino clover pasture.—Tall fescue is a perennial winter-growing crop that has a long grazing season and a high carrying capacity if the soil is adequately fertilized. It should, therefore, be an excellent pasture grass. Some of its disadvantages are its high fertilizer requirement, low growth rate during fall because of inadequate rainfall, and a somewhat lower nutritional value than the small grains and ryegrass—its principal competitors for winter grazing. These advantages and disadvantages of tall fescue emphasize the importance of its management.

Tall fescue is usually regarded as semi-dormant in the summer, because its growth is low at that time. The low summer growth, however, is probably due in part to the exhaustion of nitrogen supplies during spring. If tall fescue is needed for summer grazing, an application of nitrogen in June would probably increase its summer growth. In any event, summer is the time to get the pasture ready for winter grazing. The summer growth should be removed by mowing or grazing. This semi-dormant growth is of low nutritional value and makes very low quality hay. Therefore, during August and September, this pasture should be grazed by dry beef or dairy cows and heifers because they usually require only maintenance of weight or low daily gain. Satisfactory milk production from dairy cattle and daily gains from beef calves should not be expected from this low-grade summer forage.

Summer grazing of tall fescue may reduce the grazing of bermudagrass pastures, so that they may recover and provide more grazing late in summer and early in fall.

Since its growth is small during the winter, tall fescue should be fertilized with the three main nutrient elements—nitrogen, phosphorus, and potassium—in September or October. Thus, the fall rains can be utilized and as much fall growth as possible will be obtained. If the fall weather is dry, as it sometimes is, there will be little fall growth and other feed must be substituted for the expected grazing. Maximum gains are obtained by dairy cows or beef calves, if the forage is grazed while in the succulent, high-quality stage. Full growth or maturity reduces its nutritive value. Stocking rates and supplementary feeding can be adjusted to extend the fall and winter grazing period. Grazing of the fall growth by beef can be expensive maintenance. Limited grazing supplemented by hay will probably reduce the wintering costs.

Nitrogen should be applied in February to obtain the maximum spring growth of tall fescue. For best performance, the spring growth should be grazed in the succulent stage. As indicated by many seed stems, rapid growth and natural maturity bring about a deterioration in the quality of the forage.

Like other crops, tall fescue will produce higher yields of forage on productive soils than on less productive ones. Since it apparently requires a large amount of fertilizer, tall fescue that is to be intensively grazed probably should be planted only on the better soils, where the highest response can be expected from fertilizer. It may be profitable on the less productive soils, but fertilization and stocking practices should be in proper relationship to the productivity of the soil.

More attention should probably be given to the use of clovers on the less productive soils. Clover may make up a higher proportion of the total forage growth on areas where the stocking rates are lowest. Also, a good clover growth will furnish more nitrogen for the grass and thereby reduce the needed amount of applied nitrogen.

The yields of forage, in terms of cow-acre-days of grazing, are shown for the different soils in table 9. The yields marked by an asterisk indicate approximately the most profitable rates of fertilization. The most profitable rates are highest on the best soils, and lower on the soils of low productivity. The cost of fertilizer per day of extra grazing that it produces is about equal on different soils at the most profitable rates of fertilization. The stocking rates, of course, must be lower on the less productive soils.

Common bermudagrass and crimson clover pasture.—Many farms have large acreages of common bermudagrass. This grass has invaded cultivated fields, and much effort and expense have been expended to control it. Probably only small acreages have been actually planted to bermudagrass. If new plantings are made, Coastal bermudagrass should be used, as it is almost twice as productive as common bermudagrass.

Bermudagrass forage should be grazed in the succulent stage when the quality is highest. If this grass is heavily fertilized with nitrogen, the growth may exceed livestock consumption and become stemmy, or lose much nutritive value. Therefore, management practices should include the application of the right amount of fertilizer at the right time, the rotation of livestock among several pastures, and a proper rate of stocking.

The bermudagrass pastures in this county should be overseeded with crimson clover so as to advance the grazing season into early spring and perhaps into the winter months. This is not a sure and cheap practice. Reseeding of the clover often fails because of dry weather in fall and because of insects. A new planting of high-priced clover seed may be often necessary. Light fall disking, which seems to improve the chances of a stand, may also be necessary. The use of machinery and insecticides increases maintenance costs. In addition, phosphate and potash should be spread in the fall for immediate use by the clover and later by the bermudagrass. If a good growth of clover is obtained, limited grazing is sometimes available before cold weather. The least to be expected is good grazing during March and April before the bermudagrass is available for grazing (about May 1).

A good clover growth should eliminate the necessity of an application of nitrogen early in spring. One or two applications of nitrogen about July 1 and September 1 will help the growth of forage in summer and early in fall. The seasonal growth of bermudagrass should be regulated to some extent by the amount and time of the nitrogen application. Forage growth and the needs of livestock can thus be balanced.

In the analysis of pasture yields for common bermudagrass and crimson clover, in terms of cow-acre-days of grazing shown in table 9, stocking rates were based on the bermudagrass only in a grazing period from May 1 to November 30. A grazing period for clover, from March 1 to April 30, was then added to make the total grazing period. The reported cow-acre-day yield is therefore for the combined grazing period of bermudagrass and crimson clover. Bermudagrass, like other crops, produces better on the more productive soils. The better soils, however, commonly are used for other crops and the poorer soils for pasture. Asterisks in the table indicate approximately the most profitable yields and fertilizer rates. The cost of fertilizer, lime, and clover seed per cow-acre-day of grazing is about equal at the most profitable rates on different soils. Lower stocking rates are needed on the less productive soils to give the clover a chance to grow. These lower rates also allow more clover forage per cow than a high stocking rate. An overstocked pasture of low productivity is likely to be overgrazed.

Woodland [4]

Stands of loblolly and shortleaf pines originally covered the uplands of Spalding County. Yellow-poplar, gum, oak, maple, and ash were on bottom lands. By 1920 most of the original timber had been cut, and the uplands had reseeded naturally to loblolly and shortleaf pines. In the 1930's and 1950's, the stands of second-growth pine, as well as the better second-growth hardwoods on bottom lands were cut heavily. Loblolly and shortleaf pines are now the dominant trees on uplands, but many areas have been invaded by undesirable hardwoods. Low-grade hardwoods are dominant on the bottom lands.

Most soils in the county are well suited to trees. Approximately 49 percent of the total land area in Spalding County is woodland. About 96 percent of this woodland is owned by farmers and other individuals, and the rest is owned by companies or by the State. Farmers and foresters are restocking sparse stands to increase the yields of wood products.

In July 1946, the Georgia Forestry Commission, at the request of the county commissioners, organized a fire protection unit in the county. Since then no forest fire has burned more than a few acres. This fire control has also protected the soils, because burned-over land is generally highly susceptible to erosion.

In 1954, according to the U.S. Bureau of the Census, 2,361 cords of pulpwood were cut in the county. In 1959, the amount was 2,929 cords. In contrast, the volume of saw and veneer logs cut dropped from 976,000 board feet in 1954 to 147,000 board feet in 1959.

Adequate markets for lumber, veneer, and pulpwood are within reach. The county needs a market, however, for low-grade hardwoods that cannot be used for lumber and veneer.

In 1954, 13,853 acres of woodland were pastured. By 1959, this acreage had decreased to 8,963 acres. This reduction in pastured woodland helped to reduce the amount of erosion, because much of the ground cover is destroyed by the browsing, bedding, and movement of livestock.

In areas where eroded cotton land reseeded to shortleaf pine just before or after 1930, littleleaf disease is a severe problem. Some improvement has resulted from proper

[4] T. A. McFarland, woodland conservationist, SCS, assisted in preparing this section.

tree spacing. Efforts are being made to reestablish loblolly or slash pine on the eroded cotton land.

Woodland suitability grouping

Management of woodland can be planned more effectively if soils are grouped according to those characteristics that affect growth of trees and management of stands. For this reason, the soils of Spalding County have been placed in nine woodland suitability groups. Each group consists of soils that have about the same suitability for wood crops, require about the same management, and have about the same potential productivity.

The nine woodland suitability groups in this county are listed in table 10 and are described in the text. In this table the average site index is given for various kinds of trees on soils of each suitability group, the yearly growth that can be expected from the trees, and the hazards and limitations that affect the management of each group.

The potential productivity of a soil for a specified kind of tree is expressed as a *site index*. A site index for a given soil is the height, in feet, that a specified kind of tree growing on that soil will reach in 50 years. The site index for a given tree depends mainly on the capacity of the soil to provide moisture and growing space for tree roots. Each site index in table 10 is an average for all the soils in the suitability group. The site index for any one soil in the group may be somewhat different from the average. For this reason, table 11 is provided. It gives site indexes for 21 mapping units, and it can be used by those who want more detailed information about productivity.

TABLE 10.—*Woodland suitability groups of soils, average site index and yearly growth of commercially important trees, and the chief hazards and limitations in managing woodland*

Woodland suitability group	Map symbols [1]	Important trees [2]	Average site index [3]	Yearly growth [4]	Hazards and limitations
				Cords per acre	
Group 1: Deep, highly productive, well-drained soils on bottom lands.	Alm, Lcm	Yellow-poplar Sweetgum Loblolly pine Shortleaf pine Water oak	110 100 106 86 90	2.1 (5) 2.1 1.8 (5)	Plant competition during establishment of stands; to control plant competition, special site preparation is necessary and some treatment is required for 1 to 2 years after planting.
Group 2: Deep, productive, well-drained, moderately permeable soils on uplands; slightly to moderately eroded.	AmB, AmB2, AmC2; CYB, CYB2, CYC, CYC2, CYD, CYD2, CYE; DgB2; LdB2, LdC2, LdD2, LdE2, LGB2; MjB2, MjC2, MjD2.	Loblolly pine Yellow pine Shortleaf pine Red oak	82 80 71 70	1.3 1.2 1.2 .6	Moderate plant competition on gentle slopes, increasing to severe near the base of steeper slopes because of the buildup of moisture.
Group 3: Deep, moderately productive, moderately well-drained soil on stream terraces.	AlB2	Loblolly pine Shortleaf pine Red oak	75 68 65	1.2 1.2 .5	Moderate seedling mortality and moderate erosion, windthrow, and drought hazards because of shallow surface layer.
Group 4: Deep, well-drained, moderately permeable soils on uplands; clay loam or sandy clay loam surface layer.	AnB3, AnC3; CZB3, CZC3, CZD3; DhB3, DhC3; LeB3, LeC3, LeD3; LFB3, LFC3; LeC4, LeE4; MlB3, MlC3.	Loblolly pine Shortleaf pine	74 66	1.2 1.2	Erosion is a severe hazard on all soils of this group; moderate seedling mortality, equipment limitations, and drought and windthrow hazards on gentle slopes, increasing to severe on steeper slopes.
Group 5: Deep, somewhat excessively drained, rapidly permeable, sandy soils on uplands and stream terraces.	LnB, LnC, LnD; LlC2, LlD2; MtC.	Loblolly pine Shortleaf pine	78 69	1.4 1.3	Seedling mortality is mostly moderate but varies according to depth of sandy, rapidly permeable surface layer.
Group 6: Imperfectly drained soils on uplands; shallow to a mottled layer; compact subsoil.	CiB; HYB2, HYC2.	Loblolly pine Shortleaf pine Sweetgum Red oak	72 63 75 70	1.1 1.1 (5) .6	Moderate plant competition, seedling mortality, erosion and windthrow hazards, and equipment limitations because of shallow surface soil and imperfectly drained subsoil.
Group 7: Slowly permeable soils on uplands; heavy plastic subsoil.	HZB3, HZC3; WkB.	Loblolly pine Shortleaf pine	68 60	1.1 1.1	Severe plant competition, seedling mortality, and severe windthrow hazard because of plastic subsoil and poor drainage.

See footnotes at end of table.

TABLE 10.—*Woodland suitability groups of soils, average site index and yearly growth of commercially important trees, and the chief hazards and limitations in managing woodland*—Continued

Woodland suitability group	Map symbols [1]	Important trees [2]	Average site index [3]	Yearly growth [4]	Hazards and limitations
Group 8: Shallow to moderately shallow, low-producing soils on uplands.	WiB2, WiD2	Loblolly pine Shortleaf pine	63 55	0.9 .9	Severe seedling mortality and severe drought hazard because of shallow surface soil and undeveloped subsoil; moderate erosion and windthrow hazards.
Group 9: Imperfectly drained and poorly drained soils on stream terraces and bottom lands.	Alp, Avp; Csl; Rol; Wer	Loblolly pine Sweetgum Blackgum Green ash Water oak Shortleaf pine	88 90 80 80 80 79	1.5 (5) (5) (5) (5) (5)	Excessive moisture causes severe plant competition, severe equipment limitations, and moderate seedling mortality.

[1] Gullied land (Gul) and Rock outcrop (Rok) are not included, since commercial species generally do not grow on these land types.
[2] Species listed are generally favored for production of major wood products.
[3] Site index is the average height of dominant trees in a stand at 50 years of age.
[4] Average yearly growth up to age of 35 years, in standard rough cords per acre of fully stocked natural stands without intensive management. Adapted from USDA Misc. Pub. 50 (Now out of print) *(8)*; N.C. State Tech. Bul. 100 *(5)*; unpublished MS. by E. F. McCarthy; and USDA Bul. 560 *(4)*.
[5] Adequate growth figures not available.

TABLE 11.—*Site index ratings of commercially important trees on selected mapping units*

[Absence of figure indicates insufficient data for determining site index]

Map symbol	Soil name	Loblolly pine	Shortleaf pine	Yellow-poplar	Sweetgum	Red oak	Water oak	Green ash	Woodland suitability group
Alm	Alluvial land	[1] 105	[1] 95	[1] 108	[1] 98	[1] 80	[1] 90	[1] 80	1
Alp	Alluvial land, moderately wet	[1] 88	[1] 79	[1] 90	[1] 84	[1] 80	[1] 90	[1] 80	9
Avp	Alluvial land, wet	[1] 88	[1] 79	[1] 90	[1] 84	[1] 80	[1] 90	[1] 80	9
AmB2	Appling sandy loam, 2 to 6 percent slopes, eroded	83	[1] 69						2
AnC3	Appling sandy clay loam, 6 to 10 percent slopes, severely eroded	[1] 75	[1] 65						4
CYB2	Cecil sandy loam, 2 to 6 percent slopes, eroded	82	68						2
CZC3	Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded	74	66						4
Csl	Chewacla silt loam	100	[1] 85	[1] 92	[1] 81	[1] 80	[1] 90	[1] 80	9
CiB	Colfax sandy loam, 2 to 6 percent slopes	[1] 75	66						6
DhC3	Davidson clay loam, 6 to 10 percent slopes, severely eroded	[1] 73	[1] 66						4
HYC2	Helena sandy loam, 6 to 10 percent slopes, eroded	[1] 75	66						6
LdB2	Lloyd sandy loam, 2 to 6 percent slopes, eroded	[1] 84	[1] 72						2
LeC3	Lloyd clay loam, 6 to 10 percent slopes, severely eroded	75	67						4
LnC	Louisburg sandy loam, 6 to 10 percent slopes	[1] 75	[1] 68						5
Lcm	Local alluvial land	93	84	[1] 95	[1] 85	[1] 80	[1] 90	[1] 80	1
MjC2	Madison fine sandy loam, 6 to 10 percent slopes, eroded	[1] 80	[1] 70						2
MlC3	Madison sandy clay loam, 6 to 10 percent slopes, severely eroded	[1] 73	[1] 65						4
MtC	Molena loamy sand, 2 to 10 percent slopes	[1] 78	[1] 69						5
Wer	Wehadkee and Roanoke silty clay loams	[1] 86	[1] 77						9
WiB2	Wilkes sandy loam, 2 to 6 percent slopes, eroded	[1] 68	[1] 60						8
WkB	Worsham sandy loam, 2 to 6 percent slopes	[1] 68	[1] 60						7

[1] Data extrapolated from measurements on soils having similar characteristics.

As shown in table 10, each woodland suitability group has, in varying degree, limitations that affect its management. Some of these limitations are expressed in the relative terms "slight," "moderate," or "severe." The limitations and relative terms are explained in the following paragraphs.

Plant competition.—After a woodland has been disturbed by fire, cutting, grazing, or some other means, it may be invaded by undesirable brush, trees, and plants that compete with the desirable trees and hinder their establishment and growth.

Competition is *slight* if unwanted plants are no special problem. Competition is *moderate* if the invaders delay but do not prevent the establishment of a normal, fully stocked stand. Where plant competition is moderate, seedbed preparation is not generally needed, and simple methods will prevent undesirable plants from invading. Competition is *severe* if trees cannot regenerate naturally. Where competition is severe, the site should be carefully prepared, and management that includes controlled burning, spraying with chemicals, and girdling should be used.

Equipment limitation.—Such soil features as drainage, slopes, stoniness, or texture may restrict or prohibit the use of ordinary equipment in pruning, thinning, harvesting, or other practices. The equipment needed and its method of operation and season of use may be different for different soils.

The limitation is *slight* if there are no restrictions on the type of equipment or on the time of year that the equipment can be used. The limitation is *moderate* if use of heavy equipment is restricted by moderately steep slopes, by wetness in winter and early in spring, or by possible damage to tree roots. The limitation is *severe* if not many types of equipment can be used, if the time that equipment cannot be used is more than 3 months a year, and if it severely damages the roots of trees and the structure and stability of the soil. The limitation is also severe on moderately steep and steep soils that are stony and broken by rock outcrops, and, in winter or early in spring, on soils on wet bottom lands and low terraces.

Seedling mortality.—Even when healthy seedlings of a suitable tree are correctly planted or occur naturally in adequate numbers, some of them will not survive if characteristics of the soil are unfavorable.

Mortality is *slight* if not more than 25 percent of the planted seedlings die, or if trees do not regenerate naturally in places where there are enough seeds. It is *moderate* if 25 to 50 percent of the seedlings die, or if trees do not regenerate naturally in numbers needed for adequate restocking. In some places, replanting to fill open spaces will be necessary. Mortality is *severe*, if more than 50 percent of the planted seedlings die, or if trees do not reseed naturally in places where seeds are plentiful. If mortality is severe it is necessary to (1) plant seedlings where seeds do not reproduce, (2) prepare special seedbeds, and (3) use good methods of planting to ensure a full stand of trees.

Windthrow hazard.—Soil characteristics affect the growth of tree roots and their ability to anchor a tree against the force of wind. A high water table or an impermeable soil layer can prevent root growth. The protection of surrounding trees also affects windthrow hazard. Knowing the degree of this hazard on a soil is important in choosing trees for planting and in planning release cuttings or harvest cuttings.

The windthrow hazard is slight if roots hold the tree firmly against a normal wind. Individual trees are likely to remain standing if protective trees on all sides are removed. The hazard is moderate if the roots are well enough developed to hold the tree firmly, except when the soil is excessively wet and the wind is very strong. The hazard is severe if rooting is not deep enough to give adequate stability. Individual trees are likely to be blown over if protective trees are removed on all sides.

Erosion hazard.—Woodland can be protected from erosion by (1) choosing the kinds of trees, (2) adjusting the rotation age and cutting cycles, (3) using special management, and (4) carefully constructing and maintaining roads, trails, and landings.

The erosion hazard is rated according to the degree of erosion that can be expected on well-managed woodland that is not protected by special practices. It is *slight* if a small loss of soil is expected. Generally, erosion is slight if slopes range from 0 to 2 percent and runoff is slow or very slow. The erosion hazard is *moderate* where a moderate loss of soil can be expected if runoff is not controlled, and the soil is not protected by a vegetative cover. The erosion hazard is *severe* where steep slopes, rapid runoff, slow infiltration, slow permeability, and past erosion make the soil susceptible to further erosion.

On the following pages, the nine woodland suitability groups of this county are described, and the soils in each group are listed. Gullied land and Rock outcrop are not included because adequate stands of commercially important trees normally do not grow on these land types.

WOODLAND SUITABILITY GROUP 1

In this group are highly productive, deep, well-drained land types on first bottoms and in depressions. They are—

Alluvial land.
Local alluvial land.

Except for plant competition, the problems in managing these land types for woodland are few or none. The average site index is 106 for loblolly pine and 86 for shortleaf pine.

Competition from underbrush is usually severe after removal of the overstory.

Clearing, harrowing, furrowing, burning, poisoning, planting, or other special practices are usually necessary to assure well-stocked stands. Seedling mortality, erosion, windthrow, and drought are no special problems on these soils. The equipment limitation is moderate during short periods of excessive rain in winter.

WOODLAND SUITABILITY GROUP 2

In this group are productive, deep, well-drained, moderately permeable soils on uplands. These soils are slightly to moderately eroded; slopes range from 2 to 25 percent. The soils are—

Appling sandy loam, 2 to 6 percent slopes.
Appling sandy loam, 2 to 6 percent slopes, eroded.
Appling sandy loam, 6 to 10 percent slopes, eroded.
Cecil sandy loam, 2 to 6 percent slopes.
Cecil sandy loam, 2 to 6 percent slopes, eroded.
Cecil sandy loam, 6 to 10 percent slopes.
Cecil sandy loam, 6 to 10 percent slopes, eroded.
Cecil sandy loam, 10 to 15 percent slopes.

Cecil sandy loam, 10 to 15 percent slopes, eroded.
Cecil sandy loam, 15 to 25 percent slopes.
Davidson loam, 2 to 6 percent slopes, eroded.
Lloyd sandy loam, 2 to 6 percent slopes, eroded.
Lloyd sandy loam, compact subsoil, 2 to 6 percent slopes, eroded.
Lloyd sandy loam, 6 to 10 percent slopes, eroded.
Lloyd sandy loam, 10 to 15 percent slopes, eroded.
Lloyd sandy loam, 15 to 25 percent slopes, eroded.
Madison fine sandy loam, 2 to 6 percent slopes, eroded.
Madison fine sandy loam, 6 to 10 percent slopes, eroded.
Madison fine sandy loam, 10 to 15 percent slopes, eroded.

The soils of this group have few woodland management problems that are specifically related to soil characteristics. The average site index is 82 for loblolly pine (fig. 9) and 71 for short leaf pine.

Figure 9.—**A well-managed, 15-year-old stand of loblolly pine on soil in woodland suitability group 2.**

Plant competition is moderate on the gentle slopes and increases to severe at the base of slopes where moisture builds up. Although plant removal or other treatment is not always necessary, some control of competition generally improves growing conditions and is essential if a new stand must be established under severe conditions. Seedling mortality is not a hazard. Survival generally is good in planted or naturally reseeded stands. Because of soil depth and permeability, erosion and windthrow hazards are slight. A good ground cover, however, should be maintained to control erosion. Standard logging equipment can be used at all times during the year. Moisture conditions remain normal in these soils regardless of dry periods.

WOODLAND SUITABILITY GROUP 3

Altavista sandy loam, 2 to 6 percent slopes, eroded, is the only soil in this group. This is a deep and moderately well drained soil on stream terraces. It is moderately productive.

The average site index is 75 for loblolly pine and 68 for shortleaf pine.

Plant competition is slight. Equipment limitations are slight; usually standard logging equipment can be used throughout the year. Because of the shallow surface soil, seedling mortality, erosion, windthrow, and drought are moderate hazards in this soil and must be considered in planning woodland management. Seedling mortality ranges from 25 to 50 percent of the planted stock, and some interplanting is usually necessary.

WOODLAND SUITABILITY GROUP 4

This group consists of severely eroded, deep, well-drained, moderately permeable soils on uplands. These soils have a sandy clay loam or clay loam surface layer. The soils are—

Appling sandy clay loam, 2 to 6 percent slopes, severely eroded.
Appling sandy clay loam, 6 to 10 percent slopes, severely eroded.
Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded.
Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded.
Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded.
Davidson clay loam, 2 to 6 percent slopes, severely eroded.
Davidson clay loam, 6 to 10 percent slopes, severely eroded.
Lloyd clay loam, 2 to 6 percent slopes, severely eroded.
Lloyd clay loam, compact subsoil, 2 to 6 percent slopes, severely eroded.
Lloyd clay loam, 6 to 10 percent slopes, severely eroded.
Lloyd clay loam, 10 to 15 percent slopes, severely eroded.
Lloyd clay loam, compact subsoil, 6 to 10 percent slopes, severely eroded.
Lloyd-Gullied land complex, 6 to 10 percent slopes.
Lloyd-Gullied land complex, 10 to 25 percent slopes.
Madison sandy clay loam, 2 to 6 percent slopes, severely eroded.
Madison sandy clay loam, 6 to 10 percent slopes, severely eroded.

The average site index is 74 for loblolly pine (fig. 10) and 66 for shortleaf pine.

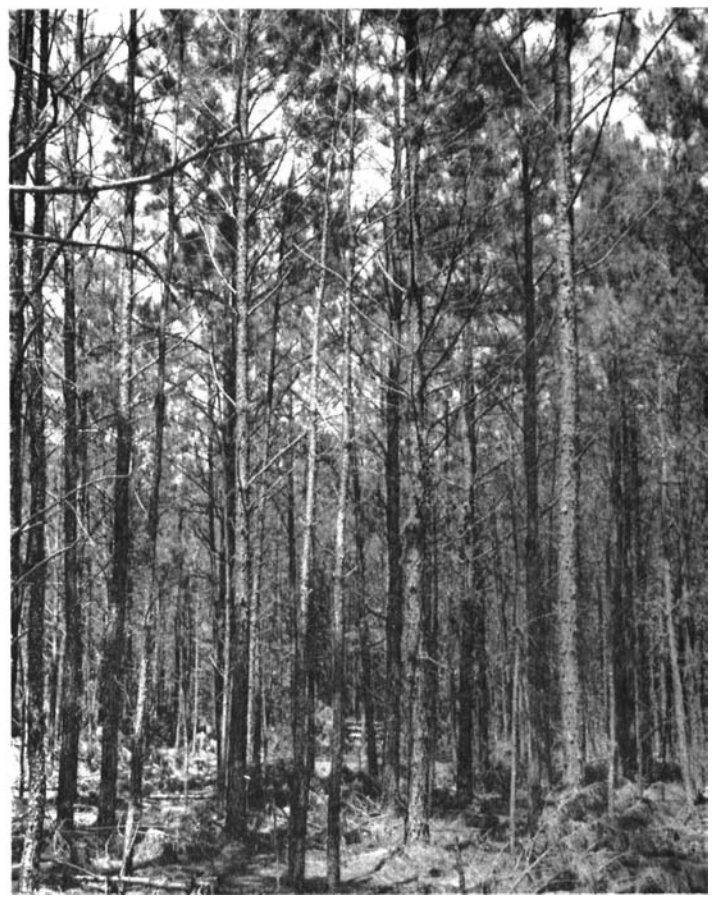

Figure 10.—**A recently thinned stand of loblolly pine on soils in woodland suitability group 4. Pulpwood cut from this stand averaged 4 cords per acre.**

Plant competition, following the removal of the overstory, is slight. No special treatment is necessary to maintain normal growth of stands. Equipment limitations and seedling mortality, windthrow, and drought hazards are moderate on the more gentle slopes and increase to severe on the steeper, more eroded slopes. Erosion is severe to very severe on all soils in this group.

WOODLAND SUITABILITY GROUP 5

This group consists of rapidly permeable soils on uplands. They have a thick, generally coarse-textured surface layer. The soils are—

Louisburg sandy loam, 2 to 6 percent slopes.
Louisburg sandy loam, 6 to 10 percent slopes.
Louisburg sandy loam, 10 to 15 percent slopes.
Louisburg soils, 6 to 10 percent slopes, eroded.
Louisburg soils, 10 to 15 percent slopes, eroded.
Molena loamy sand, 2 to 10 percent slopes.

The average site index is 78 for loblolly pine and 69 for shortleaf pine.

Because of rapid internal drainage and lack of moisture, plant competition is not a hazard on these soils. Seedling mortality is within the moderate range but varies somewhat according to the thickness of the surface layer. Where the surface layer is thick, the loss is 25 to 50 percent; where it is thinner, the loss is greater. Erosion, windthrow, and equipment limitations are slight. Drought is a moderate hazard during long dry periods because the soils are shallow and have rapid internal drainage.

WOODLAND SUITABILITY GROUP 6

This group consists of imperfectly drained soils on uplands. These soils are shallow over a mottled layer and have a compact subsoil. They are—

Colfax sandy loam, 2 to 6 percent slopes.
Helena sandy loam, 2 to 6 percent slopes, eroded.
Helena sandy loam, 6 to 10 percent slopes, eroded.

The average site index is 72 for loblolly pine and 63 for shortleaf pine.

Plant competition is moderate as a result of imperfect drainage. Although this competition usually does not prevent adequate natural regeneration, it may delay the growth of stands unless it is controlled. Seedling mortality is moderate because the shallow, compact subsoil impedes root growth and the early establishment of stands. From 25 to 50 percent mortality can be expected, and some replanting will be needed to fill in openings.

Equipment limitations and erosion, windthrow, and drought hazards are moderate, primarily because of the imperfect drainage and plastic subsoil.

WOODLAND SUITABILITY GROUP 7

The soils in this group are on uplands and have a slowly permeable, plastic subsoil. They are—

Helena sandy clay loam, 2 to 6 percent slopes, severely eroded.
Helena sandy clay loam, 6 to 10 percent slopes, severely eroded.
Worsham sandy loam, 2 to 6 percent slopes.

The average site index is 68 for loblolly pine and 60 for shortleaf pine.

Surplus moisture favors the invasion of many undesirable plants. Therefore, plant competition is a severe hazard and must be controlled during the establishment and growth of a stand. As these soils have a fine-textured, plastic subsoil, seedling mortality is severe. The soils are usually too wet or too dry for seedbed preparation, and at times more than 50 percent of planted stands are lost. The windthrow hazard is severe because roots cannot grow in the plastic subsoil. Equipment limitations are moderate because of the plastic subsoil and periods of wetness. Since the slopes are gentle and generally protected by a good ground cover, erosion is only a slight hazard.

WOODLAND SUITABILITY GROUP 8

In this group are shallow to moderately shallow soils on uplands. They are—

Wilkes sandy loam, 2 to 6 percent slopes, eroded.
Wilkes sandy loam, 10 to 15 percent slopes, eroded.

These soils are low in production and have many limitations. The average site index is 63 for loblolly pine and 55 for shortleaf pine.

On these shallow, rocky, and droughty soils, plant competition is a slight hazard, seedling mortality and drought are severe hazards, and erosion and windthrow are moderate hazards. More than 50 percent seedling mortality can be expected if drought occurs during planting or during the first growing season. Even some of the larger trees die if there is a prolonged drought.

WOODLAND SUITABILITY GROUP 9

In this group are somewhat poorly drained and poorly drained soils on first bottoms. The soils are—

Alluvial land, moderately wet.
Aluvial land, wet.
Chewacla silt loam.
Roanoke and Augusta sandy loams.
Wehadkee and Roanoke silty clay loams.

The average site index is 88 for loblolly pine and 79 for shortleaf pine. Excess moisture promotes severe plant competition (fig. 11), which must be controlled before a desirable stand can be established. Equipment limitations are severe following long periods of rainfall. Also because

Figure 11.—Low-grade hardwoods occupy large areas of soils in woodland suitability group 9.

of too much moisture, seedling mortality is a moderate hazard. Usually the mortality is 25 to 50 percent and prevents the growth of fully stocked stands. Erosion and windthrow hazards are normally slight.

Protective practices

Grazing, fire, insects, and disease damage or destroy trees and reduce the amount of wood products harvested.

Protection from grazing.—Wooded areas ought to be protected from heavy grazing, which not only destroys seedlings and damages trees, but also makes the soil more likely to erode and less likely to take in and store water for trees. Uncontrolled grazing is especially harmful on steep or eroded woodland. If the woodland must be used for grazing the livestock should be so distributed that not more than 40 percent of the low-growing cover is eaten. Grazing is less harmful to woodland in April, May, and June than at other times because more forage is available in those months. Cattle generally damage trees less than do other grazing animals.

Protection from fire.—Fire kills seedlings, young trees, and some larger trees (fig. 12). It also destroy humus and litter and thereby increases the hazard of erosion.

Firebreaks help protect wooded areas by checking or stopping fires. A road in the woods, or a plowed or disked fire lane can be used as a firebreak. At a firebreak, the firefighters can start a backfire to counter an advancing fire. Firebreaks should connect with streams, ponds, public roads, utility rights-of-way, or other barriers.

Protection from insects and disease.—Serious losses from diseases and insects are not likely on woodland in Spalding County. To avoid damage from insects, cut trees in fall or winter. Log the woodland with care so that the trees left standing are not scarred and thus made more susceptible to disease.

Wildlife

Wildlife is dependent upon the soil, water, and plant resources of an area. The largest populations of fish, wild animals, and birds are generally in areas of the more productive soils. Wildlife is often abundant, however, on wet soils and on some other soils that normally are not suitable for intensive farming. The Wehadkee soils, for example, are too wet for most crops. Nevertheless, they are well suited to Japanese millet, smartweed and other plants that tolerate water. After these plants have grown, the soils can be flooded to provide habitats for ducks.

Figure 12.—Wildfire in a pine forest.

Most of the soils in the county are suitable for bicolor lespedeza, browntop millet, field peas, Kobe lespedeza, sorghum, partridgepeas, fruit or nut trees, and other plants that provide food for wildlife. But Lloyd-Gullied land complex, 10 to 25 percent slopes, Wilkes sandy loam, 10 to 15 percent slopes, eroded, and all of the very severely eroded soils, as well as the Wehadkee soils, are poorly suited or, at most, only moderately well suited to some of these crops. Most of the soils of the county are suitable for ponds for wildlife use.

Engineering Interpretations of Soils[5]

Soil engineering is well established today. It is, in a broad sense, a subdivision of structural engineering, for it deals with soil as foundation material and as structural material. To the engineer, soils are natural materials that occur in a wide variety over the earth. The engineering properties of these materials may vary widely within the boundaries of a single project.

Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, foundations of buildings, facilities for water storage, erosion control structures, drainage systems, and sewage disposal systems. The properties most important to the engineer are permeability to water, shear strength, compaction characteristics, soil drainage, shrink-swell characteristics, grain size, plasticity, and acidity. The depth to the water table, the depth to bedrock, and the topography also are important.

Generally, soil is used in the locality and condition in which it is found. A large part of soil engineering deals with the location of the various soils, the determination of their engineering properties, the correlation of those properties with the requirements of the job, and the selection of the best material for each job.

This report contains information about the soils of Spalding County that will be helpful to engineers. Emphasis has been placed on the properties of soils that affect agricultural engineering, especially the construction of irrigation systems, farm ponds, and structures that control and conserve soil and water.

The information in this report can be used to—

1. Make studies of soil and land use that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the engineering properties of soils in planning agricultural drainage systems, farm ponds, irrigation systems, and diversion terraces.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways, airports, pipelines, and cables and in planning detailed investigations at the selected locations.

[5] FELTON B. FLOURNOY, agricultural engineer, Soil Conservation Service, assisted in writing this subsection.

4. Locate sources of sand and other construction materials.
5. Correlate performance of engineering structures with soil mapping units and thus develop information for designing and maintaining the structures.
6. Determine the suitability of soils for cross-country movement of vehicles and construction equipment.
7. Supplement the information obtained from other published maps, reports, and aerial photographs for the purpose of making maps and reports that can be readily used by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

Engineers and soil scientists used their knowledge of soils to interpret laboratory tests and field experiences and to determine how the soils in the county will affect engineering. *The interpretations are necessarily generalized, however, and do not eliminate the need for onsite sampling and testing. Without further tests and sampling, the information in this report is not adequate for design and construction of specific engineering works.*

At many construction sites, there are major variations in the soils within the depth of the proposed excavation. Also, several different soils may be found within short distances. By using the maps, soil descriptions, and other data in this report, engineers can plan the detailed investigations necessary at the construction site and only a minimum number of soil samples will be needed for laboratory testing. After the soils have been tested and their behavior, in place, has been observed under varying conditions, the engineer should be able to anticipate, to some

TABLE 12.—*Engineering test data* [1] *for*

Soil name and location	Parent material	Georgia report No.	Depth	Horizon	Moisture-density [2]		Volume change [3]		
					Maximum dry density	Optimum moisture	Shrinkage	Swell	Total volume change
Lloyd sandy loam, compact subsoil:			*Inches*		*Lb. per cu. ft.*	*Percent*	*Percent*	*Percent*	*Percent*
200 yards NW. of New Salem School (Modal).	Granite gneiss.	S60GA-126-1-1	0-3	Ap	110	13	2. 5	6. 0	8. 5
		S60GA-126-1-4	16-32	B2	93	28	11. 5	4. 8	16. 3
		S60GA-126-1-6	42-90+	C	90	28	14. 1	7. 0	21. 1
200 yards E. of Baptist Mission Church (Heavy).	Granite gneiss.	S60GA-126-3-1	0-6	Ap	108	16	8. 3	4. 6	12. 9
		S60GA-126-3-3	10-24	B22	79	29	13. 5	5. 8	19. 3
		S60GA-126-3-5	38-60+	C	90	26	6. 6	15. 2	21. 8
4.5 miles NW. of U.S. 41 on S. side of Ellis Road (Light).	Granite gneiss.	S60GA-126-7-1	0-3	Ap	106	16	7. 6	6. 2	13. 8
		S60GA-126-7-3	7-17	B21	85	31	11. 9	5. 6	17. 5
		S60GA-126-7-5	27-63+	C	94	24	7. 9	9. 4	17. 3
Davidson clay loam:									
2 miles E. of Griffin, between Central of Georgia Railroad and High Falls Road (Modal).	Hornblende gneiss and diabase.	S60GA-126-4-1	0-5	Ap	104	20	8. 7	3. 5	12. 2
		S60GA-126-4-2	5-39	B2	98	21	7. 1	6. 2	13. 3
		S60GA-126-4-3	39-63+	B3	104	20	8. 5	3. 6	12. 1
1.5 miles NE. of Rover (Heavy).	Hornblende gneiss with some mica schist.	S60GA-126-6-1	0-5	Ap	107	17	6. 0	2. 2	8. 2
		S60GA-126-6-2	5-47	B2	102	20	6. 6	1. 8	8. 4
		S60GA-126-6-4	69-100	B32	112	16	4. 7	12. 9	17. 6
0.6 mile NW. of County Line Methodist Church (Light).	Granite gneiss.	S60GA-126-2-1	0-6	Ap	114	14	6. 4	1. 6	8. 0
		S60GA-126-2-3	11-32	B22	90	27	7. 1	14. 4	21. 5
		S60GA-126-2-5	48-68+	C	93	26	11. 6	14. 3	25. 9

[1] Tests performed by the State Highway Department of Georgia, in cooperation with U.S. Department of Commerce, Bureau of Public Roads in accordance with standard procedures of the American Association of State Highway Officials (AASHO), except as stated in footnote 3.

[2] Based on The Moisture-density Relations of Soils, Using 5.5-lb. Rammer and 12-in. Drop, AASHO Designation T 99-57, Methods A and C.

[3] Based on "A System of Soil Classification", by W. F. Abercrombie, Proceedings, Highway Research Board, 1954.

[4] Mechanical analyses according to the AASHO Designation T 88. Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material,

extent, the properties of individual soil units wherever they are mapped.

Many of the terms in this report have a special meaning to soil scientists and farmers and should, therefore, be defined for engineers. Some of the more common terms are defined in the Glossary at the back of the report. Engineers can find additional information about soils in the sections "How the Soil Survey Was Made," "Descriptions of Soils," and "Genesis, Classification, and Morphology of Soils."

Most highway engineers classify soil materials according to the AASHO system (*1*). In this system soil materials are classified in seven principal groups. The groups range from A–1, consisting of gravelly soils of high-bearing capacity, to A–7, consisting of clayey soils that have low strength when wet. Within each group, the relative engineering value of the soil material is indicated by a group index number. Group indexes range from 0 for the best materials to 20 for the poorest. In this report group index numbers are assigned only for the soils on which tests have been performed.

Some engineers prefer to use the Unified system (*9*). In this system, soil materials are identified as coarse grained (8 classes), fine grained (6 classes), or highly organic.

Most of the information in this section is given in tables. Table 12 contains test data on samples taken from six soil profiles. Table 13 briefly describes the soils and gives their estimated physical and chemical properties. Engineering classifications (AASHO and Unified) of the soils are given in both tables 12 and 13. Table 14 evaluates the engineering properties of the soils for specific engineering uses.

soil samples taken from six soil profiles

Mechanical analysis [4]										Liquid limit	Plasticity index	Classification	
Percentage passing sieve—						Percentage smaller than—						AASHO [5]	Unified [6]
2-in.	¾-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
100	96	91	86	79	39	30	20	13	11	[7] NP	[7] NP	A–4(1)	SM.
------	100	99	99	97	83	80	77	63	56	51	14	A–7–5(12)	MH.
------	100	98	97	93	79	74	59	41	37	NP	NP	A–4(8)	ML.
100	98	94	89	79	55	51	44	32	28	20	0	A–4(4)	ML.
------	------	100	98	96	86	83	74	58	50	52	6	A–5(10)	MH.
------	------	100	98	97	74	66	48	30	24	NP	NP	A–4(8)	ML.
------	------	100	99	83	54	51	45	34	30	NP	NP	A–4(4)	ML.
------	------	--------	100	94	87	86	85	74	69	63	21	A–7–5(16)	MH.
------	------	--------	100	89	74	74	66	51	43	NP	NP	A–4(8)	ML.
------	100	95	87	81	67	66	63	55	50	36	12	A–6(7)	ML–CL.
------	------	100	97	90	70	65	60	47	36	NP	NP	A–4(7)	ML.
------	100	99	98	91	77	75	71	64	60	--------	--------	------------	----------
100	99	94	90	80	54	53	50	40	34	27	10	A–4(4)	CL.
------	100	97	95	88	69	69	68	62	56	NP	NP	A–4(7)	ML.
------	------	100	96	80	50	47	46	37	32	34	NP	A–4(3)	SM.
100	96	89	84	75	43	39	34	28	23	23	NP	A–4(2)	SM.
------	------	--------	100	98	84	81	73	56	47	54	11	A–7–5(11)	MH.
------	------	--------	100	99	76	71	63	49	41	NP	NP	A–4(8)	ML.

including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

[5] Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (Pt. 1, Ed. 8): The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes, AASHO Designation M 145–49.

[6] Based on the Unified Soil Classification System, Tech. Memo. No. 3–357, v. 1, Waterways Experiment Station, Corps of Engineers, March 1953.

[7] NP = Nonplastic.

TABLE 13.—*Brief descriptions of the soils and*

[Dashed lines indicate

Map symbol	Soil [1]	Description of soil and site	Depth from surface
			Inches
Alm Alp Avp Lcm	Alluvial land. Alluvial land, moderately wet. Alluvial land, wet. Local alluvial land.	Well-drained to wet, mixed alluvial materials on nearly level flood plains and in slight upland depressions; commonly underlain by stratified layers of recently deposited silt, clay, and sand; depth to bedrock commonly exceeds 10 feet; seasonally high water table at a depth of 0 to 2 feet.	[2] 0–36
AlB2	Altavista sandy loam, 2 to 6 percent slopes, eroded.	Moderately well drained soil on low stream terraces; the uppermost 6 to 12 inches of sandy loam is underlain by 3 feet or more of mottled, friable sandy clay loam formed in old alluvium; some areas are underlain by stratified layers of sand, gravel, and in places, clay at a depth of 4 to 7 feet; depth to bedrock commonly exceeds 12 feet; depth to seasonally high water table about 3 feet.	0–12 12–42 42–58
AmB AmB2 AmC2 AnB3 AnC3	Appling sandy loam, 2 to 6 percent slopes. Appling sandy loam, 2 to 6 percent slopes, eroded. Appling sandy loam, 6 to 10 percent slopes, eroded. Appling sandy clay loam, 2 to 6 percent slopes, severely eroded. Applying sandy clay loam, 6 to 10 percent slopes, severely eroded.	Well-drained soils on uplands; the upper 5 to 10 inches of sandy loam or sandy clay loam is underlain by 2 to 3 feet of mottled, friable to firm sandy clay; beneath this is weathered residuum from gneiss and granitoid gneiss mixed with schist; depth to bedrock from 6 to 15 feet; seasonally high water table at a depth of more than 15 feet.	0–5 5–32 32–58
CYB CYB2 CYC CYC2 CYD CYD2 CYE CZB3 CZC3 CZD3	Cecil sandy loam, 2 to 6 percent slopes. Cecil sandy loam, 2 to 6 percent slopes, eroded. Cecil sandy loam, 6 to 10 percent slopes. Cecil sandy loam, 6 to 10 percent slopes, eroded. Cecil sandy loam, 10 to 15 percent slopes. Cecil sandy loam, 10 to 15 percent slopes, eroded. Cecil sandy loam, 15 to 25 percent slopes. Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded. Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded. Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded.	Well-drained soils on uplands; the upper 5 to 10 inches of sandy loam or sandy clay loam is underlain by 4 to 5 feet of firm to friable sandy clay or sandy clay loam; beneath this is weathered residuum, mainly from gneiss, which, in places, is mixed with schist, granite, and quartzite; depth to bedrock 10 to 20 feet; seasonally high water table at a depth of more than 15 feet.	0–5 5–32 32–60
Csl	Chewacla silt loam.	Somewhat poorly drained soil on flood plains; the upper 6 to 10 inches of friable silt loam is underlain by 2 to 3 feet of mottled silty clay loam; beneath this is variable alluvium; depth to bedrock 10 or more feet; seasonally high water table at a depth of 0 to 2 feet.	0–6 6–36
CiB	Colfax sandy loam, 2 to 6 percent slopes.	Somewhat poorly drained soil around the head of drainageways and in seepage areas; the upper 5 to 8 inches of very friable sandy loam is underlain by 2 to 3 feet of firm silty clay loam; beneath this is weathered, light-colored granite and gneiss; depth to bedrock 10 to 12 feet; seasonally high water table at a depth of 1 to 2 feet.	0–14 14–24 24–40

See footnotes at end of table.

their estimated physical and chemical properties

texture not determined]

Classification			Percentage passing			Permeability	Available water capacity	Reaction	Shrink-swell potential
Dominant USDA textural class	Unified	AASHO	No. 4 sieve	No. 10 sieve	No. 200 sieve				
						Inches per hour	*Inches per inch of soil*	*pH*	
Loamy sand to sandy loam.	SM	A-2 or A-4	95-100	95-100	25-50	5. 0-10. 0	0. 14	5. 1-5. 5	Low.
Sandy loam	SM	A-2 or A-4	95-100	90-100	20-40	5. 0-10. 0	. 12	5. 1-6. 0	Low.
Sandy clay loam	SC, CL	A-6	95-100	95-100	45-65	0. 2- 0. 8	. 13	5. 1-6. 0	Moderate.
Sandy clay loam	SC, CL	A-6	95-100	95-100	45-65	0. 8- 5. 0	. 10	5. 1-5. 5	Low to moderate.
Sandy loam	SM	A-2 or A-4	95-100	90-100	20-40	5. 0-10. 0	. 11	5. 1-5. 5	Low.
Sandy clay loam to sandy clay.	MH, ML, CL, SC.	A-6 or A-7	95-100	95-100	45-75	0. 2- 2. 5	. 13	5. 1-5. 5	Moderate to high.
Sandy loam to sandy clay loam.	SM, SC, MH, ML, CL.	A-4 or A-7	95-100	95-100	40-70	2. 5-10. 0	. 13	5. 1-5. 5	Low to moderate.
Sandy loam	SM	A-2 or A-4	95-100	95-100	20-40	5. 0-10. 0	. 13	5. 1-5. 5	Low.
Sandy clay to sandy clay loam.	ML, CL, MH, SC.	A-6 or A-7	95-100	95-100	45-75	0. 8- 2. 5	. 13	5. 1-5. 5	Moderate to high.
Sandy clay loam	SM, SC, CL, ML, MH.	A-4 or A-6, A-7.	95-100	95-100	40-70	0. 2- 2. 5	. 10	5. 1-5. 5	Moderate.
Silt loam	ML	A-4	95-100	95-100	55-80	0. 8- 2. 5	. 13	5. 1-6. 0	Low.
Silty clay loam to silty clay.	ML to CH	A-6 or A-7	90-100	85-100	55-80	0. 8- 2. 5	. 14	5. 1-6. 0	Moderate to high.
Sandy loam	SM	A-2 or A-4	95-100	90-100	20-40	2. 5-10. 0	. 11	5. 1-5. 5	Low.
Silty clay loam	CL, CH	A-7	95-100	95-100	55-75	0. 2- 2. 5	. 13	5. 1-5. 5	Moderate to high.
Sandy clay	SC, CL	A-7	95-100	95-100	45-75	0. 8- 5. 0	. 11	5. 1-5. 5	Moderate.

TABLE 13.—*Brief descriptions of the soils and their*

[Dashed lines indicate

Map symbol	Soil [1]	Description of soil and site	Depth from surface
			Inches
DhB3 DhC3 DgB2	Davidson clay loam, 2 to 6 percent slopes, severely eroded. Davidson clay loam, 6 to 10 percent slopes, severely eroded. Davidson loam, 2 to 6 percent slopes, eroded.	Well-drained, deep soils on uplands; the upper 5 to 10 inches of loam or clay loam is underlain, in most places, by more than 5 feet of firm clay or clay loam; beneath this is a thick layer of weathered hornblende gneiss and diorite; depth to bedrock commonly exceeds 20 feet; seasonally high water table at a depth of more than 18 feet.	0–5 5–47 47–100
HYB2 HYC2 HZB3 HZC3	Helena sandy loam, 2 to 6 percent slopes, eroded. Helena sandy loam, 6 to 10 percent slopes, eroded. Helena sandy clay loam, 2 to 6 percent slopes, severely eroded. Helena sandy clay loam, 6 to 10 percent slopes, severely eroded.	Moderately well drained to somewhat poorly drained soils on uplands; the upper 4 to 9 inches of very friable sandy loam is underlain by about 2 feet of very firm sandy clay or clay; beneath this is weathered aplitic granite, gneiss, and other acidic, igneous and metamorphic rocks; depth to bedrock 6 to 15 feet; seasonally high water table at a depth of about 3 feet.	0–7 7–20 20–32+
LdB2 LdC2 LdD2 LdE2 LeB3 LeC3 LeD3 LeC4 LeE4	Lloyd sandy loam, 2 to 6 percent slopes, eroded. Lloyd sandy loam, 6 to 10 percent slopes, eroded. Lloyd sandy loam, 10 to 15 percent slopes, eroded. Lloyd sandy loam, 15 to 25 percent slopes, eroded. Lloyd clay loam, 2 to 6 percent slopes, severely eroded. Lloyd clay loam, 6 to 10 percent slopes, severely eroded. Lloyd clay loam, 10 to 15 percent slopes, severely eroded. Lloyd-Gullied land complex, 6 to 10 percent slopes. Lloyd-Gullied land complex, 10 to 25 percent slopes.	Well-drained, deep soils on uplands; the upper 4 to 10 inches of friable sandy loam is underlain by several feet of clay loam or clay; beneath this is a thick layer of residuum weathered from diorite and hornblende gneiss mixed with mica schist; depth to bedrock 12 to 18 feet; seasonally high water table at a depth of more than 15 feet.	0–10 10–33 33–48+
LGB2 LFB3 LFC3	Lloyd sandy loam, compact subsoil, 2 to 6 percent slopes, eroded. Lloyd clay loam, compact subsoil, 2 to 6 percent slopes, severely eroded. Lloyd clay loam, compact subsoil, 6 to 10 percent slopes, severely eroded.	Well-drained soils on uplands; the upper 4 to 8 inches of very friable sandy loam is underlain by a 6- to 29-inch layer of compact, very firm clay loam or clay; beneath this is residuum weathered from mixed basic and acidic rocks; depth to bedrock more than 12 feet; seasonally high water table at a depth of more than 15 feet.	0–6 6–29 29–40+
LnB LnC LnD LlC2 LlD2	Louisburg sandy loam, 2 to 6 percent slopes. Louisburg sandy loam, 6 to 10 percent slopes. Louisburg sandy loam, 10 to 15 percent slopes. Louisburg soils, 6 to 10 percent slopes, eroded. Louisburg soils, 10 to 15 percent slopes, eroded.	Somewhat excessively drained, shallow soils on uplands; the upper 4 to 9 inches of sandy loam overlies 8 to 20 inches of friable sandy clay loam; beneath this is partly weathered and disintegrated granite; granite outcrops are at the surface in some areas; depth to bedrock 18 inches to 2 feet; seasonally high water table at a depth of more than 15 feet.	0–9 9–18 18+

See footnotes at end of table.

estimated physical and chemical properties—Continued

texture not determined]

Classification			Percentage passing			Permeability	Available water capacity	Reaction	Shrink-swell potential
Dominant USDA textural class	Unified	AASHO	No. 4 sieve	No. 10 sieve	No. 200 sieve				
						Inches per hour	*Inches per inch of soil*	*pH*	
Clay loam	ML, CL, SM	A–4, A–6	95–100	95–100	40–70	2. 5– 5. 0	0. 10	5. 1– 6. 0	Low to moderate.
Clay	ML, MH	A–4 or A–7	95–100	95–100	60–85	0. 2– 5. 0	. 10	5. 1– 6. 0	Moderate to high.
Clay loam	CL, ML	A–4 or A–7	95–100	95–100	50–80	2. 5– 5. 0	. 10	5. 1– 6. 0	Moderate.
Sandy loam	SM	A–2 or A–4	95–100	95–100	25–50	2. 5–10. 0	. 10	5. 1– 5. 5	Low.
Sandy clay loam	ML, CL, SC	A–6	95–100	95–100	45–65	0. 05– 0. 8	. 10	5. 1– 5. 5	Low to moderate.
Sandy clay to clay	MH, CL, ML, CH.	A–6 or A–7	95–100	95–100	50–70	0. 2– 2. 5	. 13	5. 1– 5. 5	Moderate to high.
Sandy loam	SM	A–2 or A–4	95–100	95–100	20–40	2. 5– 5. 0	. 11	5. 1– 5. 5	Low.
Clay loam	MH, ML, CL	A–7 or A–4	95–100	95–100	55–80	0. 2– 5. 0	. 11	5. 1– 5. 5	Moderate to high.
Clay loam	CL, ML	A–7	95–100	95–100	50–80	2. 5– 5. 0	. 11	5. 1– 5. 5	Moderate.
Sandy loam	SM, ML	A–4	95–100	95–100	35– 55	2. 5– 5. 0	. 11	5. 1–5. 5	Low.
Clay loam to clay	MH	A–7 or A–5	95–100	95–100	60– 90	0. 5– 2. 5	. 10	5. 1–5. 5	Moderate to high.
Clay loam	ML, CL	A–4	95–100	95–100	60– 80	2. 5– 5. 0	. 11	5. 1–5. 5	Moderate.
Sandy loam	SM	A–2	95–100	95–100	25– 30	5. 0–10. 0	. 08	5. 1–5. 5	Low.
Sandy clay loam	SC, ML, CL	A–4	95–100	95–100	45– 55	2. 5– 5. 0	. 10	5. 1–5. 5	Low to moderate.
Partly disintegrated granite.									

TABLE 13.—*Brief descriptions of the soils and their*

[Dashed lines indicate

Map symbol	Soil [1]	Description of soil and site	Depth from surface
			Inches
MjB2 MjC2 MjD2 MlB3 MlC3	Madison fine sandy loam, 2 to 6 percent slopes, eroded. Madison fine sandy loam, 6 to 10 percent slopes, eroded. Madison fine sandy loam, 10 to 15 percent slopes, eroded. Madison sandy clay loam, 2 to 6 percent slopes, severely eroded. Madison sandy clay loam, 6 to 10 percent slopes, severely eroded.	Well-drained, highly micaceous soils on uplands; the upper 4 to 10 inches of fine sandy loam overlies 2 to 3 feet of firm to friable clay loam; beneath this is a moderately thick layer of partly weathered and disintegrated quartz mica schist and mica schist; depth to bedrock 10 to 15 feet; seasonally high water table at a depth of more than 15 feet.	0-7 7-35 35+
MtC	Molena loamy sand, 2 to 10 percent slopes.	Somewhat excessively drained soil on high stream terraces; the entire profile has a texture of loamy sand and has formed in old alluvium; depth to bedrock is generally more than 20 feet; seasonally high water table at a depth exceeding 18 feet.	0-70+
Rol	Roanoke and Augusta sandy loams.	Poorly drained and somewhat poorly drained soils on low stream terraces; the uppermost 4 to 7 inches of sandy loam overlies 2 to 3 feet of friable to firm silty clay loam or sandy clay loam; formed in general alluvium; depth to bedrock 10 feet or more; seasonally high water table at a depth less than 1 foot.	[3] 0-5 5-16 16-36+
Wer	Wehadkee and Roanoke silty clay loams.	Poorly drained soils on flood plains and low stream terraces; the uppermost 4 to 6 inches of silty clay loam overlies 3 to 4 feet of mottled, firm silty clay; formed in recent alluvium; depth to bedrock 10 feet or more; seasonally high water table at surface.	[4] 0-4 4-44
WiB2 WiD2	Wilkes sandy loam, 2 to 6 percent slopes, eroded. Wilkes sandy loam, 10 to 15 percent slopes, eroded.	Well-drained to somewhat excessively drained, shallow soils on uplands; the uppermost 4 to 8 inches of sandy loam overlies 0 to 9 inches of firm sandy clay loam or clay; beneath this is partly weathered and disintegrated mixed basic and acidic rocks; in some areas rock outcrops are at the surface; depth to bedrock 9 inches to 2 feet; seasonally high water table at a depth of more than 10 feet.	0-6 6-9 9-20
WkB	Worsham sandy loam, 2 to 6 percent slopes.	Poorly drained soil in seepage areas and around the head of drainageways in uplands; the upper 4 to 8 inches of very friable sandy loam overlies 2 to 3 feet of firm sandy clay loam or clay; beneath this is partly weathered and disintegrated granite, gneiss, and schist; depth to bedrock more than 10 feet; seasonally high water table at a depth of 0 to 6 inches.	0-6 6-18 18-36

[1] Gullied land and Rock outcrop are not rated for engineering uses. [2] Mapping unit, Alluvial land, (Alm), rated.

estimated physical and chemical properties—Continued

texture not determined]

Classification			Percentage passing			Permeability	Available water capacity	Reaction	Shrink-swell potential
Dominant USDA textural class	Unified	AASHO	No. 4 sieve	No. 10 sieve	No. 200 sieve				
						Inches per hour	*Inches per inch of soil*	*pH*	
Fine sandy loam	SM, ML	A-4 or A-6	90–100	75–100	40– 60	2. 5–10. 0	0. 13	5. 1–5. 5	Low.
Clay loam	CL, ML, MH	A-7	95–100	95–100	50– 70	0. 8– 2. 5	. 12	5. 1–5. 5	Moderate.
Partly disintegrated mica schist.									
Loamy sand	SM	A-2	95–100	90–100	20– 35	5. 0– 0. 0	. 08	5. 1–5. 5	Low.
Sandy loam	SM	A-2 or A-4	95–100	90–100	20– 40	5. 0–10. 0	. 11	5. 1–5. 5	Low.
Silty clay loam	CL	A-7 or A-4	95–100	95–100	60– 80	0. 2– 0. 8	. 13	5. 1–5. 5	Moderate.
Silty clay and clay	MH, CH	A-7	95–100	95–100	60– 90	0. 2– 5. 0	. 11	5. 1–5. 5	Moderate to high.
Silty clay	CL, ML	A-6 or A-7	100	100	80–100	0. 2– 0. 8	. 12	5. 1–5. 5	Moderate to high.
Silty clay to silty clay loam.	CL, ML, MH, CH.	A-6 or A-7	100	100	80–100	0. 2– 0. 8	. 12	5. 1–5. 5	Moderate to high.
Sandy loam	SM	A-2 or A-4	80– 95	70– 85	20– 50	2. 5–10. 0	. 08	5. 1–5. 5	Low.
Sandy clay loam to clay.	SC to CH	A-6 or A-7	80–100	75– 90	45– 75	0. 2– 0. 8	. 07	5. 1–5. 5	Moderate to high.
Partly disintegrated mixed basic and acidic rocks.									
Sandy loam	SM	A-2 or A-4	95–100	90–100	20– 40	2. 5–10. 0	. 07	5. 1–5. 5	Low.
Sandy clay loam	SC, CL	A-6	95–100	95–100	45– 65	0. 2– 2. 5	. 10	5. 1–5. 5	Moderate.
Clay loam to clay	CL, ML, MH, CH.	A-7	95–100	95–100	60– 80	0. 8– 2. 5	. 12	5. 1–5. 5	Moderate to high.

[3] Roanoke sandy loam rated.

[4] Wehadkee silty clay loam rated.

TABLE 14.—*Interpretation of*

[Absence of entry indicates that no interpretation

Soil series and map symbols [2]	Suitability as source of—			Soil features affecting engineering practices	
	Topsoil [3]	Sand	Road fill	Highway location	Farm ponds — Reservoir area
Alluvial land (Alm, Alp, Avp, Lcm).	Good	Fair to good	Fair to good	High water table; flooding.	Moderate to slow permeability; 10 feet or more to rock.
Altavista (AlB2)	Good	Unsuitable	Fair to good	Occasional flooding; unstable	Moderate permeability; stratified layers of sand and gravel in some areas; 15 feet or me to rock; slowseepage rate.
Appling (AmB, AmB2, AmC2, AnB3, AnC3).	Good in areas not severely eroded.	Unsuitable	Fair	Unstable slopes	Moderate permeability; slow seepage rate; 5 feet or more to rock.
Cecil (CYB, CYB2, CYC, CYC2, CYD, CYD2, CYE, CZB3, CZC3, CZD3).	Good in areas not severely eroded.	Unsuitable	Good	Unstable slopes	Moderate permeability; slow seepage rate; 6 feet or more to rock.
Chewacla (Csl)	Good	Unsuitable	Poor to fair; plastic; high swelling.	High water table; flooding.	Slow permeability; slow seepage; 10 feet or more to rock.
Colfax (CiB)	Good	Surface layer fair; unsuitable below surface layer.	Fair	High water table; seepage; plastic.	Slow permeability; rapid seepage; 10 feet or more to rock.
Davidson (DgB2, DhB3, DhC3).	Poor	Unsuitable	Fair; plastic, clayey; high swelling.	Unstable slopes	Moderate permeability; slow seepage; 10 feet or more to rock.
Helena (HYB2, HYC2, HZB3, HZC3).	Good in areas not severely eroded.	Unsuitable	Fair; poor below 2 to 3 feet.	Highly plastic soil material; unstable slopes.	Slow permeability; slow seepage; 5 to 15 feet to rock.
Lloyd (LdB2, LdC2, LdD2, LdE2, LeB3, LeC3, LeD3, LeC4, LeE4).	Fair if not severely eroded.	Surface layer fair if not severely eroded.	Fair; plastic; high swelling below 1 foot.	Unstable slopes	Moderate permeability; slow seepage; 10 feet or more to rock.

See footnotes at end of table.

engineering properties of soils[1]

of feature affecting engineering has been made]

	Soil features affecting engineering practices—Continued				
Farm ponds—Continued: Embankment	Agricultural drainage	Irrigation	Field terraces and diversion	Waterways	Suitability for septic tank drainage fields
Low strength and stability; slow permeability of material; high shrink-swell potential; cracks when dry.	Some areas slowly permeable, and subsurface drainage difficult to establish.	High water-holding capacity; moderate permeability; moderate to high intake rate.	Not needed because of topography.	Naturally stable waterways.	Not suitable; high water table.
Low strength and stability.	Drainage not needed.	Deep; moderate water-holding capacity; moderate permeability; moderate to high intake rate.	No limitations. Favorable.	Highly erodible.	Fair; high water table at times.
Low strength and stability.	Drainage not needed.	Deep; moderate water-holding capacity; moderate permeability; moderate intake rate. Suitable except on slopes of more than 6 percent and in severely eroded areas.	No limitations. Favorable.	Highly erodible.	Fair to good.
Low strength and stability.	Drainage not needed.	Deep; moderate water-holding capacity; moderate permeability; moderate rate of water intake. Suitable except on slopes of more than 6 percent and in severely eroded areas.	No limitations. Favorable.	Highly erodible.	Good.
Low strength and stability; slow permeability; high shrink-swell potential; cracks when dry.	Moderately permeable; seasonal high water table. With adequate outlets, subsurface drainage satisfactory.	High water table; slowly permeable.	Not needed because of topography.	-------	Not suitable; high water table.
Low strength and stability; slow permeability; high shrink-swell potential; cracks when dry.	Slowly permeable; subsurface drainage difficult.	Slow intake rate.	Shallow depth to clayey material; high water table; slow permeability.	-------	Not suitable; high water table.
High shrink-swell potential; cracks when dry; low strength and stability.	Drainage not needed.	Slow to very slow intake rate.	No limitations. Favorable.	Highly erodible.	Not suitable; high water table.
Low strength and stability; slow permeability; high shrink-swell potential; cracks when dry.	Subsurface drainage difficult.	Slow intake rate; low-producing soil.	Shallow depth to clayey material; permeability moderately slow.	Highly erodible.	Not suitable; moderately slow permeability.
Low strength and stability; high shrink-swell potential; cracks when dry.	Drainage not needed.	Slow to very slow intake rate.	No limitations. Favorable.	Highly erodible.	Good.

TABLE 14.—*Interpretation of*

Soil series and map symbols [2]	Suitability as source of—			Soil features affecting engineering practices	
	Topsoil [3]	Sand	Road fill	Highway location	Farm ponds: Reservoir area
Lloyd compact subsoil (LGB2, LFB3, LFC3).	Fair if not severely eroded.	Unsuitable	Fair; plastic; high swelling below surface layer.	Unstable slopes; compact layer at or just beneath surface.	Slow permeability; slow seepage; 10 feet or more to rock.
Louisburg (LnB, LnC, LnD)	Good	Unsuitable	Good; shallow	Boulders; shallow to bedrock; unstable slopes.	Moderate permeability; slow seepage; 1½ to 4 feet to rock.
Louisburg soils (LlC2, LlD2).	Good, but thin surface layer.	Good, except in stony areas.	Good; shallow	Shallow to bedrock; unstable slopes.	Moderate permeability; slow seepage; 4 to 10 feet to rock.
Madison (MjB2, MjC2, MjD2, MlB3, MlC3).	Good in areas not severely eroded.	Unsuitable	Fair	Unstable slopes	Moderate permeability; slow seepage; 5 feet or more to rock.
Molena (MtC)	Good	Good; poorly graded.	Good	Unstable slopes	Rapid permeability; slow seepage; 15 feet or more to rock.
Roanoke and Augusta sandy loams (Rol).	Surface layer fair; high water table.	Fair	Poor; plastic, clayey.	High water table; flooding, highly plastic soil material below 1½ to 2 feet.	Slow permeability; rapid seepage; 10 feet or more to rock.
Wehadkee and Roanoke silty clay loams (Wer).	Poor, clayey; high swelling.	Unsuitable	Unsuitable	High water table; flooding; highly plastic soil material.	Slow permeability; rapid seepage; 10 feet or more to rock.
Wilkes (WiB2, WiD2)	Poor; variable materials; shallow.	Unsuitable	Good to fair; shallow.	Boulders; shallow to bedrock; outcrops in places; unstable slopes.	Slow permeability; rapid seepage; 1½ to 3 feet to rock.
Worsham (WkB)	Poor; clayey; high swelling.	Unsuitable	Unsuitable	High water table; seepage; plastic soil material.	Slow permeability; rapid seepage; 5 to 10 feet to rock.

[1] Gullied land and Rock outcrop are not rated for engineering uses.
[2] The map symbols in parentheses are for the soils in the respective series that are included in the interpretations listed.

engineering properties of soils [1]—Continued

Soil features affecting engineering practices—Continued					Suitability for septic tank drainage fields
Farm ponds—Continued: Embankment	Agricultural drainage	Irrigation	Field terraces and diversion	Waterways	
Slow permeability; high shrink-swell potential; cracks when dry.	Drainage not needed.	Slow to very slow intake rate.	Shallow depth to compact clay.	Highly erodible	Good.
Soil material rocky, stony, and very permeable; low strength and stability.	Drainage not needed.	Low water-holding capacity; low-producing soil.	Shallow depth; hard rock at a depth of 1½ to 4 feet.	Highly erodible; low available water capacity; vegetation difficult to establish.	Fair; bedrock near the surface in some areas.
Soil material rocky, stony, and very permeable; low strength and stability; high shrink-swell potential; cracks when dry.	Drainage not needed.	Low water-holding capacity; low-producing soils.	Steep slopes, soil material stony throughout upper 5 feet.	Highly erodible; low available water capacity; shallow depth, 1½ to 4 feet to rock.	Good.
Low strength and stability.	Drainage not needed.	Deep; moderate water-holding capacity; moderate permeability; moderate intake rate. Suitable except on slopes of more than 6 percent and in severely eroded areas.	No limitations. Favorable.	Highly erodible	
Low strength and stability; rapid permeability; low shrink-swell potential.	Drainage not needed.	Very low water-holding capacity; permeability rapid.	No limitations. Favorable.	Highly erodible; low available water capacity.	
Slow permeability; high shrink-swell potential; cracks when dry.	Slowly permeable; subsurface drainage difficult.	High water table; slowly permeable.	Not needed because of topography.	----------	
Low strength and stability; slow permeability of materials; high shrink-swell potential; cracks when dry.	Very slowly permeable; seasonal high water table; needs surface drainage.	High water table; slow intake; slowly permeable.	Not needed because of topography.	----------	
Rocky, stony, and very permeable; low strength and stability.	Drainage not needed.	Low water-holding capacity; low-producing soil.	Shallow; hard rock at a depth of 1½ to 3 feet.	Highly erodible; low available water capacity; shallow, 1½ to 3 feet to rock.	
Low strength and stability; slow permeability of material; high shrink-swell potential; cracks when dry.	Very slowly permeable; seasonal high water table; needs surface drainage.	High water table; slow intake; low-producing soil.	Shallow to clayey material; high water table; slow permeability.	----------	

[3] Rating is for the surface layer, or the A horizon, that is used on embankments, cut slopes, and ditches to promote the growth of plants

Engineering test data

Soil samples from six profiles, representing two soil series, were tested in accordance with standard procedures to help evaluate the soils for engineering purposes. The test data are given in table 12. Each series was sampled in three locations, and the samples from the different locations show some variation in physical characteristics. The data, however, probably do not show the maximum variations of the B and C horizons in each of the soil series. All samples were obtained at a depth of 100 inches or less. The test data, therefore, may not be adequate for estimating the characteristics of soil materials in deep cuts made in rolling or hilly areas. These samples were tested for moisture-density, grain-size distribution, liquid limit, and plasticity index.

The result of a mechanical analysis, obtained by combined sieve and hydrometer methods, can be used to determine the relative proportions of the different sizes of particles in a soil sample. The data on clay content obtained by the hydrometer method, which is generally used by engineers, should not be used in naming soil textural classes.

The values of the liquid limit and plasticity index indicate the effects of water on the consistence of soil material. As the moisture content of a soil material increases from a very dry state, the material changes from a solid to a semisolid, or plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and plastic limit. It indicates the range of moisture content within which soil material is in a plastic condition. The two engineering classifications (AASHO and Unified) for each soil sample in table 12 are based on the mechanical analysis, the liquid limit, and the plastic limit. (See pages 42–43.)

Soil properties significant to engineering

Table 13 gives brief descriptions of the soils of the county, but the soil materials are described only to a depth of 100 inches or less. The physical and chemical properties were estimated on the basis of field observations, experience, and for some soils, laboratory tests. These estimates apply only to the soils of Spalding County.

Table 13 also gives the USDA textural classification of the soils and estimates of the Unified and AASHO classifications. (See pages 44–49.)

The information in the column showing depth from surface (typical profile), is based on the descriptions of typical profiles given in the section "Description of Soils." The information in table 13 about grain size, permeability, available water capacity, reaction, and shrink-swell potential has been generalized from laboratory tests of some soils and estimated for others. In the column on permeability, estimates are based on soil structure and porosity and have been compared with permeability tests on undisturbed cores of similar soil material. The column on available water capacity, estimated in inches per inch of soil depth, shows the approximate amounts of capillary water in the soils when wet to field capacity. When the soils are air dry, these amounts of water will wet the soil material to a depth of one inch without deeper percolation. The pH value, shown in the table under reaction, indicates the degree of soil acidity (less than 7.0) or alkalinity (more than 7.0). The shrink-swell potential is an indication of the volume change to be expected with a change in moisture content. It is estimated on the basis of the amount and type of clay content in the soil strata. In general soils classified as CH and A–7 have a high shrink-swell potential. Clean sands and gravels (single-grain structure) and those having small amounts of nonplastic to slightly plastic fines, as well as most other nonplastic to slightly plastic soil materials, have low shrink-swell potential.

Table 14 gives estimates of the suitability of the soils for highway construction and for conservation engineering. It also rates the soils according to their suitability as drainage fields for septic tanks. The estimates are based on data and on interpretations of estimates given in table 13 and on actual field experience and performance. Each soil is given a rating of good, fair, poor, or unsuitable according to its suitability as sources of topsoil, sand, and road fill. If the rating is fair or poor, the hazard or adverse feature is described. Factors affecting highway location are also listed. (See pages 50–53.)

Genesis, Classification, and Morphology of Soils

In the first part of this section, the genesis of the soils, or the manner in which they originated, is discussed, particularly in relation to the processes responsible for the development of the solum, or true soil, from the unconsolidated parent material. In the second part, the soil series are classified by higher categories (order and great soil group) and the morphology, or makeup, of a representative soil of each series is given.

Genesis of Soils

Soil is formed by weathering and other processes that act upon parent material. The characteristics of the soil at any point on earth depend upon five soil-forming factors: (1) The physical and mineralogical composition of the parent material, (2) climate, (3) plant and animal life, (4) relief, and (5) time.

The relative importance of each factor differs from place to place. In some places one factor dominates the formation of a soil and fixes most of its properties, as is common when the parent material consists of pure quartz sand. Quartz sand is highly resistant to change, and soils formed in it generally have faint horizons. Under certain types of vegetation, however, where the relief is flat and the water table is high, a distinct profile can be formed even in quartz sand. Thus, the past combination of the five major factors has determined the present character of every soil.

The five soil-forming factors are discussed in this section.

Parent material.—Parent material is the unconsolidated mass from which soil develops. It is largely responsible for the chemical and mineralogical composition of soils.

In Spalding County the parent material of most soils is residual; that is, the soils have formed in place through the weathering of the parent rock.

According to the Geologic Map of Georgia (*2*), biotite gneiss and schist underlie about 72 percent of the county. The Cecil and Madison are the principal soils formed in materials derived from these two kinds of rock. In about 15 percent of the county, the soils are underlain by diorite and hornblende schist and gneiss. Most of these soils are of the Lloyd and Davidson series. Granite gneiss underlies the soils in 3 percent of the county. The Appling and Helena are the principal soils formed in materials from this kind of parent rock.

In about 10 percent of the county, the soils formed in alluvium, mainly along the larger streams. About 1 percent of these soils formed in old alluvium and about 9 percent in young alluvium. The soils on first bottoms show little profile development and are still receiving deposits. In contrast, the soils on the broad, undulating to sloping uplands have been in place long enough for distinct horizons to have developed.

Relief.—The relief, or topography, is largely determined by the kind of bedrock formations, by the geologic history of the area, and by the effects of dissection by streams. Relief influences soil formation by its effects on moisture, temperature, erosion, and plant cover. In Spalding County slopes range from 0 to 35 percent.

In upland areas soils on slopes of less than 15 percent are generally deeper and have more distinct horizons than soils on stronger slopes. On slopes of 15 percent or greater, geologic erosion removes the soil material almost as fast as it forms. As a result, most of these soils, such as the Louisburg, have a thin solum, which is the upper part of the profile above the parent material.

The highest elevation in the county is on a ridge north of Griffin. Here the elevation is 995 feet above sea level. The lowest elevation is along Flint River near the line between Spalding and Pike Counties. The elevation there is 710 feet above sea level, or 285 feet below the highest point.

This difference in elevation and the many branching drainageways contribute to the good drainage in most of Spalding County. Excess surface water moves into the stream channels rapidly.

Time.—The time required for a mature soil to develop depends largely on the other soil-forming factors. In the profile of a normal or mature soil, the zone of eluviation (A horizon) and zone of illuviation (B horizon) are easily recognized. Less time is generally required for a soil to develop in humid, warm areas under rank vegetation than in dry or cold areas under scant vegetation. Other factors being equal, less time is required for a soil to develop if the parent material is coarse textured than if it is fine textured.

Soils vary considerably in age. The older soils generally show a greater degree of horizon differentiation than the younger soils. For example, on the smoother uplands and old stream terraces, the soils have developed to maturity. On the stronger slopes, however, geologic erosion has removed the soil material so rapidly that the depth to bedrock, in many places, is shallow. Consequently, these soils are not well developed. On first bottoms and in areas of local alluvium, the soil materials have been in place for too short a time to allow a mature profile to develop.

Living organisms.—The kind and number of plants and animals that live on and in the soil are determined mainly by climate and, to varying degrees, by the parent material, topography, and age of the soil. Bacteria, fungi, and other micro-organisms aid in weathering rock and decomposing organic matter. Nearly all of the soils of the county contain millions of insects and small plants and animals in each cubic foot of soil. These organisms exert a continuous effect on the physical and chemical properties of soils. Fungi and other micro-organisms are by far more numerous in the upper few inches of soil.

The larger plants supply organic matter. They also transfer elements from the subsoil to the surface soil by assimilating these elements into the tissue of the plant and then depositing this tissue on the surface layer as fallen fruits, nuts, leaves, or stems. Earthworms and other small invertebrates carry on a slow, but continuous, process of soil mixing. Soil may be altered chemically when ingested by earthworms.

Before about 1800 the uplands of Spalding County were covered by forests consisting mainly of oak and hickory, along with a few pines. Soils on flood plains were generally covered by yellow-poplar, gum, ash, oak, willow, and beech. Most of these areas were cleared and cultivated at one time, but much of their acreage is now covered by pines.

Clearing forests, cultivating soils, and introducing new kinds of plants affect the direction and rate of soil genesis. Few results of these changes can be seen as yet, however, except for a sharp reduction of organic matter in soils after a few months of cultivation and the loss of the somewhat coarser textured, eluviated layer as a result of more rapid erosion. Probably some results will not be evident for many centuries. Nevertheless, man's activities have drastically changed the complex of living organisms that affect soil genesis in Spalding County.

Climate.—Climate affects the physical, chemical, and biological relationships in the soil profile, mainly through the influence of moisture and temperature. Water dissolves minerals, supports biological activity, and transports mineral and organic residues through the soil profile. The amount of water that percolates through the soil depends on rainfall, relative humidity, length of the frost-free period, soil permeability, and physiographic position. Temperature influences the kinds of organisms and their rate of growth, as well as the speed of physical and chemical reactions in the soil.

Spalding County has the humid, warm-temperate type of climate that is characteristic of the southeastern part of the United States. (See table 3, p. 4, for average temperatures and for distribution of rainfall by months.) The soils are moist much of the time from November 15 through July 31. They are moderately dry much of the time from August 1 through November 14. The surface soil is frozen to a depth of 1 to 3 inches for only a few days during the winter months.

Because the climate is uniform throughout the county, it has not caused differences in the soils. As is typical under this type of climate, most of the soils in Spalding County are strongly weathered, highly leached, strongly acid, and low in fertility.

Classification and Morphology of Soils

The natural soil classification system used in the United States (*7*) consists of six categories. Beginning at the top, they are the order, suborder, great soil group, family, series, and type.

In the highest category are the zonal, intrazonal, and azonal orders. Although the highest category consists of only three orders, thousands of soil types are recognized in the lowest category. The suborder and family categories have never been fully developed and thus have been little used. Soils have been classified mainly by great soil groups, series, and types.

In the following pages, the soil series of Spalding County are classified according to order and great soil group, and a representative profile of each series is described. Some of the soil series are not representative of the central concept of any great soil group but intergrade from one great soil group to another. The soils are classified mainly on the basis of characteristics observed in the field. Their classification may be revised as knowledge about the soils increases. Table 15 lists the soil series under great soil groups and orders and gives some of the distinguishing characteristics of each series.

Zonal order

Soils in the zonal order have evident, genetically related horizons that reflect in their formation the dominant influence of climate and living organisms. In Spalding County the great soil groups in the zonal order are the Red-Yellow Podzolic and the Reddish-Brown Lateritic.

RED-YELLOW PODZOLIC SOILS

The Red-Yellow Podzolic great soil group consists of well-developed, well-drained, acid soils that have a thin, organic A0 horizon and an organic-mineral A1 horizon. The A1 horizon is underlain by a light-colored, bleached A2 horizon that, in turn is underlain by a red, yellowish-red, or yellow, more clayey B2 horizon. The parent material is all more or less siliceous. Coarse, reticulate streaks or mottles of red, brown, and light gray are generally in the deep horizons where the parent material is thick (*6*). Kaolinite is the dominant clay mineral. The cation-exchange capacity is low, and the percentage of base saturation is very low. These soils in Spalding County generally have a cation-exchange capacity of less than 20 milliequivalents per 100 grams of soil and a percentage of base saturation ranging from 5 to 30. Their subsoil has moderate, subangular blocky structure and colors of high chroma.

The Madison, Cecil, Appling, and Altavista soils represent the central concept of the Red-Yellow Podzolic group in Spalding County. All of these soils originally had a dark-colored but thin A1 horizon and a well-defined A2 horizon. Plowing and erosion, however, have so disturbed these horizons that the present surface layer is (1) a mixture of the original A1 and A2 horizons, (2) a mixture of the A2 and B horizons, or (3) mostly material from the B horizon. In most areas that are not severely eroded, the surface soil is granular sandy loam to sandy clay loam that is strongly acid. The B horizon has moderate, medium, subangular blocky structure. It generally contains from two to six times as much clay as the A horizon and nearly twice as much clay as the C horizon. Clay films are common to prominent in the B2 horizon. The C horizon has weaker structure than the B horizon, is more mottled and variable in color, and generally is more strongly acid.

The Madison and Cecil soils are examples of Red-Yellow Podzolic soils with a subsoil that has a red hue and fairly high chroma. They have moderate, medium, subangular blocky structure. The Madison soils are more micaceous than the Cecil soils.

The following profile description of Madison fine sandy loam, 2 to 6 percent slopes, eroded, is representative of the Madison series—

Ap—0 to 7 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; weak, fine, granular structure; very friable; common quartz gravel and schist fragments; many mica flakes; strongly acid; clear, smooth boundary. 6 to 10 inches thick.

B21—7 to 15 inches, red (10R 4/6) sandy clay loam; moderate, medium, subangular blocky structure; friable; some quartz gravel and schist fragments; common, fine to medium mica flakes; strongly acid; diffuse, irregular boundary. 4 to 12 inches thick.

B22—15 to 27 inches, red (10R 4/6) clay loam; moderate, medium, subangular blocky structure; firm when moist, sticky when wet; some gravel; many fine and medium mica flakes, which cause the soil to feel slick or greasy; strongly acid; diffuse, irregular boundary. 8 to 16 inches thick.

B3—27 to 35 inches, red (10R 4/8) clay loam; moderate, coarse, subangular blocky structure; friable when moist, sticky when wet; many fine and medium mica flakes; strongly acid; diffuse, irregular boundary. 2 to 12 inches thick.

C—35 inches +, red (10R 4/8) friable, weathered, soft mica schist.

The following profile description of Cecil sandy loam, 2 to 6 percent slopes, eroded, is representative of the Cecil series—

Ap—0 to 5 inches, dark yellowish-brown (10YR 4/4) sandy loam; weak, fine, granular structure; friable; many fine roots; strongly acid; gradual, wavy boundary. 4 to 8 inches thick.

B1—5 to 8 inches, reddish-brown (5YR 4/4) sandy clay loam; moderate, medium, subangular blocky structure; friable; many fine roots; strongly acid; gradual, wavy boundary. 3 to 10 inches thick.

B2—8 to 26 inches, weak red (10R 4/4) sandy clay; moderate, medium, subangular blocky structure; firm when moist, plastic when wet, hard when dry; some quartz gravel; few mica flakes; strongly acid; gradual, wavy boundary. 6 to 30 inches thick.

B3—26 to 32 inches, red (2.5YR 4/6) sandy clay loam to clay loam; moderate, coarse, blocky structure; firm to friable; much quartz gravel and many fine mica flakes; strongly acid; diffuse, irregular boundary. 20 to 36 inches thick.

C—32 to 60 inches, partly disintegrated rock material containing pockets of red (2.5YR 4/8) sandy clay loam; weak, fine, granular structure; strongly acid.

The Appling and Altavista soils are less red than the Cecil and Madison soils. The Appling soils are predominantly yellowish-brown to mottled strong brown, rather than red, below a depth of 12 inches. In their entire B horizon, the Altavista soils are yellowish brown to yellow and have a few or none of the red mottles that are common to the Appling soils. In both of these series, the soils have reticulate or mottled patterns below the B horizon. The Altavista soils have brownish-yellow mottles at a depth of 26 inches, which increase in number below a depth of 42 inches. In mottling, the Altavista series is somewhat like the Low-Humic Gley group. The

TABLE 15.—*Classification and characteristics of soil series*

Order, great soil group, and series	Profile description [1]	Position	Drainage	Slope range	Parent material	Profile development [2]
ZONAL ORDER:						
Red-Yellow Podzolic soils—						
Central concept—				*Percent*		
Madison	Dark yellowish-brown, very friable fine sandy loam over firm to friable, red clay loam.	Upland slopes and ridges.	Good	2 to 15	Residuum from mica schist and quartz mica schist.	Strong.
Cecil	Dark yellowish-brown, friable sandy loam over firm to friable, red sandy clay.	Upland slopes and ridges.	Good	2 to 25	Residuum, chiefly from gneiss; mixed in places with granite, schist, and quartzite.	Strong.
Appling	Yellowish-brown, very friable sandy loam over yellowish-brown to strong-brown, firm to friable sandy clay to sandy clay loam; mottled in the lower part.	Upland slopes and ridges.	Good	2 to 10	Residuum from gneiss and granitoid gneiss; mixed in places with schist.	Strong.
Altavista	Light olive-brown, very friable sandy loam over friable, yellowish-brown to olive-yellow sandy clay loam; mottled yellow at a depth of about 26 inches.	Low stream terraces.	Moderately good.	2 to 6	Old alluvium	Strong.
With characteristics of Reddish-Brown Lateritic soils—						
Lloyd	Reddish-brown to brown, very friable sandy loam over dark-red, friable sandy clay to clay loam.	Upland slopes and ridges.	Good	2 to 25	Residuum from diorite and hornblende gneiss; mixed with mica schist.	Strong.
With characteristics of Low-Humic Gley soils—						
Helena	Light olive-gray, very friable sandy loam over firm, mottled, yellow to brownish-yellow sandy clay loam; mottled, yellowish-brown sandy clay or clay at a depth of about 20 inches.	Upland slopes	Moderately good to somewhat poor.	2 to 10	Residuum, chiefly from aplitic granite and gneiss.	Medium to strong.
Colfax	Gray, very friable sandy loam over mottled, yellow to yellowish-brown, very firm silty clay loam; mottled, yellowish-brown sandy clay at a depth of about 24 inches.	Around the head of drainage-ways and on low saddles.	Somewhat poor	2 to 6	Residuum from granite and gneiss.	Medium.
Augusta	Grayish-brown, friable sandy loam over light yellowish-brown to pale-olive, friable sandy clay loam, mottled below 20 inches; grayish-brown, mottled sandy clay at a depth of about 36 inches.	Low stream terraces.	Somewhat poor	0 to 2	Old alluvium	Medium.
Reddish-Brown Lateritic soils—						
Central concept—						
Davidson	Dark reddish-brown loam over dark-red, firm clay.	Upland slopes and ridges.	Good	2 to 10	Residuum from dark-colored basic rocks, chiefly diorite and hornblende gneiss.	Strong.

See footnotes at end of table.

TABLE 15.—*Classification and characteristics of soil series*—Continued

Order, great soil group, and series	Profile description [1]	Position	Drainage	Slope range	Parent material	Profile development [2]
INTRAZONAL ORDER:						
Low-Humic Gley soils—						
Central concept—				*Percent*		
Wehadkee	Gray, firm to friable silty clay loam over prominently mottled, gray silty clay to silty clay loam.	Flood plain	Poor	0 to 2	Recent alluvium	Weak.
Worsham	Light olive-gray, very friable sandy loam over mottled, pale-brown, firm sandy clay loam; mottled, light-gray, firm clay loam to clay at a depth of about 18 inches.	Upland depressions and seepage areas.	Poor	2 to 6	Residuum from granite, gneiss, and schist.	Medium.
Roanoke	Dark yellowish-brown, friable sandy loam over mottled, grayish-brown to light brownish-gray silty clay loam; underlain by mottled, gray, clayey material at a depth of about 16 inches.	Low stream terraces.	Poor	0 to 2	General alluvium	Medium.
AZONAL ORDER:						
Regosols—						
Central concept—						
Molena	Dark reddish-brown, very friable loamy sand over yellowish-red, loose loamy sand.	High terraces	Somewhat excessive.	2 to 10	Old alluvium	Weak.
Alluvial soils with characteristics of Low-Humic Gley soils—						
Chewacla	Dark-brown to brown silt loam over reddish-brown to dark-brown silty clay loam to silty clay; mottled at a depth of about 12 inches; dark-gray, mottled silty clay commonly at a depth of about 28 inches.	Flood plain	Somewhat poor	0 to 2	Recent alluvium	Weak.
Lithosols—						
Louisburg	Olive to gray, very friable sandy loam over strong-brown to yellowish-red, friable sandy clay loam; yellowish-red soft materials from rock are at a depth of about 18 inches.	Upland slopes and ridges.	Somewhat excessive.	2 to 15	Residuum from granite, gneiss, and quartzitic material.	Medium to weak.
Wilkes	Olive to brownish-gray, very friable sandy loam over a thin layer of mottled, yellowish-brown, firm sandy clay loam to clay; pale-brown, partially disintegrated rock at a depth of 9 to 20 inches.	Upland slopes	Good to somewhat excessive.	2 to 15	Residuum from mixed acidic and basic, igneous and metamorphic rocks.	Weak.

[1] The soil profiles described have not been greatly affected by accelerated erosion.
[2] The degree of profile development is measured by the number of important genetic horizons and the degree of contrast between them.

stronger mottling, however, is at a greater depth in Altavista soils than in Helena, Colfax, and Augusta soils, which are more like soils of the Low-Humic Gley group.

The following profile description of Appling sandy loam, 2 to 6 percent slopes, eroded, is representative of the Appling series—

Ap—0 to 5 inches, yellowish-brown (10YR 5/6) sandy loam; weak, fine, granular structure; very friable; few coarse sand grains; strongly acid; abrupt, wavy boundary. 3 to 8 inches thick.

B1—5 to 12 inches, yellowish-brown (10YR 5/6) sandy clay loam; weak, moderate, subangular blocky structure; very friable; few quartz pebbles and rounded concretions; strongly acid; gradual, wavy boundary. 5 to 9 inches thick.

B2—12 to 21 inches, strong-brown (7.5YR 5/6) sandy clay; moderate, coarse, subangular blocky structure; friable; few quartz pebbles; strongly acid; gradual, wavy boundary. 6 to 11 inches thick.

B3—21 to 32 inches, mottled strong-brown (7.5YR 5/6), yellowish-brown (10YR 5/4), and red (2.5YR 4/8) sandy clay; mottles are common, medium, and distinct; moderate, coarse, subangular blocky structure; friable; many quartz pebbles and few fine mica flakes; strongly acid; gradual, wavy boundary. 10 to 15 inches thick.

C—32 to 58 inches, brownish-yellow and yellowish-red, weathered and disintegrated material from gneiss and schist; massive (structureless); friable; fragments contain many fine mica flakes and quartz pebbles.

The following profile description of Altavista sandy loam, 2 to 6 percent slopes, eroded, is representative of the Altavista series—

Ap—0 to 5 inches, light olive-brown (2.5Y 5/4) sandy loam; weak, very fine, granular structure; loose; many fine roots; strongly acid; clear, smooth boundary. 4 to 6 inches thick.

B1—5 to 12 inches, yellowish-brown (10YR 5/4) sandy loam; weak, fine, granular structure; very friable; many fine roots; strongly acid; gradual, smooth boundary. 3 to 11 inches thick.

B21—12 to 26 inches, olive-yellow (2.5Y 6/6) sandy clay loam; weak, medium, subangular blocky structure; friable; some clay films on peds; few roots; strongly acid; gradual, smooth boundary. 14 to 24 inches thick.

B22—26 to 42 inches, yellow (2.5YR 7/6) sandy clay loam; common, fine, faint, brownish-yellow (10YR 6/8) mottles; moderate, coarse, subangular blocky structure; firm when moist, slightly sticky when wet; strongly acid; gradual, smooth boundary. 8 to 16 inches thick.

C—42 to 58 inches, very pale brown (10YR 7/3) sandy clay loam; many coarse, distinct, reddish-yellow (7.5YR 6/6) mottles; massive (structureless); friable; strongly acid.

The Lloyd soils are Red-Yellow Podzolic soils that lack a marked contrast between the A1 and A2 horizons, and this lack of contrast is a characteristic of the Reddish-Brown Lateritic soils. The subsoil has the structure, clay, and color characteristics of the reddest Red-Yellow Podzolic soils, and the color is identical to that of Reddish-Brown Lateritic soils. The parent material of the Lloyd soils is less micaceous than that of most Red-Yellow Podzolic soils.

The following profile description of Lloyd sandy loam, 2 to 6 percent slopes, eroded, is representative of the Lloyd series—

Ap—0 to 4 inches, reddish-brown (5YR 4/4) sandy loam; weak, fine, granular structure; very friable; many roots and a few pebbles; strongly acid; clear, smooth boundary. 3 to 10 inches thick.

B1—4 to 10 inches, dark-red (2.5YR 3/6) sandy clay loam; weak, medium, subangular blocky structure; very friable; some roots and gravel; strongly acid; clear, wavy boundary. 2 to 10 inches thick.

B2—10 to 33 inches, dark-red (2.5YR 3/6) clay loam; moderate, medium, subangular blocky structure; patchy clay films on peds; friable; few roots and some fine mica flakes; strongly acid; diffuse, irregular boundary. 15 to 38 inches thick.

B3—33 to 48 inches, dark-red (2.5YR 3/6) clay loam; weak, medium, subangular blocky structure; very friable; contains mica flakes; strongly acid; clear, irregular boundary. 8 to 24 inches thick.

C—48 to 70 inches, weathered, basic mica schist that is dark red, streaked with yellow and black; massive (structureless); very micaceous.

The Helena, Augusta, and Colfax are Red-Yellow Podzolic soils that have some characteristics of Low-Humic Gley soils. These soils are mainly somewhat poorly drained. Where they are uneroded, they have a strong color contrast between the A1 and A2 horizons. The mottles of the B horizon are predominantly yellow and gray; there are few or no red mottles.

The Helena soils have moderate structure and distinct clay films in the B2 horizon. The chroma of the dominant color of these soils is higher than that of the Augusta and Colfax soils. The firm sandy clay of the B2 horizon has some characteristics of Planosols, but the textural gradation from the B12 to the B2 horizons is not so abrupt as in Planosols.

The Augusta and Colfax soils have weaker color and more gray in the B horizon than the Helena soils, and the structure and clay films are less well developed.

The following profile description of Helena sandy loam, 2 to 6 percent slopes, eroded, is representative of the Helena series—

Ap—0 to 7 inches, light olive-gray (5Y 6/2) sandy loam; weak, fine, granular structure; loose; abundant fine roots; few small pebbles; strongly acid; abrupt, smooth boundary. 4 to 8 inches thick.

B11—7 to 12 inches, yellow (2.5Y 7/8) sandy clay loam; moderate, medium, subangular blocky structure; patchy clay films; friable; abundant fine roots; strongly acid; clear, smooth boundary. 4 to 7 inches thick.

B12—12 to 20 inches, brownish-yellow (10YR 6/6) sandy clay loam, mottled with reddish yellow (7.5YR 7/8); mottles are common, medium, and faint; moderate, medium, angular blocky structure; patchy clay films; firm; abundant fine roots; strongly acid; clear, wavy boundary. 4 to 8 inches thick.

B2—20 to 32 inches, yellowish-brown (10YR 5/6) sandy clay, mottled with red (2.5YR 5/8); mottles are common, medium, and prominent; strong, coarse, blocky structure; distinct clay films; very firm; strongly acid; gradual, wavy boundary. 5 to 8 inches thick.

C—32 inches +, mottled light-gray and red, partly weathered parent material, streaked with gray and brown.

The following profile description of Colfax sandy loam, 2 to 6 percent slopes, is representative of the Colfax series—

Ap—0 to 8 inches, gray (2.5YR 6/0) sandy loam; weak, fine, granular structure; very friable; many small quartz pebbles; strongly acid; clear, smooth boundary. 6 to 10 inches thick.

B1—8 to 14 inches, yellow (2.5Y 8/6) very fine sandy loam; moderate, medium, granular structure; firm; many small quartz pebbles; strongly acid; gradual, wavy boundary. 5 to 11 inches thick.

B2—14 to 24 inches, yellowish-brown (10YR 5/6) silty clay loam; few, medium, faint mottles of yellowish red (5YR 5/6); strong, coarse, subangular blocky structure; very firm; many small quartz pebbles; strongly acid; gradual, wavy boundary. 8 to 12 inches thick.

C—24 to 40 inches, yellowish-brown (10YR 5/6) sandy clay material; many, medium, prominent mottles of light reddish brown (2.5YR 6/4); mixed with highly weathered granite gneiss; hard; strongly acid; grades to weathered granite gneiss below 40 inches.

The following profile description of Augusta sandy loam is from the undifferentiated unit, Roanoke and Augusta sandy loams, and is representative of the Augusta series—

Ap—0 to 7 inches, grayish-brown (10YR 5/2) sandy loam; weak, fine, granular structure; friable; many fine roots; strongly acid; clear, smooth boundary. 4 to 7 inches thick.

B1—7 to 14 inches, light yellowish-brown (2.5Y 6/4) sandy clay loam; weak, medium, subangular blocky structure; friable; many fine roots; strongly acid; clear, smooth boundary. 4 to 8 inches thick.

B2—14 to 20 inches, pale-olive (5Y 6/3) sandy clay loam; moderate, medium, subangular blocky structure; friable; thin patchy clay films; strongly acid; gradual, wavy boundary. 8 to 17 inches thick.

B3—20 to 36 inches, light brownish-gray (2.5Y 6/2) sandy clay loam; few, fine mottles of brownish yellow (10YR 6/8); moderate, medium, subangular blocky structure; firm when moist, sticky when wet; strongly acid; diffuse, irregular boundary. 6 to 10 inches thick.

C—36 inches +, grayish-brown (10YR 5/2) sandy clay; common, fine, faint mottles of light olive brown (2.5Y 5/6); massive (structureless); firm when moist, sticky when wet; strongly acid.

REDDISH-BROWN LATERITIC SOILS

Reddish-Brown Lateritic soils have a dark reddish-brown mineral surface layer underlain by a dark-red, clayey, illuvial B horizon. These soils lack a light-colored eluvial A2 horizon, and they have a B horizon, or subsoil, that is redder than is characteristic of the Red-Yellow Podzolic soils. They have developed in a moist, warm, temperate climate, evidently under deciduous hardwoods.

These soils are medium to strongly acid and are low in organic matter. The base-exchange capacity of their subsoil is less than 20 milliequivalents per 100 grams of soil, and the base saturation is less than 30 percent.

The soils of the Davidson series are the only soils in Spalding County in the Reddish-Brown Lateritic group. They have formed in material weathered from basic igneous and metamorphic rocks. The Davidson series represents the central concept of this great soil group.

The Davidson soils are distinguished from the Cecil and Madison soils chiefly by having a darker red profile and a lower content of rock fragments, sand, and mica. Kaolinite and vermiculite are the dominant clay minerals in Davidson soils.

The following profile description of Davidson clay loam, 2 to 6 percent slopes, severely eroded, is representative of the Davidson series—

Ap—0 to 5 inches, dark reddish-brown (5YR 3/4) clay loam; weak, medium, subangular blocky structure; firm; strongly acid; gradual, wavy boundary. 4 to 10 inches thick.

B2—5 to 47 inches, dark-red (10R 3/6) clay; strong, medium, subangular blocky structure; firm; many fine manganese concretions and small pebbles; medium to strongly acid; diffuse, irregular boundary, 24 to 60 inches thick.

B31—47 to 69 inches, dark-red (10R 3/6) clay loam; moderate, medium, subangular blocky structure; friable; many fine manganese concretions and small to medium pebbles; medium to strongly acid; gradual, wavy boundary. 10 to 26 inches thick.

B32—69 to 100 inches +, dark-red (10R 3/6) clay loam; weak, medium, subangular blocky structure; friable; much fine mica and some gravel; medium to strongly acid.

Intrazonal order

In the intrazonal order are soils that have more or less well-developed characteristics that reflect the dominant influence of some local factor of relief or of parent material over the normal influences of climate and vegetation. In Spalding County the only great soil group in the intrazonal order is the Low-Humic Gley.

LOW-HUMIC GLEY SOILS

The Low-Humic Gley great soil group consists of imperfectly drained to poorly drained soils. These soils have a thin horizon that is moderately high to high in content of organic matter. This horizon overlies a mottled gray and brown, somewhat gleyed mineral horizon that has a low degree of textural differentiation.

In Spalding County the Wehadkee, Worsham, and Roanoke soils are in the Low-Humic Gley group and represent the central concept of that group. The Wehadkee soils are in low positions on flood plains, and the Worsham soils are in seepage areas and around the head of drainageways. The water table is at or near the surface during wet periods, but it is well below the surface during dry periods. Uneroded areas have a dark but thin A1 horizon. These soils are strongly acid, and the percentage of base saturation is low. The Roanoke soils are on low stream terraces. They have a finer textured, more plastic B horizon and poorer drainage than Altavista and Augusta soils. They have more profile development than Wehadkee soils.

The following profile description of Wedhadkee silty clay loam is from the undifferentiated unit, Wehadkee and Roanoke silty clay loams, and is representative of the Wehadkee series—

A–0 to 4 inches, gray (5Y 6/1) silty clay loam; many fine, prominent, mottles of brownish yellow (10YR 6/8); weak, fine, granular structure; friable; abundant roots; strongly acid; abrupt, smooth boundary. 6 to 8 inches thick.

ACg—4 to 22 inches, gray (5Y 6/1) silty clay; many large, prominent, mottles of brownish-yellow (10YR 6/6); weak, fine, subangular blocky structure; friable when moist, slightly plastic when wet; clay films on ped faces; strongly acid; abrupt; smooth boundary. 2 to 24 inches thick.

Cg—22 to 44 inches, gray (5Y 5/1) silty clay loam; many large, prominent mottles of strong brown (7.5YR 5/6); weak, fine, granular structure; firm when moist, slightly sticky when wet; strongly acid.

The following profile description of Worsham sandy loam, 2 to 6 percent slopes, is representative of the Worsham series—

Ap—0 to 6 inches, light olive-gray (5Y 6/2) sandy loam; weak, fine, granular structure; very friable; many fine roots; many angular quartz pebbles; strongly acid; abrupt, smooth boundary. 3 to 8 inches thick.

B1—6 to 18 inches, pale-brown (10YR 6/3) sandy clay loam, mottled with grayish brown (10YR 5/2); mottles are faint, few, and fine; moderate, medium, subangular blocky structure; friable; many fine roots; strongly acid; gradual, wavy boundary. 6 to 10 inches thick.

B2—18 to 30 inches, light-gray (2.5Y 7/2) clay loam to clay, mottled with very pale brown (10YR 7/3); mottles are common, medium, and distinct; strong, coarse, subangular blocky structure; firm when moist, hard when dry, sticky when wet; few angular quartz pebbles; strongly acid; diffuse, irregular boundary. 10 to 14 inches thick.

C—30 inches +, white (5Y 8/2) weathered rock material, mottled with pink (5YR 7/4); mottles are few, medium, and distinct; massive (structureless); friable; strongly acid.

The following is a description of a profile of Roanoke sandy loam, from the undifferentiated unit, Roanoke and Augusta sandy loams, and is representative of the Roanoke series—

Ap—0 to 5 inches, dark yellowish-brown (10YR 4/4) sandy loam; weak, very fine, granular structure; friable; abundant fine roots; strongly acid; clear, smooth boundary. 2 to 7 inches thick.

B1—5 to 10 inches, grayish-brown (2.5Y 5/2) silty clay loam, stained and streaked with dark brown; moderate, medium, subangular blocky structure; friable; abundant fine roots; strongly acid; clear, wavy boundary. 4 to 10 inches thick.

B2g—10 to 16 inches, light brownish-gray (2.5Y 6/2) silty clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/8); moderate, medium, blocky structure; friable when moist, plastic and sticky when wet; few roots; strongly acid; clear, wavy boundary. 12 to 18 inches thick.

B3g—16 to 36 inches, gray (10YR 5/1) silty clay; common, medium, distinct mottles of light gray (10YR 6/1) and reddish yellow (7.5YR 6/8); strong, medium, angular blocky structure; very firm when moist, plastic and sticky when wet; strongly acid; clear, wavy boundary. 18 to 30 inches thick.

Cg—36 inches +, gray clay (10YR 5/1); common, medium to large, distinct mottles of reddish yellow (7.5YR 7/6); massive (structureless); very firm; strongly acid.

Azonal order

The soils in the azonal order lack well-developed profile characteristics because of their youth, parent material, or relief. In Spalding County the great soil groups in this order are the Regosols, Alluvial soils, and Lithosols.

REGOSOLS

Regosols consist of deep, unconsolidated rock or soft mineral deposits, in which few or no clearly expressed soil characteristics have developed. The Molena is the only series of this group in the county, and it represents the central concept.

In uneroded areas, these soils normally have an A1 horizon that is poorly distinguished from the underlying C horizon. The structure and the textural characteristics of a B horizon are lacking. The chroma and red hue generally increase with increasing depth throughout the profile. This indicates that the color is an inherited characteristic and is altered by weathering only in the top part of the profile, or chiefly in the Ap horizon. Molena soils are strongly acid and are low in clay content.

The following profile description of Molena loamy sand, 2 to 10 percent slopes, is representative of the Molena series—

Ap—0 to 5 inches, dark reddish-brown (5YR 3/3) loamy sand; weak, fine, granular structure; very friable; strongly acid; clear, smooth boundary. 4 to 10 inches thick.

AC—5 to 14 inches, dark reddish-brown (5YR 3/4) loamy sand; weak, fine, granular structure; very friable; strongly acid; gradual, smooth boundary. 6 to 12 inches thick.

C—14 inches to 15 feet, yellowish-red (5YR 5/6) loamy sand; structureless; loose; strongly acid; abrupt, smooth boundary.

ALLUVIAL SOILS

Alluvial soils are azonal soils that have developed from relatively recently deposited alluvium. The original material has been modified little, if any, by soil-forming processes. These soils are subject to flooding. All are medium to strongly acid and are low in percentage of base saturation.

In Spalding County only the Chewacla series is in the Alluvial group, and only one Chewacla soil has been mapped. This soil, however, has some characteristics of the Low-Humic Gley group. It is moderately well drained to somewhat poorly drained. The upper part, ranging from 12 to 22 inches in thickness, is free of gleying, but the lower part has indications of at least moderate gleying. In general, the top layer is slightly darker than that of the moderately well drained to somewhat poorly drained, associated Alluvial lands. There is no clear evidence of a B horizon in the Chewacla soil. The entire profile is strongly acid, and the percentage of base saturation is low.

The following profile description of Chewacla silt loam is representative of the Chewacla series—

Ap—0 to 6 inches, dark-brown (7.5YR 4/2) silt loam; weak, fine, granular structure; friable; many fine mica flakes; strongly acid; clear, smooth boundary. 4 to 9 inches thick.

AC—6 to 12 inches, dark reddish-brown (5YR 3/3) silty clay loam; weak, very fine, granular structure; friable; many fine mica flakes; strongly acid; abrupt, smooth boundary. 4 to 10 inches thick.

C1—12 to 18 inches, reddish-brown (5YR 4/3) silt loam mottled with light gray (2.5Y 7/2); mottles are few, fine, and distinct; massive; friable; common fine mica flakes; strongly acid; gradual, wavy boundary. 4 to 12 inches thick.

C2—18 to 28 inches, dark-brown (7.5YR 4/4) silty clay mottled with brown (10YR 5/3); mottles are common, fine, and faint; massive; friable; common fine mica flakes; strongly acid; gradual, wavy boundary. 8 to 14 inches thick.

C3—28 to 36 inches, dark-gray (2.5YR 4/0) silty clay mottled with brown (10YR 5/3); mottles are many, coarse, and distinct; firm; few fine mica flakes; strongly acid.

LITHOSOLS

The Lithosol great soil group is made up of soils that are shallow or very shallow to bedrock. In most areas they are rough, hilly, or steep. In many places they are stony, and in other places bedrock is exposed. In this county they differ little in relief, stoniness, or drainage.

Lithosols do not have evident, genetically related horizons. They consist of freshly and imperfectly weathered rock fragments. Geologic erosion has nearly kept pace with soil development. In Spalding County the native vegetation consists of thin, open stands of hardwoods.

The Louisburg and Wilkes soils are classified as Lithosols. Soils of the Louisburg series have formed in residuum that weathered from coarse-grained granite. They differ from true Lithosols, however, in having a thin, discontinuous B horizon that is as thick as 9 inches in places. Louisburg soils are strongly acid and have a low base saturation.

In the Wilkes series are shallow soils that have weathered from mixed basic and acidic rocks. The B horizon is thin or lacking. Wilkes soils are strongly acid.

The following profile description of Louisburg sandy loam, 2 to 6 percent slopes, is representative of the Louisburg series—

Ap—0 to 9 inches, olive (5Y 5/3) to gray (5Y 5/1) sandy loam; weak, fine, granular structure; very friable; many fine roots; strongly acid; clear, smooth boundary. 6 to 14 inches thick.

BC—9 to 18 inches, strong-brown (7.5YR 5/6) sandy clay loam; weak, medium, granular structure; friable; strongly acid; clear, smooth boundary. 7 to 20 inches thick.

C—18 inches +, yellowish-red (5YR 5/6) soft, friable materials from disintegrated light-colored granite.

The following profile description of Wilkes sandy loam, 2 to 6 percent slopes, eroded, is representative of the Wilkes series—

Ap—0 to 6 inches, olive (5Y 5/3) sandy loam; weak, fine, granular structure; very friable; many fine roots; a few small quartz pebbles; strongly acid; clear, smooth boundary. 6 to 10 inches thick.

B—6 to 9 inches, yellowish-brown (10YR 5/4) sandy clay loam to clay; many fine, prominent mottles of pale olive (5Y 6/3); moderate, medium, subangular blocky structure; firm when moist, plastic when wet; some fine roots; strongly acid; irregular, diffuse boundary. 0 to 6 inches thick.

C—9 to 20 inches, pale-brown, disintegrated and partly decomposed, light-colored granite, cut by dykes of dark-colored basic rock; contains much fine mica.

Literature Cited

(1) American Association of State Highway Officials.
1961. Standard specifications for highway materials and methods of sampling and testing. Ed. 8, Pt. 1.

(2) Georgia Division of Mines, Mining, and Geology, in Cooperation With U.S. Dept. of Interior, Geologic Survey.
1939. Geologic map of Georgia. 1 p.

(3) Larson, Robert W.
1956. The timber supply situation in Georgia. U.S. Forest Serv. Forest Resource Rept. No. 12, 51 p., illus.

(4) Schnur, G. Luther.
1937. Yield, stand, and volume tables for even-aged upland oak forests. U.S. Dept. Agr. Tech. Bul. 560, 88 p., illus.

(5) Slocum, G. K., and Miller, W. D.
1953. Virginia pine—reproduction, growth, and management on the Hill Demonstration Forest, Durham County, N.C. N.C. State Tech. Bul. 100, 51 p., illus.

(6) Thorp, James, and Smith, Guy D.
1949. Higher categories of soil classification: order, suborder, and great soil group. Soil Sci. 67: 117–126.

(7) U.S. Department of Agriculture.
1938. Soils and men. U.S. Dept. Agr. Ybk., 1232 p., illus.

(8) ———
1929. Volume, yield, and stand tables of second growth southern pines. Misc. Pub. 50, 202 p.

(9) Waterways Experiment Station, Corps of Engineers.
1953. The unified soil classification system. Tech. Memo. 3-357, v. 1.

Glossary

Acidity, 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. The degrees of acidity or alkalinity are expressed as follows:

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity. The capacity of a soil to hold water in a form available to plants. The difference between the amount of water in a soil at field capacity and the amount in the same soil at the permanent wilting point. Commonly expressed as inches of water per inch in depth of soil.

Bedrock. The solid rock that underlies the soil and other unconsolidated material, or that is exposed at the surface.

Clay. See Texture, soil.

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

Consistence, soil. The cohesive quality of soil. The feel of soil and the ease with which a lump can be crushed between the fingers. Consistence varies with moisture content. Therefore, terms that describe consistence refer to dry, moist, or wet soil, as follows: *when dry*—loose, soft, slightly hard, hard, very hard, extremely hard; *when moist*—loose, very friable, friable, firm, very firm, extremely firm; *when wet*—nonsticky, slightly sticky, sticky, very sticky, nonplastic, slightly plastic, plastic, very plastic. In this report, unless otherwise indicated, the terms refer to moist soil. Some of the terms are defined as follows—

Loose. Noncoherent when moist or dry; will not hold together in a mass. Loose soils are generally coarse textured and are easily tilled.

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

Firm. When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable. Firm soils are generally difficult to till.

Plastic. When wet, readily deformed by moderate pressure but can be pressed into a lump; forms a "wire" when rolled between the fingers. Plastic soils are high in content of clay and are difficult to till.

Sticky. When wet, adheres to other material, and tends to stretch 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. A brittle, hard consistence caused by some substance other than clay minerals. The cementing substance may be calcium carbonate, silica, or oxides or salts of iron and aluminum.

Indurated. A degree of cementation in which the soil is hard and very strongly cemented; brittle; does not soften under prolonged wetting.

Drainage, natural. Refers to moisture conditions 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 drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding 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 have mottling in the lower B and in the C horizons.

Imperfectly drained or somewhat poorly drained soils are wet for significant periods but not all the time, and the podzolic soils commonly have mottling in the lower A horizon and in the B and C horizons.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray, or light gray, with or without mottling, in the deeper parts of the profile.

Erosion, soil. The wearing away of the land surface by wind, moving water, or ice, and by landslides and creep.

Fertility, soil. The presence of the necessary elements, in adequate amounts and in proper balance, for the growth of specified plants, when light, temperature, physical condition (tilth), and other factors are favorable.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Galled spots. Severely eroded, small bare spots.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major soil horizons:

A horizon. The mineral horizon at the surface. It contains organic matter, has been leached of soluble minerals and clay, or shows the effects of both.

B horizon. The horizon (1) that contains an accumulation of clay minerals or other materials, or (2) that has developed a blocky or prismatic structure, or (3) that shows characteristics of both processes.

C horizon. The unconsolidated material immediately under the true soil. In chemical, physical, and mineral composition it is presumed to be similar to the material from which at least part of the overlying solum has developed.

D horizon. Any layer, or stratum, underlying the C horizon, or the B horizon if no C horizon is present. If this stratum is rock that presumably was the source of material in the C horizon, it is designated Dr.

Igneous rock. Rock that has been formed by the cooling of molten mineral material. Examples are granite, syenite, diorite, and gabbro.

Infiltration rate. The rate at which water penetrates the surface of the soil, generally expressed in inches per hour. May be limited either by the infiltration capacity of the soil or by the rate at which water is applied to the soil surface.

Loam. See Texture, soil.

Metamorphic rock. A rock of any origin that has been changed physically by heat, pressure, and movement. Igneous and sedimentary rocks may be changed to metamorphic rock, or one metamorphic rock may be changed to another. Examples are gneiss, schist, and slate.

Morphology, soil. The makeup of the soil, including the texture, structure, consistence, color, and other physical, mineralogical, and biological properties of the various horizons of the soil profile.

Mottled. Irregularly marked with spots of different colors that vary in number, size, and contrast. Mottling in soils generally indicates poor aeration and drainage. Descriptive terms are: Number—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.*

Munsell color system. In soil science the color of soil is described in words and by the Munsell system, which designates color by degrees of the three variables—hue, value, and chroma. For example, 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Parent material, soil. The weathered rock or partly weathered soil material (or peat) from which soil formed; in some soils, horizon C in the soil profile.

Permeability, soil. That quality of a soil horizon that enables air or water to move through it. Terms used to describe permeability are as follows: *Very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Plant nutrients. The elements or groups of elements that are essential to plant growth and are taken in and used by plants in the production of their food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil and carbon, hydrogen, and oxygen obtained mostly from air and water. These nutrients include those obtained from fertilizer.

Poorly graded soil (engineering). A soil material consisting mainly of particles 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 extending through all its horizons into the parent material. See Horizon, soil.

Reaction. See Acidity, soil.

Relief. The elevations or inequalities of the land surface, considered collectively.

Residuum. Unconsolidated, partly weathered mineral material that accumulates over disintegrating rock. Residual material is not soil but is frequently the material in which a soil has formed.

Sand. See Texture, soil.

Silt. See Texture, soil.

Slope. The incline of the surface of a soil. It is generally expressed in percentage of slope, which equals the number of feet of fall per 100 feet of horizontal distance.

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 upon parent material, as conditioned by relief over periods of time.

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 soils includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying parent material. Living roots and other plant and animal life 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 (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, that part of the profile below plow depth.

Substratum. Any layer lying beneath the solum, or true soil; the C or D horizon.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called *second bottoms.* They are higher than the *flood plains,* and are seldom subject to overflow. Many streams are bordered by a series of terraces at different levels, indicating the location of the flood plains during successive periods. Many older terraces have become more or less hilly through stream dissection, but they are still regarded as terraces. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of the various size groups of individual soil grains in a mass of soil. Specifically, the proportions of sand, silt, and clay. The basic textural classes, in order of increasing proportions of fine particles are *sand, loamy sand, sandy loam, loam, silty loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* These classes are defined according to size distribution as follows:

Sand. As a soil separate, individual rock or mineral fragments that range in diameter from 0.05 millimeter (0.002 inch) to 2.0 millimeters (0.079 inch). Most sand grains consist of quartz, but they may be of any mineral composition. As a soil textural class, any soil that contains 85 percent or more sand and not more than 10 percent clay.

Loamy sand. Soil material that contains, at the upper limit, 85 to 90 percent sand, and the percentage of silt, plus 1½ times the percentage of clay, is not less than 15; at the lower limit, it contains not less than 70 to 85 percent sand, and the percentage of silt plus twice the percentage of clay does not exceed 30.

Sandy loam. Soil material that contains (1) either 20 percent clay or less, and the percentage of silt plus twice the percentage of clay exceeds 30, and 52 percent or more sand; or (2) less than 7 percent clay, less than 50 percent silt, and between 43 percent and 52 percent sand.

Loam. Soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

Silt loam. Soil material that contains 50 percent or more silt and 12 to 27 percent clay, or 50 to 80 percent silt and less than 12 percent clay.

Silt. As a soil separate, the mineral soil grains that range from 0.05 millimeter (0.002 inch) to 0.002 millimeter (0.000079 inch) in diameter. As a soil textural class, silt contains 80 percent or more silt and less than 12 percent clay.

Sandy clay loam. Soil material that contains 20 to 35 percent clay, less than 28 percent silt, and 45 percent or more sand.

Clay loam. Soil material that contains 27 to 40 percent clay and 20 to 45 percent sand.

Silty clay loam. Soil material that contains 27 to 40 percent clay and less than 20 percent sand.

Sandy clay. Soil material that contains 35 percent or more clay and 45 percent or more sand.

Silty clay. Soil material that contains 40 percent or more clay and 40 percent or more silt.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter (0.000079 inch) in diameter. As a soil textural class, soil material that contains 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

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

Upland (geological). Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace.

GUIDE TO MAPPING UNITS,[1] CAPABILITY UNITS, AND WOODLAND SUITABILITY GROUPS

Map symbol	Mapping unit	Page	Capability unit		Woodland suitability group	
			Symbol	Page	Group	Page
AlB2	Altavista sandy loam, 2 to 6 percent slopes, eroded	9	IIe-2	24	3	39
Alm	Alluvial land	8	IIw-2	25	1	38
Alp	Alluvial land, moderately wet	9	IIIw-2	27	9	40
AmB	Appling sandy loam, 2 to 6 percent slopes	10	IIe-2	24	2	38
AmB2	Appling sandy loam, 2 to 6 percent slopes, eroded	10	IIe-2	24	2	38
AmC2	Appling sandy loam, 6 to 10 percent slopes, eroded	10	IIIe-2	26	2	38
AnB3	Appling sandy clay loam, 2 to 6 percent slopes, severely eroded	10	IIIe-2	26	4	39
AnC3	Appling sandy clay loam, 6 to 10 percent slopes, severely eroded	10	IVe-1	28	4	39
Avp	Alluvial land, wet	9	IVw-1	30	9	40
CiB	Colfax sandy loam, 2 to 6 percent slopes	13	IIIw-3	28	6	40
Csl	Chewacla silt loam	13	IIIw-2	27	9	40
CYB	Cecil sandy loam, 2 to 6 percent slopes	11	IIe-1	23	2	38
CYB2	Cecil sandy loam, 2 to 6 percent slopes, eroded	11	IIe-1	23	2	38
CYC	Cecil sandy loam, 6 to 10 percent slopes	11	IIIe-1	25	2	38
CYC2	Cecil sandy loam, 6 to 10 percent slopes, eroded	11	IIIe-1	25	2	38
CYD	Cecil sandy loam, 10 to 15 percent slopes	12	IVe-1	28	2	38
CYD2	Cecil sandy loam, 10 to 15 percent slopes, eroded	12	IVe-1	28	2	38
CYE	Cecil sandy loam, 15 to 25 percent slopes	12	VIe-2	31	2	38
CZB3	Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded	12	IIIe-1	25	4	39
CZC3	Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded	12	IVe-1	28	4	39
CZD3	Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded	12	VIe-2	31	4	39
DgB2	Davidson loam, 2 to 6 percent slopes, eroded	14	IIe-1	23	2	38
DhB3	Davidson clay loam, 2 to 6 percent slopes, severely eroded	13	IIIe-1	25	4	39
DhC3	Davidson clay loam, 6 to 10 percent slopes, severely eroded	14	IVe-1	28	4	39
Gul	Gullied land	14	VIIe-4	32	([2])	
HYB2	Helena sandy loam, 2 to 6 percent slopes, eroded	14	IIe-3	24	6	40
HYC2	Helena sandy loam, 6 to 10 percent slopes, eroded	14	IVe-2	29	6	40
HZB3	Helena sandy clay loam, 2 to 6 percent slopes, severely eroded	15	IVe-2	29	7	40
HZC3	Helena sandy clay loam, 6 to 10 percent slopes, severely eroded	15	VIe-4	32	7	40
Lcm	Local alluvial land	9	I-1	22	1	38
LdB2	Lloyd sandy loam, 2 to 6 percent slopes, eroded	15	IIe-1	23	2	38
LdC2	Lloyd sandy loam, 6 to 10 percent slopes, eroded	15	IIIe-1	25	2	38
LdD2	Lloyd sandy loam, 10 to 15 percent slopes, eroded	15	IVe-1	28	2	38
LdE2	Lloyd sandy loam, 15 to 25 percent slopes, eroded	15	VIe-2	31	2	38
LeB3	Lloyd clay loam, 2 to 6 percent slopes, severely eroded	16	IIIe-1	25	4	39
LeC3	Lloyd clay loam, 6 to 10 percent slopes, severely eroded	16	IVe-1	28	4	39
LeD3	Lloyd clay loam, 10 to 15 percent slopes, severely eroded	16	IVe-1	28	4	39
LeC4	Lloyd-Gullied land complex, 6 to 10 percent slopes	16	VIe-2	31	4	39
LeE4	Lloyd-Gullied land complex, 10 to 25 percent slopes	16	VIIe-1	32	4	39
LFB3	Lloyd clay loam, compact subsoil, 2 to 6 percent slopes, severely eroded	16	IIIe-3	27	4	39
LFC3	Lloyd clay loam, compact subsoil, 6 to 10 percent slopes, severely eroded	16	IVe-2	29	4	39
LGB2	Lloyd sandy loam, compact subsoil, 2 to 6 percent slopes, eroded	16	IIe-3	24	2	38
LIC2	Louisburg soils, 6 to 10 percent slopes, eroded	17	IVe-4	30	5	40
LID2	Louisburg soils, 10 to 15 percent slopes, eroded	17	VIe-3	32	5	40
LnB	Louisburg sandy loam, 2 to 6 percent slopes	17	IIIe-5	27	5	40
LnC	Louisburg sandy loam, 6 to 10 percent slopes	17	IVe-4	30	5	40
LnD	Louisburg sandy loam, 10 to 15 percent slopes	17	VIe-3	32	5	40
MjB2	Madison fine sandy loam, 2 to 6 percent slopes, eroded	18	IIe-1	23	2	38
MjC2	Madison fine sandy loam, 6 to 10 percent slopes, eroded	18	IIIe-1	25	2	38
MjD2	Madison fine sandy loam, 10 to 15 percent slopes, eroded	18	IVe-1	28	2	38
MlB3	Madison sandy clay loam, 2 to 6 percent slopes, severely eroded	18	IIIe-1	25	4	39
MlC3	Madison sandy clay loam, 6 to 10 percent slopes, severely eroded	18	IVe-1	28	4	39
MtC	Molena loamy sand, 2 to 10 percent slopes	18	IVs-1	31	5	40
Rok	Rock outcrop	19	VIIIs-1	33	([2])	
Rol	Roanoke and Augusta sandy loams	19	IVw-2	30	9	40
Wer	Wehadkee and Roanoke silty clay loams	20	IVw-1	30	9	40
WiB2	Wilkes sandy loam, 2 to 6 percent slopes, eroded	20	IIIe-5	27	8	40
WiD2	Wilkes sandy loam, 10 to 15 percent slopes, eroded	20	VIe-3	32	8	40
WkB	Worsham sandy loam, 2 to 6 percent slopes	21	Vw-1	31	7	40

[1] The approximate acreage and proportionate extent of the soils are listed in table 8, p. 8; the estimated yields of selected crops are in table 9, facing page 34; and the engineering properties of the soils are in tables 12, 13, and 14 in the section "Engineering Interpretations of Soils," p. 41.

[2] Not suitable for trees.

O

TABLE 9.—*Estimated annual yields of crops per acre under different levels of fertilization*

[Asterisk (*) denotes the yields and fertilizer rates believed to be the most profitable. Where asterisks are in two columns for the same crop and same soil, increased yields are questionable. Absence of yield indicates that crop is not adapted or is not commonly grown]

Soils	Corn							Cotton						
	Pounds per acre of N., P_2O_5, and K_2O, respectively							Pounds per acre of N., P_2O_5, and K_2O, respectively						
	0-0-0	30-15-15	60-30-30	90-45-45	120-60-60	150-75-75	180-90-90	0-0-0	30-15-15	60-30-30	90-45-45	120-60-60	150-75-75	180-90-90
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Lint lbs.*	*Lint lbs.*	*Lint lbs.*	*Lint lbs.*	*Lint lbs.*	*Lint lbs.*	*Lint lbs.*
Alluvial land	22	49	66	77	85	88*	92							
Alluvial land, moderately wet	12	27	37	43*	47	50	51							
Alluvial land, wet														
Altavista sandy loam, 2 to 6 percent slopes, eroded	16	43	60	71	79	83*	86	150	345	465	545	595	625*	645
Appling sandy loam, 2 to 6 percent slopes	18	45	62	73	81	85*	88	175	370	490	570	620	650*	670
Appling sandy loam, 2 to 6 percent slopes, eroded	18	45	62	73	81	85*	88	175	370	490	570	620	650*	670
Appling sandy loam, 6 to 10 percent slopes, eroded	15	33	45	52	57*	60	62	150	345	465	545	595	625*	645
Appling sandy clay loam, 2 to 6 percent slopes, severely eroded	10	23	30	35*	38	40	41	125	260	340	395	430*	450	465
Appling sandy clay loam, 6 to 10 percent slopes, severely eroded	10	23	30	35*	38	40	41	125	260	340	395	430*	450	465
Cecil sandy loam, 2 to 6 percent slopes	18	45	62	73	81	85*	88	200	420	565	655	715	750	775*
Cecil sandy loam, 2 to 6 percent slopes, eroded	18	45	62	73	81	85*	88	200	420	565	655	715	750	775*
Cecil sandy loam, 6 to 10 percent slopes	15	33	45	52	57*	60	62	175	370	490	570	620	650*	670
Cecil sandy loam, 6 to 10 percent slopes, eroded	15	33	45	52	57*	60	62	175	370	490	570	620	650*	670
Cecil sandy loam, 10 to 15 percent slopes	10	23	30	35*	38	40	41	125	260	340	395	430*	450	465
Cecil sandy loam, 10 to 15 percent slopes, eroded	10	23	30	35*	38	40	41	125	260	340	395	430*	450	465
Cecil sandy loam, 15 to 25 percent slopes														
Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded	12	27	37	43*	47	50	51	150	345	465	545	595	625*	645
Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded	10	23	30	35*	38	40	41	125	260	340	395	430*	450	465
Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded														
Chewacla silt loam	22	49	66	77	85*	88	92							
Colfax sandy loam, 2 to 6 percent slopes	10	23	30	35*	38	40	41							
Davidson loam, 2 to 6 percent slopes, eroded	18	45	62	73	81	85*	88	200	420	565	655	715	750	775*
Davidson clay loam, 2 to 6 percent slopes, severely eroded	12	27	37	43*	47	50	51	150	345	465	545	595	625*	645
Davidson clay loam, 6 to 10 percent slopes, severely eroded	10	23	30	35*	38	40	41	125	260	340	395	430*	450	465
Gullied land														
Helena sandy loam, 2 to 6 percent slopes, eroded	12	27	37	43*	47	50	51	125	260	340	395	430*	450	465
Helena sandy loam, 6 to 10 percent slopes, eroded	10	23	30	35*	38	40	41	125	260	340	395	430*	450	465
Helena sandy clay loam, 2 to 6 percent slopes, severely eroded	10	23	30	35*	38	40	41	100	200	260	305*	330	350	360
Helena sandy clay loam, 6 to 10 percent slopes, severely eroded														
Lloyd sandy loam, 2 to 6 percent slopes, eroded	18	45	62	73	81	85*	88	200	420	565	655	715	750	775*
Lloyd sandy loam, compact subsoil, 2 to 6 percent slopes, eroded	15	33	45	52	57*	60	62	150	345	465	545	595	625*	645
Lloyd sandy loam, 6 to 10 percent slopes, eroded	15	33	45	52	57*	60	62	175	370	490	570	620	650*	670
Lloyd sandy loam, 10 to 15 percent slopes, eroded	10	23	30	35*	38	40	41	125	260	340	395	430*	450	470
Lloyd sandy loam, 15 to 25 percent slopes, eroded														
Lloyd clay loam, 2 to 6 percent slopes, severely eroded	12	27	37	43*	47	50	51	150	345	465	545	595	625*	645
Lloyd clay loam, compact subsoil, 2 to 6 percent slopes, severely eroded	10	23	30	35*	38	40	41	125	260	340	395	430*	450	465
Lloyd clay loam, 6 to 10 percent slopes, severely eroded	10	23	30	35*	38	40	41	125	260	340	395	430*	450	465
Lloyd clay loam, 10 to 15 percent slopes, severely eroded	8	17	22*	26	28	30	31	125	260	340	395	430*	450	465
Lloyd clay loam, compact subsoil, 6 to 10 percent slopes, severely eroded	8	17	22*	26	28	30	31	125	260	340	395	430*	450	465
Lloyd-Gullied land complex, 6 to 10 percent slopes														
Lloyd-Gullied land complex, 10 to 25 percent slopes														
Local alluvial land	24	51	68	79	87	91	94	220	460	585	675	735	770	795
Louisburg sandy loam, 2 to 6 percent slopes	15	33	45	52	57*	60	62	150	345	465	545	595	625*	645
Louisburg sandy loam, 6 to 10 percent slopes	12	27	37	43*	47	50	51	125	260	340	395	430*	450	465
Louisburg sandy loam, 10 to 15 percent slopes														
Louisburg soils, 6 to 10 percent slopes, eroded	8	17	22*	26	28	30	31	100	200	260	305*	330	350	360
Louisburg soils, 10 to 15 percent slopes, eroded														
Madison fine sandy loam, 2 to 6 percent slopes, eroded	18	45	62	73	81	85*	88	200	420	565	655	715	750	775*
Madison fine sandy loam, 6 to 10 percent slopes, eroded	15	33	45	52	57*	60	62	175	370	490	570	620	650*	670
Madison fine sandy loam, 10 to 15 percent slopes, eroded	10	23	30	35*	38	40	41	125	260	430	393	430*	450	465
Madison sandy clay loam, 2 to 6 percent slopes, severely eroded	12	27	37	43*	47	50	51	150	345	465	545	595	625*	645
Madison sandy clay loam, 6 to 10 percent slopes, severely eroded	10	23	30	35*	38	40	41	125	260	340	395	430*	450	465
Molena loamy sand, 2 to 10 percent slopes	10	23	30	35*	38	40	41	125	260	340	395	430*	450	465
Roanoke and Augusta sandy loams	10	23	30	35*	38	40	41							
Rock outcrop														
Wehadkee and Roanoke silty clay loams	8	17	22*	26	28	30	31							
Wilkes sandy loam, 2 to 6 percent slopes, eroded	8	17	22*	26	28	30	31	100	200	260	305*	330	350	360
Wilkes sandy loam, 10 to 15 percent slopes, eroded														
Worsham sandy loam, 2 to 6 percent slopes														

Soils	Oats						Wheat					
	Pounds per acre of N., P_2O_5, and K_2O, respectively						Pounds per acre of N., P_2O_5, and K_2O, respectively					
	0-0-0	30-15-15	60-30-30	90-45-45	120-60-60	150-75-75	0-0-0	30-15-15	60-30-30	90-45-45	120-60-60	150-75-75
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*
Alluvial land	22	41	53	60*	65	68						
Alluvial land, moderately wet												
Alluvial land, wet												
Altavista sandy loam, 2 to 6 percent slopes, eroded	15	30	40*	46	50	52	5	12	17*	20	21	22
Appling sandy loam, 2 to 6 percent slopes	22	41	53*	60	65	68	8	16	22*	25	27	28
Appling sandy loam, 2 to 6 percent slopes, eroded	22	41	53*	60	65	68	8	16	22*	25	27	28
Appling sandy loam, 6 to 10 percent slopes, eroded	22	41	53*	60	65	68	8	16	22*	25	27	28
Appling sandy clay loam, 2 to 6 percent slopes, severely eroded	15	30	40*	46	50	52	5	12	17*	20	21	22
Appling sandy clay loam, 6 to 10 percent slopes, severely eroded	15	30	40*	40	50	52	8	16	22*	25	27	28
Cecil sandy loam, 2 to 6 percent slopes	25	46	61	69*	75	79	13	25	32	37*	40	42
Cecil sandy loam, 2 to 6 percent slopes, eroded	25	46	61	69*	75	79	13	25	32	37*	40	42
Cecil sandy loam, 6 to 10 percent slopes	22	41	53*	60	65	68	12	22	28	32*	35	37
Cecil sandy loam, 6 to 10 percent slopes, eroded	22	41	53*	60	65	68	12	22	28	32*	35	37
Cecil sandy loam, 10 to 15 percent slopes	15	30	40*	46	50	52	8	16	22*	25	27	28
Cecil sandy loam, 10 to 15 percent slopes, eroded	15	30	40*	46	50	52	8	16	22*	25	27	28
Cecil sandy loam, 15 to 25 percent slopes												
Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded	22	41	53	60*	65	68	12	22	28	32*	35	37
Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded	15	30	40*	46	50	52	8	16	22*	25	27	28
Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded												
Chewacla silt loam												
Colfax sandy loam, 2 to 6 percent slopes												
Davidson loam, 2 to 6 percent slopes, eroded	25	46	61	69*	75	79	13	25	32	37*	40	42
Davidson clay loam, 2 to 6 percent slopes, severely eroded	22	41	53	60*	65	60	12	22	28	32*	35	37
Davidson clay loam, 6 to 10 percent slopes, severely eroded	15	30	40*	46	50	52	8	16	22*	25	27	28
Gullied land												
Helena sandy loam, 2 to 6 percent slopes, eroded	15	30	40*	46	50	52						
Helena sandy loam, 6 to 10 percent slopes, eroded	15	30	40*	46	50	52						
Helena sandy clay loam, 2 to 6 percent slopes, severely eroded	10	23*	31	36	40	42						
Helena sandy clay loam, 6 to 10 percent slopes, severely eroded												
Lloyd sandy loam, 2 to 6 percent slopes, eroded	25	46	61	69*	75	79	13	25	32	37	40*	42
Lloyd sandy loam, compact subsoil, 2 to 6 percent slopes, eroded	22	41	53*	60*	65	68	8	16	22*	25	27	28
Lloyd sandy loam, 6 to 10 percent slopes, eroded	22	41	53	60*	65	68	12	22	28	32*	35	37
Lloyd sandy loam, 10 to 15 percent slopes, eroded	15	30	40*	46	50	52	8	16	22*	25	27	28
Lloyd sandy loam, 15 to 25 percent slopes, eroded												
Lloyd clay loam, 2 to 6 percent slopes, severely eroded	22	41	53	60*	65	68	12	22	28	32*	35	37
Lloyd clay loam, compact subsoil, 2 to 6 percent slopes, severely eroded	10*	23*	31	36	40	42	5	12	17*	20	21	22
Lloyd clay loam, 6 to 10 percent slopes, severely eroded	15	30	40*	46	50	52	8	16	22*	25	27	28
Lloyd clay loam, 10 to 15 percent slopes, severely eroded	10	23*	31	36	40	42	5	12	17*	20	21	22
Lloyd clay loam, compact subsoil, 6 to 10 percent slopes, severely eroded	15	30	40*	46	50	52	8	16	22*	25	27	28
Lloyd-Gullied land complex, 6 to 10 percent slopes												
Lloyd-Gullied land complex, 10 to 25 percent slopes												
Local alluvial land	24	51	68	79	87	91	15	27	34	39	42*	44
Louisburg sandy loam, 2 to 6 percent slopes	15	30	40*	46	50	52	8	16	22*	25	27	28
Louisburg sandy loam, 6 to 10 percent slopes	15	30	40*	46	50	52	5	12	17	20	21	22
Louisburg sandy loam, 10 to 15 percent slopes												
Louisburg soils, 6 to 10 percent slopes, eroded	10	23*	31	36	40	42						
Louisburg soils, 10 to 15 percent slopes, eroded												
Madison fine sandy loam, 2 to 6 percent slopes, eroded	25	46	61	69*	75	79	13	25	32	37*	40	42
Madison fine sandy loam, 6 to 10 percent slopes, eroded	22	41	53	60*	65	68	12	22	28	32*	35	37
Madison fine sandy loam, 10 to 15 percent slopes, eroded	15	30	40*	46	50	52	8	16	22*	25	27	28
Madison sandy clay loam, 2 to 6 percent slopes, severely eroded	22	41	53	60*	65	68	12	22	28	32*	35	37
Madison sandy clay loam, 6 to 10 percent slopes, severely eroded	15	30	40*	46	50	52	8	16	22*	25	27	28
Molena loamy sand, 2 to 10 percent slopes												
Roanoke and Augusta sandy loams												
Rock outcrop												
Wehadkee and Roanoke silty clay loams												
Wilkes sandy loam, 2 to 6 percent slopes, eroded	10	23*	31	36	40	42						
Wilkes sandy loam, 10 to 15 percent slopes, eroded												
Worsham sandy loam, 2 to 6 percent slopes												

Soils	Tall fescue and white or ladino clover						Common bermudagrass and crimson clover						
	Pounds per acre of N., P_2O_5, and K_2O, respectively						Pounds per acre of N., P_2O_5, and K_2O, respectively						
	0-0-0	30-15-15	60-30-30	90-45-45	120-60-60	150-75-75	0-0-0	0-30-30	0-45-45	30-60-60	60-75-75	90-90-90	120-90-90
	Cow-acre-days [1]	*Cow-acre-days* [1]	*Cow-acre-days* [1]	*Cow-acre-days* [1]	*Cow-acre-days* [1]	*Cow-acre-days* [1]	*Cow-acre-days* [1]	*Cow-acre-days* [1]	*Cow-acre-days* [1]	*Cow-acre-days* [1]	*Cow-acre-days* [1]	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Alluvial land	100	240	332	390	428*	450*	66	175	238	328	380	423*	454*
Alluvial land, moderately wet	75	185	260	302*	330*	350	40	122	190	243*	285*	316	343
Alluvial land, wet	25	115	175*	210*	235	250	27	40	153*	200*	238	263	285
Altavista sandy loam, 2 to 6 percent slopes, eroded	100	240	332	390	428*	450*	53	148	221	285	333*	370*	401
Appling sandy loam, 2 to 6 percent slopes	100	240	332	390	428*	450*	53	148	221	285	333*	370*	401
Appling sandy loam, 2 to 6 percent slopes, eroded	100	240	332	390	428*	450*	53	148	221	285	333*	370*	401
Appling sandy loam, 6 to 10 percent slopes, eroded	75	185	260	302*	330*	350	53	148	221	285	333*	370*	401
Appling sandy clay loam, 2 to 6 percent slopes, severely eroded	50	158	218*	258*	285	300	53	148	221	285	333*	370*	401
Appling sandy clay loam, 6 to 10 percent slopes, severely eroded	50	158	218*	258*	285	300	40	122	190	243*	285*	316	343
Cecil sandy loam, 2 to 6 percent slopes	100	240	332	390	428*	450*	66	175	238	328	380	423*	454*
Cecil sandy loam, 2 to 6 percent slopes, eroded	100	240	332	390	428*	450*	66	175	238	328	380	423*	454*
Cecil sandy loam, 6 to 10 percent slopes	75	185	260	302*	330*	250	53	148	221	285	333*	370*	401
Cecil sandy loam, 6 to 10 percent slopes, eroded	75	185	260	302*	330*	350	53	148	221	285	333*	370*	401
Cecil sandy loam, 10 to 15 percent slopes	50	158	218*	258*	285	300	40	122	190	243*	285*	316	343
Cecil sandy loam, 10 to 15 percent slopes, eroded	50	158	218*	258*	285	300	40	122	190	243*	285*	316	343
Cecil sandy loam, 15 to 25 percent slopes	25	115	175*	210*	235	250	27	40	153*	200*	238	263	285
Cecil sandy clay loam, 2 to 6 percent slopes, severely eroded	75	185	260	302*	330*	350	53	148	221	285	333*	370*	401
Cecil sandy clay loam, 6 to 10 percent slopes, severely eroded	50	158	218*	258*	285	300	40	122	190	243*	285*	316	343
Cecil sandy clay loam, 10 to 15 percent slopes, severely eroded	25	115	175*	210*	235	250	27	40	153*	200*	238	263	285
Chewacla silt loam	100	240	332	390	428*	450*	27	40	153*	200*	238	263	285
Colfax sandy loam, 2 to 6 percent slopes	50	158	218*	258*	285	300	40	122	190	243*	285*	316	343
Davidson loam, 2 to 6 percent slopes, eroded	100	240	332	390	428*	450*	66	175	238	328	380	423*	454*
Davidson clay loam, 2 to 6 percent slopes, severely eroded	75	185	260	302*	330*	350	53	148	221	285	333*	370*	401
Davidson clay loam, 6 to 10 percent slopes, severely eroded	50	158	218*	258*	285	300	40	122	190	243*	285*	316	343
Gullied land													
Helena sandy loam, 2 to 6 percent slopes, eroded	75	185	260	302*	330*	350	53	148	221	285	333*	370*	401
Helena sandy loam, 6 to 10 percent slopes, eroded	75	185	260	302*	330*	350	53	148	221	285	333*	370*	401
Helena sandy clay loam, 2 to 6 percent slopes, severely eroded	50	158	218*	258*	285	300	40	122	190	243*	285*	316	343
Helena sandy clay loam, 6 to 10 percent slopes, severely eroded	50	158	218*	258*	285	300	27	40	153*	200*	238*	263	285
Lloyd sandy loam, 2 to 6 percent slopes, eroded	100	240	332	390	428*	450*	66	175	238	328	380	423*	454*
Lloyd sandy loam, compact subsoil, 2 to 6 percent slopes, eroded	100	240	33	390	428*	450*	66	175	238	328	380	423*	454*
Lloyd sandy loam, 6 to 10 percent slopes, eroded	75	185	260	302*	330*	350	53	148	221	285	333*	370*	401
Lloyd sandy loam, 10 to 15 percent slopes, eroded	50	158	218*	258*	285	300	40	122	190	243*	285*	316	343
Lloyd sandy loam, 15 to 25 percent slopes, eroded	25	115	175*	210*	235	250	27	40	153*	200*	238	263	285
Lloyd clay loam, 2 to 6 percent slopes, severely eroded	75	185	260	302*	330*	350	53	148	221	285	333*	370*	401
Lloyd clay loam, compact subsoil, 2 to 6 percent slopes, severely eroded	75	185	260	302*	330*	350	53	148	221	285	333*	370*	401
Lloyd clay loam, 6 to 10 percent slopes, severely eroded	50	158	218*	258*	285	300	40	122	190	243*	285*	316	343
Lloyd clay loam, 10 to 15 percent slopes, severely eroded	25	115	175*	210*	235	250	27	40	153*	200*	238	263	285
Lloyd clay loam, compact subsoil, 6 to 10 percent slopes, severely eroded	50	158	218*	258*	285	300	40	122	190	243*	285*	316	343
Lloyd-Gullied land complex, 6 to 10 percent slopes													
Lloyd-Gullied land complex, 10 to 25 percent slopes													
Local alluvial land	100	240	332	390	478*	450*	66	175	238	328	380	423*	454*
Louisburg sandy loam, 2 to 6 percent slopes	75	185	260	302*	330*	350	53	148	221	285	333*	370*	401
Louisburg sandy loam, 6 to 10 percent slopes	75	185	260	302*	330*	350	40	122	190	243*	285*	316	343
Louisburg sandy loam, 10 to 15 percent slopes	25	115	175*	210*	235	250	27	40	153*	200*	238	263	285
Louisburg soils, 6 to 10 percent slopes, eroded	25	115	175*	210*	235	250	27	40	153*	200*	238	263	285
Louisburg soils, 10 to 15 percent slopes, eroded	25	115	175*	210*	235	250	27	40	153*	200*	238	263	285
Madison fine sandy loam, 2 to 6 percent slopes, eroded	100	240	332	390	428*	450*	66	175	238	328	380	423*	454
Madison fine sandy loam, 6 to 10 percent slopes, eroded	75	185	260	302*	330*	350	53	148	221	285	333*	370*	401
Madison fine sandy loam, 10 to 15 percent slopes, eroded	50	158	218*	258*	285	300	40	122	190	243*	285*	316	343*
Madison sandy clay loam, 2 to 6 percent slopes, severely eroded	75	185	260	302*	330*	350	53	148	221	285	333*	370*	401
Madison sandy clay loam, 6 to 10 percent slopes, severely eroded	50	158	218*	258*	285	300	40	122	190	243*	285*	316	343
Molena loamy sand, 2 to 10 percent slopes	25	115	175*	210*	235	250	40	122	190	243*	285*	316	343
Roanoke and Augusta sandy loams	25	115	175*	210*	235	250	40	122	190	243*	285*	316	343
Rock outcrop													
Wehadkee and Roanoke silty clay loams	25	115	175*	210*	235	250	27	40	153*	200*	238	263	285
Wilkes sandy loam, 2 to 6 percent slopes, eroded	50	158	218*	258*	285	300	40	122	190	243*	285*	316	343
Wilkes sandy loam, 10 to 15 percent slopes, eroded	25	115	175*	210*	235	250	27	40	153*	200*	238	263	285
Worsham sandy loam, 2 to 6 percent slopes	25	115	175*	210*	235	250	40	122	190	243*	285*	316	343

[1] The term "cow-acre-days" expresses the carrying capacity of pasture. As used here, it is the product of the number of animal units carried per acre, multiplied by the number of days during the year that animals can graze without injury to the pasture.

713-600 O - 64 (Face p. 34)

NRCS Accessibility Statement