SOIL SURVEY OF

Laurens and Union Counties South Carolina

United States Department of Agriculture
Soil Conservation Service and Forest Service
in cooperation with
South Carolina Agricultural Experiment Station
and the South Carolina
Land Resources Conservation Commission

Issued February 1975

Major fieldwork for this soil survey was done in the period 1961–69. Soil names and descriptions were approved in 1970. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1970. This survey was made cooperatively by the Soil Conservation Service, the Forest Service, the South Carolina Agricultural Experiment Station, and the South Carolina Land Resources Conservation Commission. It is part of the technical assistance furnished to the Laurens County Soil and Water Conservation District and Union County Soil and Water Conservation District.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, United States Department of Agriculture, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

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

Locating Soils

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

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

Finding and Using Information

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

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

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

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

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

Engineers and builders can find, under "Use of the Soils in Engineering," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

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

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

Newcomers in Laurens and Union Counties may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information given in the section "Additional Facts About Laurens and Union Counties."

Cover: **Beef cattle grazing fescue and white clover on Chewacla loam.**

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SOIL SURVEY OF LAURENS AND UNION COUNTIES, SOUTH CAROLINA

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE AND FOREST SERVICE, IN COOPERATION WITH THE SOUTH CAROLINA AGRICULTURAL EXPERIMENT STATION AND THE SOUTH CAROLINA LAND RESOURCES CONSERVATION COMMISSION

LAURENS AND UNION COUNTIES are in northwest-central South Carolina (fig. 1). Laurens County occupies approximately 711 square miles, or 454,976 acres. Of this area, about 9 square miles is water, mostly small ponds and lakes. Laurens, the county seat, is in the center of the county. Union County occupies approximately 514 square miles, or 328,704 acres. The Broad, Tyger, and Enoree Rivers, as well as other bodies of water, cover about 3 square miles of this area. Union, the county seat, is in the center of the county.

The first settlements in Laurens County were on Duncan Creek and near Maddens in the early 1750's. The early settlers came from Pennsylvania, Virginia, and North Carolina. The first settlements in Union County were along Broad River, Browns Creek, and Tyger River in the early 1750's. These settlers came from Pennsylvania and Virginia. Laurens and Union Counties were founded in 1785.

Seven-tenths of Laurens and Union Counties is woodland: Sumter National Forest covers 20,379 acres in Laurens County and 57,728 acres in Union County. Pulp and paper companies own large acreages of woodland in both counties.

Most soils in Laurens and Union Counties have a loamy surface layer, and a large acreage is suited to cotton, soybeans, corn, other row crops, and pasture. The soils most used for cultivated crops and pasture are Appling, Cecil, Durham, Enon, Hiwassee, Iredell, and Madison soils. Woodland is a good use for strongly sloping to steep areas, which are susceptible to erosion.

Most farm income is from the sale of livestock or livestock products, pulpwood or other forest products, poultry or poultry products, soybeans, cotton, and some truck crops.

Local textile manufacturing began in both counties in the early 1900's, and since then other industries have grown. Glass is manufactured in Laurens County. Miners produce vermiculite in central and north-central Laurens County, while rock is quarried in the north-central part.

[1] V. A. ROGERS and E. C. HERREN assisted in the fieldwork for this soil survey.

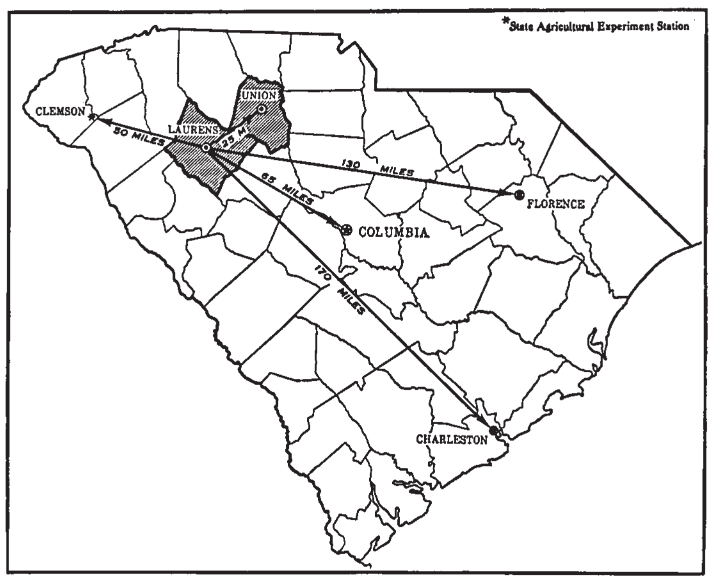

Figure 1.—Location of Laurens and Union Counties in South Carolina.

Streams and ponds are the chief sources of water for livestock. Dug or drilled wells furnish water for most homes.

Among the recreational facilities in these counties are parks, athletic fields, playgrounds, tennis courts, swimming pools, and golf courses. There are also facilities for fishing and hunting. Lake Greenwood provides water skiing, boating, and fishing.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Laurens and Union Counties, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not.

They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into parent material that has not been changed much by leaching or by the action of plant roots.

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

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

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Cecil sandy loam, 2 to 6 percent slopes, is one of several phases within the Cecil series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this publication 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 the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

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

A soil complex consists of areas of two or more soils, so intermingled or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Cartecay-Toccoa complex is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Madison and Pacolet soils, 15 to 40 percent slopes, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. The Gullied land part of Gullied land-Pacolet soils complex is a land type in Laurens and Union Counties.

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 soil 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 kind of soil. 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 such a way as to be readily useful to different groups of users, among them farmers, managers of woodland and rangeland, and engineers.

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others, then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map in an envelope at the back of this survey shows, in color, the soil associations in Laurens and Union Counties. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The associations in this survey have been grouped into four general kinds of landscapes for broad interpretative purposes. Each of the broad groups and the soil associations in each group are described on the following pages.

Nearly Level Soils That Are Medium or Slightly Acid in Some Layer; on Flood Plains

The two soil associations in this group form the flood plains along major streams and their tributaries. The soils formed in deposits of loamy and sandy alluvial sediments. Fresh deposits are continually laid down by streams during floods. Recent deposits have a surface layer of stratified loam and sandy loam. The many scars and scoured areas appear to have been old stream channels. The soils are poorly drained to well drained. In places the water table is near the surface for 6 months or more in most years.

1. Cartecay-Toccoa association

Somewhat poorly drained to well-drained soils that are mostly sandy loam throughout

This association occurs as a nearly level flood plain along the Saluda, Enoree, Tyger, and Broad Rivers and North Rabon, South Rabon, and Browns Creeks and their tributaries. The soils formed in thick loamy alluvial sediments washed from upland soils. They are frequently flooded for brief periods.

This association makes up about 6 percent of Laurens County and 5 percent of Union County. It is about 50 percent Cartecay soils, 25 percent Toccoa soils, and 25 percent soils of minor extent.

Cartecay soils have a brown sandy loam surface layer. Below this, in sequence, is brownish-yellow loamy sand, grayish-brown sandy loam mottled with yellowish brown, brown loamy sand mottled with yellow and gray, and gray fine sandy loam mottled with pale brown.

Toccoa soils are at the upper reaches of the drainage pattern and in areas adjacent to stream channels where streambanks are steep. The surface layer is typically brown sandy loam, but in some recently overwashed areas it consists of deposits of fine gravel or sandy clay loam sediments. Below the surface layer, in sequence, is yellowish-red sandy loam, reddish-brown sandy loam mottled with pale brown, and reddish-brown loamy sand.

Of minor extent in this association are Buncombe, Chewacla, Enoree, and Wehadkee soils. Buncombe soils are along the larger streams. Chewacla and Enoree soils are in scattered areas throughout the flood plains. Wehadkee soils are in elongated areas adjacent to uplands.

Most of this association is pasture and woodland, dominantly wetland hardwoods. Wood crops are used for pulpwood, sawtimber, and veneer. This association provides suitable habitat for woodland and wetland wildlife.

2. Enoree-Chewacla-Wehadkee association

Poorly drained and somewhat poorly drained soils that are mostly sandy clay loam and loam throughout

This association is on flood plains of Fairforest, Duncan, Warrior, and Rabon Creeks and the Reedy and Little Rivers. The soils formed in loamy alluvial sediments. They are subject to frequent flooding.

This association makes up about 3 percent of Laurens County and about 2 percent of Union County. It is about 29 percent Enoree soils, 28 percent Chewacla soils, 19 percent Wehadkee soils, and 24 percent soils of minor extent.

Enoree soils are in the lower positions on flood plains and are poorly drained. Their surface layer is grayish-brown silt loam mottled with reddish brown. Below the surface layer, in sequence, is grayish-brown sandy clay loam mottled with reddish brown and strong brown, light brownish-gray and brown sandy loam, and grayish-brown loamy sand.

Chewacla soils, on the higher positions and flood plains, are somewhat poorly drained. Their surface layer is dark-brown loam. Below the surface layer, in sequence, is brown silt loam mottled with light yellowish brown, strong-brown silty clay loam mottled with light brownish gray, strong-brown loam mottled with light brownish gray and reddish yellow, light brownish-gray loam mottled with yellowish red and reddish yellow, and gray sandy loam.

Wehadkee soils are poorly drained and are in elongated areas adjacent to the uplands. Their surface layer is grayish-brown loam mottled with dark gray. Beneath the surface layer, in sequence, is gray loam mottled with brownish yellow, gray sandy clay loam mottled with yellowish brown, and gray sandy loam mottled with yellowish brown and pale brown. Stratification is evident in the lower part of the subsoil.

Of minor extent in this association are Cartecay, Toccoa, and Worsham soils. Cartecay soils are on the high positions on flood plains. Toccoa and Worsham soils are at the upper reaches of the drainage pattern.

About 80 percent of this association is woodland in which water-tolerant hardwoods predominate. The association is suited to pasture, is well suited to woodland wildlife, and is suited to wetland wildlife.

Mostly Gently Sloping to Strongly Sloping Soils That Are Strongly Acid in Part of the Subsoil; on Uplands

The four associations in this group are on narrow, medium, and broad ridges. The soils formed in regolith weathered from granite, gneiss, or schist. They are well drained and moderately deep to deep. They have a surface layer of loamy sand, sandy loam, or sandy clay loam and a subsoil of sandy clay loam, clay loam, or clay.

3. Cecil-Appling association

Well-drained, deep soils that are brownish to red, firm clay in the main part of the subsoil; on narrow to broad ridges

This association is on watershed divides of the major streams. The landscape is one of broad gently sloping ridges, medium sloping ridges, and narrow strongly sloping ridges that are dissected by a few long, shallow drainageways. Narrow nearly level areas occur along the larger streams. The soils formed in material weathered from granite, gneiss, or schist. Because they are gently sloping to strongly sloping, they are subject to erosion.

This association makes up about 29 percent of Laurens County. It is about 60 percent Cecil soils, 12 percent Appling soils, and 28 percent soils of minor extent.

Cecil soils are gently sloping on the broad ridges and sloping on the medium ridges and adjacent to drainageways and small and medium streams. Their surface layer is typically brown sandy loam, but in eroded areas is yellowish-red sandy clay loam. The main part of the subsoil is red clay.

Appling soils are gently sloping to sloping on the broad ridges and sloping adjacent to drainageways. They have a brown loamy sand surface layer. The main part of the subsoil is brownish-yellow clay mottled with yellowish red and red.

Of minor extent in this association are Worsham, Colfax, Durham, Vance, and Pacolet soils. Worsham soils are at the upper reaches of the drainage pattern. Colfax soils are in saddles and drainageways. The gently sloping Durham and Vance soils are on medium ridges. The steeper Pacolet soils are on the breaks adjacent to streams.

Most of this association is in cultivated crops or pasture; the rest is mixed forest or is used for nonfarm purposes. This association is suited to poorly suited to openland wildlife, but suited to well suited to woodland wildlife. Farm ponds provide favorable fishing.

4. Hiwassee-Cecil association

Well-drained, deep soils that are dark-red to red, firm clay in the main part of the subsoil; on medium to broad ridges

This association occurs as irregular ridges that have gently sloping crests and sloping to strongly sloping sides adjacent to streams. The drainageways are long, crooked, and well defined, and the bottom land adjacent to streams is narrow. The soils formed in regolith weathered from gneiss or schist. Because they are gently sloping to strongly sloping, they are subject to erosion.

This association makes up about 10 percent of Laurens County and about 9 percent of Union County. It is about 40 percent Hiwassee soils, 30 percent Cecil soils, and 30 percent soils of minor extent.

Hiwassee soils are gently sloping on the broad ridges, sloping on the medium ridges and adjacent to drainageways, and strongly sloping adjacent to streams. Their surface layer is typically dark reddish-brown sandy loam, but in eroded areas is dark-red sandy clay loam. The upper part of the subsoil is dark-red clay and the lower part is dark-red clay loam mottled with yellowish red.

Cecil soils are gently sloping on the broad ridges, sloping on the medium ridges and adjacent to drainageways, and strongly sloping adjacent to small and medium streams. Their surface layer is typically brown sandy loam, but in eroded areas is yellowish-red sandy clay loam. The main part of the subsoil is red clay.

Of minor extent in this association are Enon, Louisburg, Mecklenburg, and Pacolet soils. The gently sloping and sloping Enon and Mecklenburg soils are on ridges. The sloping and steep Louisburg and Pacolet soils are on breaks adjacent to streams.

Most of this association is in cultivated crops or pasture; the rest is pine forest or is used for nonfarm purposes. This association is suited to cultivated crops, pasture, and woodland. It is suited to poorly suited to openland wildlife and suited to well suited to woodland wildlife. Farm ponds provide favorable fishing.

5. Durham-Appling-Cecil association

Well-drained, deep soils that are brownish to red, friable to firm sandy clay loam to clay in the main part of the subsoil; on medium ridges

This association occurs as medium, gently sloping ridge crests and sloping to strongly sloping sides adjacent to drainageways and streams. The soils formed in regolith weathered from granite, gneiss, or schist. Because they are gently sloping to strongly sloping, they are subject to erosion.

This association makes up about 1 percent of Laurens County and 4 percent of Union County. It is about 30 percent Durham soils, 20 percent Appling soils, 15 percent Cecil soils, and 35 percent soils of minor extent.

Durham soils are gently sloping on the broad and medium ridges at the heads of drainageways and sloping at the heads of drainageways and on medium ridges. Their surface layer is grayish-brown loamy sand or pale-brown sandy loam. The upper part of the subsoil is yellow sandy clay loam that has reddish mottles, and the lower part is brownish-yellow to very pale brown sandy clay loam mottled with red and brownish yellow.

Appling soils are gently sloping on the broad ridges and sloping on the narrower ridges and adjacent to drainageways. Their surface layer is brown loamy sand. The main part of the subsoil is brownish-yellow clay mottled with yellowish red and red.

Cecil soils are sloping and strongly sloping. They are adjacent to streams. Their surface layer is typically brown sandy loam, but in eroded areas is yellowish-red sandy clay loam. The main part of the subsoil is red clay.

Of minor extent in this association are Worsham, Mecklenburg, Hiwassee, Enon, and Wilkes soils. Worsham soils are at the upper reaches of the drainage pattern. The gently sloping and sloping Mecklenburg, Hiwassee, and Enon soils are on ridges. The steep Wilkes soils are on breaks adjacent to streams.

Most of this association is in pine forest in Laurens County and in cultivated crops or pasture in Union County. The association is suited to cultivated crops, pasture, and woodland. It is suited to poorly suited to openland wildlife and suited to well suited to woodland wildlife. Farm ponds provide favorable fishing.

6. Madison-Cecil association

Well-drained, moderately deep to deep soils that are red, friable to firm clay loam to clay in the main part of the subsoil; on irregular ridges and short side slopes

This association occurs as irregular ridges, adjacent to streams, that have gently sloping or sloping crests and strongly sloping to steep sides. The bottom land adjacent to the streams is narrow. The soils formed in regolith weathered from quartz-mica gneiss, quartz-mica schist, and granitoid gneiss. Because they are gently sloping to steep, they are subject to erosion.

This association makes up about 16 percent of Union County. It is about 65 percent Madison soils, 15 percent Cecil soils, and 20 percent soils of minor extent.

Madison soils are gently sloping on the broad ridges, sloping on the medium ridges and adjacent to some drainageways, and strongly sloping adjacent to other drainageways and streams. Their surface layer is typically grayish-brown sandy loam, but in eroded areas is reddish-brown sandy clay loam. The subsoil is red clay loam in the upper and lower parts and red clay in the middle part. Common to many fine mica flakes are throughout the profile.

Cecil soils are gently sloping. They are on broad ridges. Their surface layer is typically brown sandy loam, but in eroded areas is yellowish-red sandy clay loam. The main part of the subsoil is red clay.

Of minor extent in this association are Pacolet, Louisburg, and Hiwassee soils. The gently sloping and sloping Hiwassee soils are on ridges. The steep Pacolet and Louisburg soils are on breaks adjacent to streams.

Most of this association is in cultivated crops or pasture; the rest is pine forest or is used for nonfarm purposes. The association is suited to cultivated crops, pasture, and woodland. It is generally suited to poorly suited to openland wildlife. The steep areas are unsuited. The association is suited to well suited to woodland wildlife. Farm ponds provide favorable fishing.

Mostly Gently Sloping to Strongly Sloping Soils That Are Slightly Acid or Neutral in the Subsoil; on Uplands

The two associations in this group occur as gently sloping medium ridges, sloping narrow ridges, and sloping to strongly sloping side slopes. The soils formed in regolith weathered from granite, gneiss, schist, gabbro, diorite, and other dark-colored rock, or from acid rock that has intrusions of alkaline material. They are somewhat poorly drained to well drained. Some are shallow to moderately deep over a fragipan, and some are moderately deep to deep. The surface layer is fine sandy loam, sandy loam, or sandy clay loam, and the subsoil is sandy clay loam, clay loam, or clay.

7. *Enon-Wilkes-Iredell association*

Well-drained to somewhat poorly drained, shallow to deep soils that are mainly brownish, firm to extremely firm clay loam to clay in the subsoil; on narrow and medium ridges and irregular side slopes

This association occurs as gently sloping medium ridges, sloping narrow ridges, sloping to strongly sloping areas adjacent to streams, and narrow nearly level areas along streams. The soils formed in regolith weathered from gneiss or schist of high basic mineral content or in regolith weathered from gabbro diorite. Because they are gently sloping to strongly sloping, they are subject to erosion. Drainageways are well defined, long, and deep.

This association makes up about 1 percent of Laurens County and 2 percent of Union County. It is about 35 percent Enon soils, 30 percent Wilkes soils, 18 percent Iredell soils, and 17 percent soils of minor extent.

Enon soils are moderately deep to deep, gently sloping to sloping, and well drained. They are on medium and narrow ridges and side slopes along streams. Their surface layer is brown sandy loam. The upper and middle parts of the subsoil are strong-brown clay loam to clay mottled with yellowish red and pale brown.

Wilkes soils are shallow, sloping to strongly sloping, well-drained soils adjacent to streams. Their surface layer is brown sandy loam. The subsoil is yellowish-brown sandy clay loam mottled with green and dark brown.

Iredell soils are moderately deep, gently sloping, and moderately well drained to somewhat poorly drained soils on broad ridges. Their surface layer is dark-brown fine sandy loam. The upper part of the subsoil is light olive-brown clay. The lower part is olive clay loam mottled with yellowish brown.

Of minor extent in this association are Hiwassee, Mecklenburg, and Cataula soils. The gently sloping Hiwassee soils and the gently sloping and sloping Cataula and Mecklenburg soils are on ridges.

Most of this association is in cultivated crops or pasture, and the rest is forest. Enon and Iredell soils are better suited to cultivation than Wilkes soils. They are also suited to pasture. Wilkes soils are suited to limited cultivation and to pasture. Hardwoods grow better than pines on Iredell and Wilkes soils. The stony Iredell soils are unsuited to openland wildlife and poorly suited to woodland wildlife. The rest of the association is suited to unsuited to openland wildlife and poorly suited to well suited to woodland wildlife.

8. *Cataula-Enon association*

Well-drained, moderately deep to deep soils that are mainly brownish to red, firm to very firm clay loam to clay in the subsoil; on narrow to medium ridges and side slopes

This association occurs as gently sloping medium ridges, sloping narrow ridges, and strongly sloping side slopes. The soils formed in regolith weathered from gneiss and schist influenced, in most places, by basic mineral dikes. Because they are gently to strongly sloping, they are subject to erosion.

This association makes up about 6 percent of Laurens County and 11 percent of Union County. It is about 50 percent Cataula soils, 20 percent Enon soils, and 30 percent soils of minor extent.

Cataula soils are well drained. They are gently sloping on the medium to narrow ridges and sloping on the narrow ridges and adjacent to drainageways. Their surface layer is typically dark-brown sandy loam, but in eroded areas is yellowish-red sandy clay loam. The subsoil is red sandy clay loam in the upper part and red clay loam in the lower part. It is moderately deep over a fragipan.

Enon soils are strongly sloping and well drained. They are adjacent to drainageways. Their surface layer is brown sandy loam. The upper and middle parts of the subsoil are strong-brown clay loam to clay mottled with yellowish red and pale brown. The lower part is yellowish-brown clay loam mottled with very pale brown.

Of minor extent in this association are Hiwassee, Pacolet, Mecklenburg, and Wilkes soils. The gently sloping Hiwassee and Mecklenburg soils are on ridges. The steep Pacolet and Wilkes soils are adjacent to streams.

Most of this association is pine forest, but is suited to cultivated crops and pasture. The association is suited to poorly suited to openland wildlife and suited to well suited to woodland wildlife. Farm ponds provide favorable fishing. Areas adjacent to watershed ponds provide community recreation (fig. 2).

Mostly Strongly Sloping to Steep Soils That Are Strongly Acid in Part of the Subsoil; on Uplands

The three associations in this group occur as strongly sloping ridges and strongly sloping to steep side slopes. The soils formed in regolith weathered from granite, gneiss, diorite, and other dark-colored rocks. They are well drained to excessively drained and shallow to deep. They have a surface layer of loamy sand, sandy loam, or sandy clay loam and a subsoil of sandy clay loam, clay loam, or clay. In steep areas the shallow Louisburg and Wilkes soils have a discontinuous subsoil.

9. *Madison-Pacolet-Cecil association*

Well-drained, moderately deep to deep soils that are mainly yellowish-red to red, friable to firm clay loam to clay in the subsoil; on narrow ridges and side slopes

This association occurs as narrow, strongly sloping ridge crests and steep slopes adjacent to streams. The soils formed in material weathered from granite, gneiss, or schist that contains mica and feldspar. They are well drained and moderately deep to deep. Because they are strongly sloping to steep, they are subject to erosion.

This association makes up about 10 percent of Laurens County and about 17 percent of Union County. It is about 35 percent Madison soils, 20 percent Pacolet soils, 20 percent Cecil soils, and 25 percent soils of minor extent.

Madison soils are strongly sloping to steep and well drained. Their surface layer is typically grayish-brown sandy loam, but in eroded areas is reddish-brown sandy clay loam. The subsoil is red clay loam in the upper and lower parts and red clay in the middle part. Fine mica flakes are common to many in all layers.

Pacolet soils also are strongly sloping to steep and well drained. They are adjacent to streams. Their surface layer is typically dark-brown sandy loam, but in eroded areas is yellowish-red sandy clay loam. The upper part of

Figure 2.—Community recreation on Cataula sandy loam, 6 to 10 percent slopes, eroded. Watershed pond in background.

the subsoil is red clay loam. The lower part is red sandy clay loam mottled with reddish yellow.

Cecil soils are sloping and well drained. They occupy the few medium and narrow ridges. Their surface layer is typically brown sandy loam. In places erosion has removed most of the original surface layer and the present layer is yellowish-red sandy clay loam. The main part of the subsoil is red clay.

Of minor extent in this association are Cataula, Enon, Hiwassee, Louisburg, Mecklenburg, and Wilkes soils. The gently sloping Cataula, Hiwassee, and Mecklenburg soils are on ridges. Enon soils are strongly sloping. The steep Louisburg and Wilkes soils are adjacent to streams.

Most of this association is mixed forest or planted pine forest. Products are pulpwood and sawtimber. The trend is toward increased use of these soils for pine forest. The association is suited to woodland wildlife, but is poorly suited to unsuited to openland wildlife. Farm ponds provide favorable fishing.

10. Madison-Pacolet-Louisburg association

Well-drained to excessively drained, shallow to deep soils that are mainly red to yellowish-brown, friable to firm sandy clay loam to clay in the subsoil; on narrow ridges and side slopes

This association occurs as short, strongly sloping tops of ridges and strongly sloping to steep sides of ridges along deep crooked drainageways. The soils formed in material weathered from granite, gneiss, quartz-mica gneiss, quartz-mica schist, and granitoid gneiss. Because they are strongly sloping to steep, they are subject to erosion.

This association makes up about 4 percent of Laurens County and 2 percent of Union County. It is about 40 percent Madison soils, 18 percent Pacolet soils, 15 percent Louisburg soils, and 27 percent soils of minor extent.

Madison soils are well drained and strongly sloping to steep. They are on the tops and sides of ridges. Their surface layer is typically grayish-brown sandy loam, but in eroded areas is reddish-brown sandy clay loam. The subsoil is red clay loam in the upper and lower parts and red clay in the middle part. Common to many fine mica flakes are in all layers.

Pacolet soils are steep and well drained. They are adjacent to streams. Their surface layer is typically dark-brown sandy loam, but in eroded areas is yellowish-red sandy clay loam. The subsoil is red clay loam in the upper and middle parts and red sandy clay loam mottled with reddish yellow in the lower part. At Little Knob and Big Knob, east and west of Barksdale in Laurens County, common to many, medium and large rocks are on the surface and throughout the soil.

Louisburg soils are shallow, well drained to excessively drained, and sloping to steep. They are sloping to strongly sloping on the narrow ridge crests and steep along the deep, crooked drainageways. They have a dark-brown loamy sand surface layer. The subsoil is yellowish-brown sandy clay loam.

Of minor extent in this association are Cecil and Appling soils and Gullied land. The gently sloping Cecil and Appling soils occupy ridges.

Most of this association is mixed forest or planted pine forest. Products are pulpwood and sawtimber. The trend is toward increased use of the association for pine forest. This association is poorly suited to unsuited to openland wildlife and suited to unsuited to woodland wildlife. Farm ponds provide favorable fishing.

11. Wilkes-Pacolet-Enon association

Well-drained, shallow to deep soils that are mainly yellowish-brown, strong-brown, or red, friable to very firm sandy clay loam to clay in the subsoil; on irregular ridges and side slopes

This association occurs as irregular ridges that have strongly sloping crests and steep sides adjacent to streams. The soils formed in material weathered from gneiss or schist, influenced in most places by basic minerals. Because they are strongly sloping to steep, these soils are subject to erosion.

This association makes up about 28 percent of Laurens County and about 32 percent of Union County. It is about 40 percent Wilkes soils, 15 percent Pacolet soils, 15 percent Enon soils, and 30 percent soils of minor extent.

Wilkes soils are steep, shallow, and well drained. They are adjacent to streams. They have a brown sandy loam surface layer. The subsoil is yellowish-brown sandy clay loam mottled with green and dark brown.

Pacolet soils are moderately deep, well drained, and steep. Their surface layer is typically dark-brown sandy loam, but in eroded areas is yellowish-red sandy clay loam. The subsoil is red clay loam in the upper and middle parts, and red sandy clay loam mottled with reddish yellow in the lower part.

Enon soils are well drained, moderately deep to deep, and sloping to moderately steep. They occupy medium ridges and areas adjacent to streams. They have a brown sandy loam surface layer. The upper and middle parts of the subsoil are strong-brown clay loam to clay mottled with yellowish red and pale brown. The lower part of the subsoil is yellowish-brown clay loam mottled with very pale brown.

Of minor extent in this association are Cataula, Cecil, Mecklenburg, and Hiwassee soils and Gullied land. The gently sloping and sloping Cataula, Cecil, Mecklenburg, and Hiwassee soils are on ridges.

Most of this association is mixed hardwood and pine forest. Products are pulpwood, sawtimber, and veneer blocks. This association is poorly suited to unsuited to openland wildlife and suited to unsuited to woodland wildlife. Farm ponds provide fishing and recreation. Lake Greenwood in Laurens County, adjacent to most of this association, provides water skiing, boating, and fishing.

Descriptions of the Soils [2]

This section describes the soil series and mapping units in Laurens and Union Counties. Each soil series is described in detail, and then, briefly, each mapping unit in that series. Unless it is specifically mentioned other-

[2] L. D. EAGLES, conservation agronomist, Soil Conservation Service, assisted in preparation of management practices.

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

[A dash in the column indicates that the soil does not occur in the county or the acreage is less than 0.05 percent]

Soil	Laurens County		Union County		Total	
	Acres	Percent	Acres	Percent	Acres	Percent
Appling loamy sand, 2 to 6 percent slopes	18,973	4.2	2,643	0.8	21,616	2.8
Appling loamy sand, 6 to 10 percent slopes	3,827	.8	1,084	.3	4,911	.6
Buncombe sand	----------	----------	519	.2	519	.1
Cartecay-Toccoa complex	23,885	5.3	19,596	6.0	43,481	5.5
Cataula sandy loam, 2 to 6 percent slopes, eroded	11,102	2.5	4,809	1.5	15,911	2.0
Cataula sandy loam, 6 to 10 percent slopes, eroded	12,994	2.9	9,717	3.0	22,711	2.9
Cataula sandy clay loam, 2 to 6 percent slopes, eroded	3,616	.8	1,788	.5	5,404	.7
Cataula sandy clay loam, 6 to 10 percent slopes, eroded	11,862	2.6	5,611	1.7	17,473	2.2
Cecil sandy loam, 2 to 6 percent slopes	66,207	14.7	12,460	3.8	78,667	10.0
Cecil sandy loam, 6 to 10 percent slopes, eroded	41,521	9.1	8,339	2.5	49,860	6.4
Cecil sandy loam, 10 to 15 percent slopes	20,035	4.4	4,262	1.3	24,297	3.1
Cecil sandy clay loam, 2 to 6 percent slopes, eroded	10,475	2.3	1,675	.5	12,150	1.5
Cecil sandy clay loam, 6 to 10 percent slopes, eroded	26,039	5.8	6,294	1.9	32,333	4.1
Chewacla loam	2,085	.5	----------	----------	2,085	.3
Chewacla and Worsham soils	2,800	.6	521	.2	3,321	.4
Colfax loamy sand, 1 to 4 percent slopes	1,509	1.3	----------	----------	1,509	.2
Durham loamy sand, 2 to 6 percent slopes	679	.2	----------	----------	679	.1
Durham sandy loam, 2 to 6 percent slopes	1,514	.3	3,029	.9	4,543	.6
Durham sandy loam, 6 to 10 percent slopes	1,155	.3	2,208	.7	3,363	.4
Enon sandy loam, 2 to 6 percent slopes	6,112	1.4	3,591	1.1	9,703	1.2
Enon sandy loam, 6 to 10 percent slopes	16,227	3.6	7,159	2.2	23,386	3.0
Enon sandy loam, 10 to 15 percent slopes	8,508	1.9	6,127	1.9	14,635	1.9
Enon sandy loam, 15 to 25 percent slopes	1,880	.4	4,664	1.4	6,544	.8
Enoree soils	6,026	1.3	----------	----------	6,026	.8
Gullied land-Pacolet soils complex	5,253	1.2	780	.2	6,033	.8
Hiwassee sandy loam, 2 to 6 percent slopes	3,387	.7	3,587	1.1	6,974	.9
Hiwassee sandy loam, 6 to 10 percent slopes, eroded	1,331	.3	5,890	1.8	7,221	.9
Hiwassee sandy loam, 10 to 15 percent slopes, eroded	465	.1	2,085	.6	2,550	.3
Hiwassee sandy clay loam, 2 to 6 percent slopes, eroded	3,373	.7	1,423	.4	4,796	.6
Hiwassee sandy clay loam, 6 to 10 percent slopes, eroded	3,933	.9	6,022	1.8	9,955	1.3
Hiwassee sandy clay loam, 10 to 15 percent slopes, eroded	----------	----------	2,581	.8	2,581	.3
Iredell fine sandy loam, 2 to 6 percent slopes	268	.1	3,076	.9	3,344	.4
Iredell stony loam, 2 to 6 percent slopes	----------	----------	487	.2	487	.1
Louisburg loamy sand, 6 to 10 percent slopes	1,069	.2	----------	----------	1,069	.1
Louisburg loamy sand, 10 to 40 percent slopes	1,496	.3	3,394	1.0	4,890	.6
Madison sandy loam, 2 to 6 percent slopes	155	----------	6,337	1.9	6,492	.8
Madison sandy loam, 6 to 10 percent slopes	191	----------	10,032	3.1	10,223	1.3
Madison sandy loam, 10 to 15 percent slopes	120	----------	12,957	3.9	13,077	1.7
Madison sandy clay loam, 2 to 6 percent slopes, eroded	41	----------	2,051	.6	2,092	.3
Madison sandy clay loam, 6 to 10 percent slopes, eroded	217	.1	13,029	4.0	13,246	1.7
Madison sandy clay loam, 10 to 15 percent slopes, eroded	159	----------	16,688	5.1	16,847	2.2
Madison and Pacolet soils, 15 to 40 percent slopes	50,414	9.8	54,500	16.6	104,914	13.4
Mecklenburg sandy loam, 2 to 6 percent slopes	1,575	.4	1,355	.4	2,930	.4
Mecklenburg sandy loam, 6 to 10 percent slopes	575	.1	1,921	.6	2,496	.3
Pacolet sandy clay loam, 10 to 15 percent slopes, eroded	18,798	4.1	----------	----------	18,798	2.4
Vance sandy loam, 2 to 6 percent slopes	4,724	1.0	69	----------	4,793	.6
Vance sandy loam, 6 to 10 percent slopes	1,105	.3	11	----------	1,116	.1
Wehadkee-Chewacla complex	----------	----------	12,195	3.7	12,195	1.6
Wilkes sandy loam, 6 to 15 percent slopes	9,107	2.0	14,101	4.3	23,208	3.0
Wilkes soils, 15 to 40 percent slopes	42,109	9.3	46,339	14.1	88,420	11.3
Water	5,924	1.2	1,854	.5	7,774	1.0
Total	454,976	100.0	328,704	100.0	783,680	100.0

wise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

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

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series.

The Gullied land part of the Gullied land-Pacolet soils complex, for example, does not belong to a soil series, but nevertheless, is listed in alphabetic order with the soil series.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit are the capability unit and woodland group in which the mapping unit has been placed. The page for the description of each capability unit or woodland group can be learned by referring to the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the Glossary, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*9*).[3]

Appling Series

Soils of the Appling series are gently sloping to sloping and well drained. They formed in material weathered from granite, gneiss, and schist.

In a representative profile the surface layer is brown loamy sand 7 inches thick. The subsoil, in sequence from the top, is 4 inches of light yellowish-brown sandy clay loam, 33 inches of brownish-yellow clay mottled with yellowish red in the upper part and red in the lower part, and 11 inches of reddish-yellow sandy clay loam mottled with brownish yellow. The underlying material, to a depth of 72 inches, is reddish-yellow weathered gneiss rock mottled with pink and very pale brown.

Appling soils are near Cecil, Durham, Vance, and Colfax soils. They are not so red in the subsoil as Cecil soils, and their subsoil is finer textured in the middle part than that of Durham soils. They are less firm in the main part of the subsoil than Vance soils and are better drained than Colfax soils.

Permeability is moderate, and available water capacity is medium.

The native vegetation was mixed hardwood and pine forest and an understory of vines, briers, and grasses.

Representative profile of Appling loamy sand, 2 to 6 percent slopes, in Laurens County, about 2 miles south of Fountain Inn, 15 feet north of a field road about 500 feet east of State Highway 14 in a cultivated field where the slope is 4 percent.

Ap—0 to 7 inches, brown (10YR 5/3) loamy sand; weak, fine, granular structure; very friable; many fine roots; few fine pores; slightly acid, pH 6.4; abrupt, smooth boundary.

B1t—7 to 11 inches, light yellowish-brown (10YR 6/4) sandy clay loam; weak, fine, subangular blocky structure; friable; common fine roots; few fine pores; slightly acid, pH 6.3; clear, smooth boundary.

B21t—11 to 20 inches, brownish-yellow (10YR 6/6) clay; common, fine and medium, distinct, yellowish-red (5YR 5/6) mottles; moderate, fine, subangular blocky structure; firm; few fine roots; many fine pores; few fine mica flakes; patchy clay films on faces of peds; strongly acid, pH 5.4; gradual, smooth boundary.

B22t—20 to 44 inches, brownish-yellow (10YR 6/8) clay; common, medium, distinct, red (2.5YR 5/8) mottles; moderate, medium, subangular blocky structure; firm; common fine pores; few fine mica flakes; continuous clay films on faces of peds; very strongly acid, pH 5.0; clear, smooth boundary.

B3t—44 to 55 inches, reddish-yellow (5YR 6/6) sandy clay loam; common, medium, distinct, brownish-yellow (10YR 6/6) mottles and few, fine, distinct, very pale brown mottles; moderate, fine, subangular blocky structure; firm; few fine mica flakes; very strongly acid, pH 4.8; clear, wavy boundary.

C—55 to 72 inches, reddish-yellow (5YR 7/6) weathered gneiss rock material of loam texture; few, fine, faint, pink and very pale brown mottles; structureless; very strongly acid, pH 4.8.

In hardwood areas the A1 horizon is very dark grayish brown and 2 to 3 inches thick. Under stands of pine it is dark brown or grayish brown and 5 to 6 inches thick. In cultivated fields, the Ap horizon is brown and 4 to 9 inches thick. The B1t horizon is sandy clay loam or clay loam. The B2t horizon is brownish yellow, yellowish brown, or yellowish red and has reddish mottles. It is clay or sandy clay. The B3t horizon is reddish-yellow, yellowish-red, or red sandy clay or sandy clay loam mottled with brownish yellow, pale brown, or very pale brown. Few to common fine mica flakes are throughout the B horizon. The C horizon is weathered granite, gneiss, or schist mottled with shades of red, brown, yellow, or gray. When crushed, the texture is loam, clay loam, sandy clay loam, or sandy loam. The solum ranges from about 40 to 58 inches in thickness. Depth to hard rock ranges from about 5 to more than 40 feet. The Ap and B1t horizons are slightly acid to medium acid. The B2t, B3t, and C horizons are strongly acid to very strongly acid.

Appling loamy sand, 2 to 6 percent slopes (ApB).—This soil has the profile described as representative of the series. It is on broad ridges.

Included with this soil in mapping are small areas of Cecil, Durham, Vance, Worsham, and Colfax soils; small areas where slopes are greater than 6 percent; and some areas of soils that have a sandy loam surface layer.

This Appling soil is easy to till. Response to fertilizer and lime is good.

Erosion control is needed. A crop rotation that includes perennial grasses is sufficient to control erosion on some fields, but on other fields a water-disposal system, including terraces, grassed waterways, and contour tillage, is needed in addition. Crop residue left on or near the surface increases infiltration and prevents washing. Cover crops also are effective in controlling erosion. Capability unit IIe-2; woodland group 3o7.

Appling loamy sand, 6 to 10 percent slopes (ApC).—This soil is on ridges and side slopes adjacent to drainageways. Included in mapping are small areas of Cecil, Colfax, Durham, Vance, and Worsham soils; small areas where slopes are less than 6 percent; and some areas of soils that have a sandy loam surface layer.

This Appling soil is easy to till. Response to fertilizer and lime is good.

Erosion is the chief hazard. Effective management provides an improved crop rotation, grassed waterways, terraces, contour tillage, crop residue management, sod crops in rotation, or stripcropping. Capability unit IIIe-2; woodland group 3o7.

Buncombe Series

Soils of the Buncombe series are nearly level and excessively drained. They formed in recent sandy alluvium.

[3] Italic numbers in parentheses refer to Literature Cited, p. 63.

In a representative profile the surface layer is dark-brown sand about 6 inches thick. The underlying material is coarse sand to a depth of 72 inches or more. The upper 18 inches is brown, the next 21 inches is strong brown, and the lower 27 inches is yellowish brown.

Buncombe soils are near Cartecay, Enoree, and Toccoa soils. In contrast with those soils, they are excessively drained.

These soils are droughty. Permeability is rapid, and available water capacity is very low to low.

The native vegetation was birch, elm, and sycamore trees and an understory of vines and briers.

Representative profile of Buncombe sand in Union County, about 2 miles north of Lockhart, in a pasture 75 feet south of the Broad River:

Ap—0 to 6 inches, dark-brown (10YR 4/3) sand; structureless; very friable; many fine roots; few fine mica flakes; few fine quartz pebbles; slightly acid, pH 6.1; abrupt, smooth boundary.

C1—6 to 24 inches, brown (7.5YR 5/4) coarse sand; structureless; loose; few fine roots, few medium roots; many feldspar crystals; many, fine, dark-colored pebbles or fine quartz pebbles; few fine mica flakes; slightly acid, pH 6.1; gradual, smooth boundary.

C2—24 to 45 inches, strong-brown (7.5YR 5/6) coarse sand; structureless; loose; few feldspar crystals; common fine mica flakes; few fine pebbles; few dark-colored minerals; medium acid, pH 6.0; gradual, smooth boundary.

C3—45 to 72 inches, yellowish-brown (10YR 5/4) coarse sand; few, thin, distinct streaks of yellowish red; structureless; stratified; thin bands of silt that contain dark-colored minerals; loose; many fine mica flakes; common feldspar crystals; medium acid, pH 5.9.

The A horizon is dark brown, brown, or yellowish brown. The C horizon is brown, light brown, strong brown, or yellowish brown. It is coarse sand, sand, or loamy sand. The soil contains few to many mica flakes and few feldspar crystals throughout. Stratification is evident throughout most profiles. Yellowish-red streaks are in the lower part of some profiles. Reaction throughout ranges from slightly acid to strongly acid.

Buncombe sand (Bu).—This excessively drained soil is on bottom lands along the larger streams in Union County. Included in mapping are small areas of Cartecay, Enoree, and Toccoa soils and small areas where the surface layer is loamy sand.

This Buncombe soil is droughty, but is easy to till. Most of the acreage is woodland. The chief management concerns are flooding, droughtiness, leaching, and low fertility. The management needed prevents flooding, maintains a permanent sod cover, adds humus, and protects the soil from overgrazing and other destructive hazards. Without flood protection, a crop loss can be expected one year out of three. Capability unit IIIs-2; woodland group 2s8.

Cartecay Series

Soils of the Cartecay series are nearly level and moderately well drained to somewhat poorly drained. They formed in thick, dominantly loamy alluvial sediments.

In a representative profile the surface layer is 8 inches of brown, very friable sandy loam. The underlying material, in sequence from the top, is 6 inches of brownish-yellow loamy sand, 16 inches of grayish-brown sandy loam mottled with yellowish brown, 17 inches of brown loamy sand mottled with yellow and gray, and 8 inches of gray fine sandy loam mottled with pale brown.

Cartecay soils are near Enoree and Toccoa soils. They are not so well drained as Toccoa soils, but are better drained than Enoree soils.

Cartecay soils are medium in organic-matter content. Permmeability is moderately rapid, and available water capacity is medium to low.

The native vegetation was mixed hardwoods and an understory of vines, grasses, and canes.

Representative profile of Cartecay sandy loam, in Laurens County, in an area mapped Cartecay-Toccoa complex in an improved pasture 2 miles north of Friendship Church, 150 yards north of County Road 67:

Ap—0 to 8 inches, brown (10YR 5/3) sandy loam; weak, fine, granular structure; very friable; many fine roots; common fine mica flakes; few fine quartz pebbles; medium acid, pH 5.9; abrupt, smooth boundary.

C1—8 to 14 inches, brownish-yellow (10YR 6/6) loamy sand; structureless; stratified; very friable; many fine roots; few quartz pebbles; common fine mica flakes; thin bedding planes; slightly acid, pH 6.2; clear, smooth boundary.

C2—14 to 30 inches, grayish-brown (10YR 5/2) sandy loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; structureless; stratified; very friable; common fine mica flakes; thin bedding planes; slightly acid, pH 6.4; clear, smooth boundary.

C3—30 to 47 inches, brown (10YR 5/3) loamy sand; common, medium, distinct, yellow (10YR 7/8) mottles and few, fine, distinct, gray mottles; structureless; stratified; very friable; many fine mica flakes; thin bedding planes and strata of sand; slightly acid, pH 6.1; abrupt, smooth boundary.

C4g—47 to 55 inches, gray (10YR 6/1) fine sandy loam; few, fine, faint, pale-brown mottles; structureless; friable; many fine mica flakes; very strongly acid, pH 4.8.

The A horizon is dark grayish brown, grayish brown, brown, or reddish brown. The C horizon is fine sandy loam, sandy loam, loamy sand, or sand. The upper part of the C horizon is yellowish brown, brownish yellow, grayish brown, brown, pale brown or light yellowish brown and has mottles of chroma 2 or less within 20 inches of the surface. The lower part of the C horizon is gray or is mottled with shades of gray, brown, and red. Thin bedding planes of contrasting textures are throughout the profiles. Mica flakes are common to many in all horizons. Reaction throughout ranges from slightly acid to very strongly acid.

Cartecay-Toccoa complex (Ca).—This mapping unit is commonly 45 to 60 percent Cartecay soils and 35 to 50 percent Toccoa soils. These soils are on the first bottoms of streams and are subject to overflow. The Toccoa soil is described under the heading "Toccoa Series."

Included with these soils in mapping are small areas of Buncombe, Chewacla, and Enoree soils; areas of soils that have a coarse sand, loamy sand, sandy clay loam, loam, or silt loam surface layer; and some recently overwashed areas that have fine gravel deposits on the surface.

In most areas tilth is good to fair. Most of the acreage is pasture or woodland. Flooding, siltation, a high water table, and poor drainage are hazards. The chief management needs are a drainage system to remove excess water, diversion ditches to intercept hillside runoff, and measures to prevent flooding. The loss of a crop once every 3 to 5 years is to be expected unless these soils are protected from flooding. Capability unit IIIw-2; woodland group 2w8, 1o7.

Cataula Series

Soils of the Cataula series are well drained, are gently sloping to sloping, and have a fragipan. They formed in clayey and loamy material weathered from granite, gneiss, and schist.

In a representative profile the surface layer is dark-brown sandy loam 6 inches thick. The subsoil, in sequence from the top, is 8 inches of very firm, red sandy clay loam and 10 inches of extremely firm, red clay loam. Below this is a fragipan that extends to a depth of 50 inches. The upper part of the pan is red sandy clay mottled with brownish yellow and light brownish gray. The lower part is mottled red, reddish-yellow, yellowish-red, brownish-yellow, and gray sandy clay loam.

Cataula soils are near Cecil, Enon, Vance, and Wilkes soils. They differ from Cecil, Enon, and Vance soils in having a fragipan. They are deeper than Wilkes soils.

Permeability is slow, and available water capacity is medium.

The native vegetation was oak, elm, gum, pine, and some redcedar and an understory of vines, briers, and grasses.

Representative profile of Cataula sandy loam, 2 to 6 percent slopes, eroded, in Laurens County, about 1 mile southeast of Reedy Fork Church, 30 feet southwest of County Road 48 in an idle field near the crest of a 3.5 percent slope:

Ap—0 to 6 inches, dark-brown (7.5YR 4/4) sandy loam; weak, fine, granular structure; very friable; many fine roots; many coarse sand grains; few fine quartz pebbles; few fine pores; slightly acid, pH 6.1; abrupt, smooth boundary.

B21t—6 to 14 inches, red (2.5YR 4/8) sandy clay loam; moderate, medium, angular blocky structure; very firm, very hard, sticky; few fine roots; few fine pores; clay films on faces of peds and in pores; strongly acid, pH 5.5; gradual, smooth boundary.

B22t—14 to 24 inches, red (2.5YR 4/6) clay loam; few, fine, faint, yellowish-red mottles; strong, coarse, angular blocky structure; extremely firm, compact; few fine pores; continuous clay films on faces of peds; medium acid, pH 5.8; abrupt, smooth boundary.

Bx1—24 to 37 inches, red (2.5YR 4/6) sandy clay; common, medium, prominent, brownish-yellow (10YR 6/6) mottles surrounding common, fine, prominent, light brownish-gray mottles; moderate, thick, platy structure parting to moderate, medium, angular blocky structure; very firm, compact and brittle; few coarse sand grains; thin, patchy clay films on horizontal faces of peds; medium acid, pH 5.6; gradual, wavy boundary.

Bx2—37 to 50 inches, mottled red (2.5YR 4/8), reddish-yellow (5YR 6/6), yellowish-red (5YR 4/6), brownish-yellow (10YR 6/6), and gray (10YR 6/1) sandy clay loam; moderate, thick, platy structure parting to moderate, coarse, angular blocky structure; very firm, compact, dense, and brittle; few quartz pebbles; few weathered fragments of gneiss; patchy clay films on horizontal faces of peds; strongly acid, pH 5.2.

The A horizon is dark-brown, brown, yellowish-red, or reddish-brown sandy clay loam or sandy loam. The Bt horizon is sandy clay cloam, clay loam, or clay. The Bx horizon is prominently mottled with red, brown, yellow, and some gray. It is sandy or sandy clay loam. Depth to the fragipan ranges from 20 to 36 inches. The A horizon is slightly acid to strongly acid, and the B horizon and the material below are medium acid to very strongly acid.

Cataula sandy loam, 2 to 6 percent slopes, eroded (CdB2).—This soil has the profile described as representative of the series. It is on medium to narrow ridges.

Included with this soil in mapping are small areas of Cecil, Enon, and Vance soils and small areas where slopes are 6 to 10 percent. The surface layer is reddish brown on an estimated 25 to 40 percent of some plowed areas.

This Cataula soil is easy to keep in good tilth. Response to fertilizer and lime is very good.

Most of the acreage is wooded. The rest is pastured or cultivated. Erosion is the chief hazard. Surface runoff is rapid. Management is also affected by the fragipan that restricts roots and water movement. A crop rotation is needed in which close-growing crops are grown two-thirds of the time. A water disposal system of terraces and grassed waterways is essential for erosion control. Also, contour farming or stripcropping is needed. Capability unit IIIe-3; woodland group 3o7.

Cataula sandy loam, 6 to 10 percent slopes, eroded (CdC2).—This soil is on irregular ridges and adjacent to drainageways. A few rills and shallow gullies have formed.

Included with this soil in mapping are small areas of Cecil, Enon, and Wilkes soils and small areas where slopes are 2 to 6 percent. The surface layer is reddish-brown sandy clay loam on an estimated 30 to 50 percent of some plowed areas.

Tilth is good in most areas. Where the surface layer is reddish-brown sandy clay loam, however, tilth is only fair.

Most of the acreage is woodland. Erosion and a fragipan that restricts roots and water movement are management concerns. A long-term crop rotation is needed in which close-growing crops are grown three-fourths of the time. Contour tillage, stripcropping, and grassed waterways in all natural draws are needed for erosion control. Capability unit IVe-2; woodland group 3o7.

Cataula sandy clay loam, 2 to 6 percent slopes, eroded (CeB2).—This soil is on narrow, irregular ridges. It has a profile similar to the one described as representative of the series, but the surface layer is yellowish-red sandy clay loam about 4 inches thick. Sheet erosion, shallow gullies, and rills are common.

Included with this soil in mapping are small areas of Cecil, Enon, and Vance soils; small areas where slopes are 6 to 10 percent; some severely eroded areas where the plow layer is clay loam; and a few uneroded areas where it is sandy loam.

Maintaining good tilth is difficult. Clods and crusts form unless the soil is tilled within only a narrow range of moisture content.

This soil is suitable for only limited cultivation. Most of the acreage has been cultivated but is now pine forest. Erosion and a restricted root zone are management concerns. A long-term crop rotation is needed in which close-growing crops are grown three-fourths of the time. Permanent sod is needed in all natural draws. Capability unit IVe-2; woodland group 5c3e.

Cataula sandy clay loam, 6 to 10 percent slopes, eroded (CeC2).—This soil is on narrow ridges and on breaks to drainageways. It has a profile similar to the one described as representative of the series, but the surface layer is yellowish-red sandy clay loam about 4 inches thick. Sheet erosion, rills, shallow gullies, and a few stabilized, moderately deep gullies are evident in small areas.

Included with this soil in mapping are small areas of Cecil, Enon, and Wilkes soils; areas where slopes are 2 to 6 percent; some small areas where the plow layer is clay loam; and others where it is sandy loam.

Maintaining good tilth is difficult. Most of the acreage is woodland. Sericea lespedeza is planted for supplemental grazing in summer and early in fall. Erosion and a restricted root zone are management concerns. The chief management need is controlled grazing in order to retain a good sod cover. Capability unit VIe-3; woodland group 5c3e.

Cecil Series

Soils of the Cecil series are gently sloping to strongly sloping and well drained. They formed in clayey and loamy material weathered from granite, gneiss, and schist.

In a representative profile the surface layer is brown sandy loam 5 inches thick. The subsoil, in sequence from the top, is about 2 inches of yellowish-red sandy clay loam, 32 inches of red clay, and 19 inches of red clay loam mottled with pink. The underlying material, to a depth of 79 inches, is red clay loam mottled with pink and brownish yellow.

Cecil soils are near Appling, Cataula, Durham, Hiwassee, Madison, and Louisburg soils. They are redder in the subsoil than Appling and Durham soils, but not so dark red as Hiwassee soils. They do not have mica throughout the profile that is typical of Madison soils. They are thicker than Louisburg soils. They do not have the fragipan that is typical of Cataula soils.

Permeability is moderate, and available water capacity is medium.

The native vegetation was mixed hardwood and pine forest and an understory of briers and grasses.

Representative profile of Cecil sandy loam, 2 to 6 percent slopes, in Laurens County about 1 mile southeast of Barksdale, 20 feet south of County Road 113, in a cultivated field about 100 feet from the crest of a 4.5 percent slope:

Ap—0 to 5 inches, brown (10YR 5/3) sandy loam; weak, fine, granular structure; very friable; common fine roots; few coarse sand grains; medium acid, pH 5.8; abrupt, smooth boundary.

B1t—5 to 7 inches, yellowish-red (5YR 5/8) sandy clay loam; weak, fine, subangular blocky structure; friable; few fine roots; few fine pores; medium acid, pH 5.9; abrupt, smooth boundary.

B21t—7 to 21 inches, red (2.5YR 4/8) clay; moderate, medium, subangular blocky structure; firm; few fine roots; few fine pores; continuous thin clay films on faces of peds; strongly acid, pH 5.2; gradual, wavy boundary.

B22t—21 to 39 inches, red (2.5YR 4/6) clay; moderate, coarse, subangular blocky structure; firm; few, fine and medium pores; prominent clay films on faces of peds; strongly acid, pH 5.1; clear, wavy boundary.

B3t—39 to 58 inches, red (2.5YR 4/8) clay loam; few, fine, faint, pink mottles; weak, medium, subangular blocky structure; firm; few fine mica flakes; few partially weathered fragments of gneiss; patchy clay films on faces of peds; strongly acid, pH 5.1; clear, wavy boundary.

C—58 to 79 inches, red (2.5YR 5/8) weathered gneiss that crushes to clay loam; few, fine, faint, pink mottles and few, fine, distinct, brownish-yellow mottles; structureless; friable; fine and medium fragments of weathered gneiss; common fine mica flakes; very strongly acid, pH 4.9.

The A horizon is brown, yellowish-red, or red sandy loam or sandy clay loam. The B1 horizon is sandy clay loam or clay loam. The C horizon is commonly red clay loam, sandy clay loam, or sandy loam mottled with shades of brown, yellow, and white. The solum ranges from about 40 to 58 inches in thickness. Depth to hard rock is greater than 5 feet. The A horizon is slightly acid to very strongly acid, and the B and C horizons are medium acid to very strongly acid.

Cecil sandy loam, 2 to 6 percent slopes (CIB).—This soil has the profile described as representative of the series. It is on irregularly shaped broad ridges (fig. 3).

Included with this soil in mapping are small areas of Appling, Cataula, Durham, and Hiwassee soils; small areas where slopes are 6 to 10 percent; and small areas where the surface layer is sandy clay loam.

This soil is easy to keep in good tilth, except in areas where the subsoil is exposed. Response to fertilizer and lime is good.

Most of the acreage is cultivated or pastured. Management that provides contour tillage, terraces, grassed waterways, and crop rotations controls erosion on most fields. In some fields terraces are not needed if the rotation includes sod crops. Crop residue kept on or near the surface helps control erosion. Capability unit IIe-1; woodland group 3o7.

Cecil sandy loam, 6 to 10 percent slopes, eroded (CIC2).—This soil is on medium ridges and adjacent to drainageways. A few rills and shallow gullies have formed.

Included with this soil in mapping are small areas of Appling, Cataula, Hiwassee, Madison, and Louisburg soils and small areas where slopes are 2 to 6 percent and 10 to 15 percent. On an estimated 30 to 40 percent of some plowed areas, the surface layer is reddish sandy clay loam.

This Cecil soil is easy to keep in good tilth, except where the plow layer is reddish sandy clay loam. The plow layer can be tilled without clodding within only a medium range of moisture content.

Most of the acreage is cultivated or pastured. Erosion is the chief hazard, mainly because the soil is sloping. A crop rotation in which close-growing crops are grown two-thirds of the time is needed. A water-disposal system of grassed waterways and terraces is essential for erosion control. Contour farming and stripcropping are other methods of controlling erosion. Capability unit IIIe-1; woodland group 3o7.

Cecil sandy loam, 10 to 15 percent slopes (CID).—This soil is on the side slopes adjacent to small and medium size streams. A few shallow and moderately deep gullies have formed.

Included with this soil in mapping are small areas of Hiwassee, Madison, and Louisburg soils, and small areas where slopes are 6 to 10 percent.

In most areas of this soil, tilth is good. Most of the acreage is wooded or pastured. Erosion is the chief hazard to management, mainly because the soil is strongly slop-

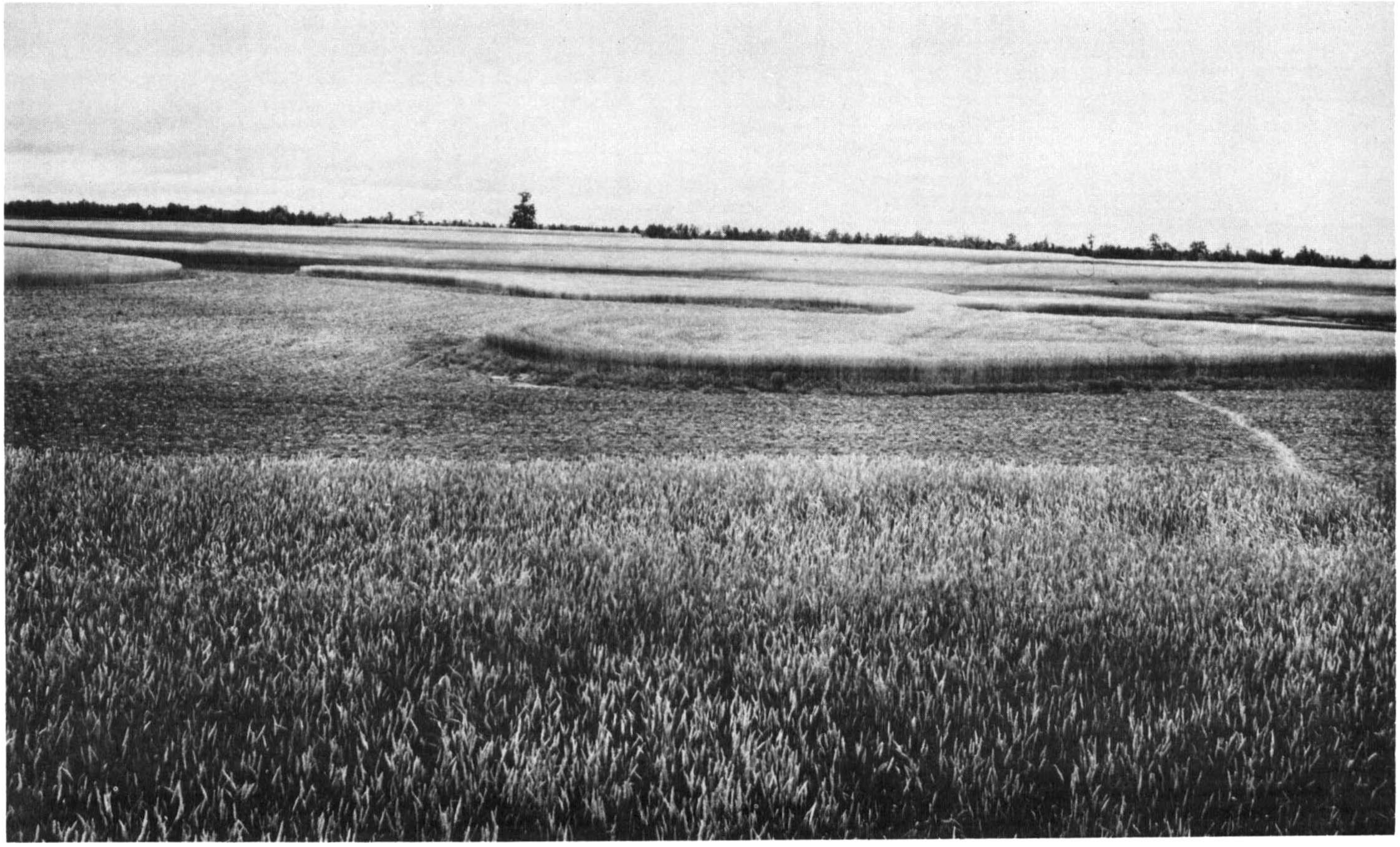

Figure 3.—**Stripcropping for erosion control on broad ridge of Cecil sandy loam, 2 to 6 percent slopes.**

ing. A long-term crop rotation in which close-growing crops are grown three-fourths of the time is needed. Contour farming and a water-disposal system of grassed natural draws are essential for erosion control. Capability unit IVe-1; woodland group 3o7.

Cecil sandy clay loam, 2 to 6 percent slopes, eroded (CmB2).—This soil is on irregularly shaped, medium and broad ridges. It has a profile similar to the one described as representative of the series, but the surface layer is yellowish-red sandy clay loam about 4 inches thick. Galled areas, rills, and shallow gullies are common.

Included with this soil in mapping are 1- to 4-acre tracts of Appling, Durham, and Hiwassee soils; a few 1- to 4-acre tracts where slopes are 6 to 10 percent; less eroded areas where the surface layer is sandy loam; and a few severely eroded areas where the plow layer is clay loam.

Maintaining good tilth is difficult. Most of the acreage has been cultivated, but much of it now is pine forest. Grassed waterways, terraces, contour tillage, and crop rotations in which close-growing crops are grown two-thirds of the time are needed for erosion control. Capability unit IIIe-1; woodland group 4c2e.

Cecil sandy clay loam, 6 to 10 percent slopes, eroded (CmC2).—This soil is on narrow, irregular ridge crests and on breaks to drainageways. It has a profile similar to the one described as representative of the series, but the upper 5 inches is yellowish-red sandy clay loam or clay loam. Small galled areas, rills, and shallow gullies are common.

Included with this soil in mapping are small areas of Appling, Durham, Hiwassee, Madison, and Louisburg soils; some small areas where slopes are 2 to 6 percent; and a few small areas where the surface layer is sandy loam.

Maintaining good tilth is difficult. Most of the acreage has been cultivated but now is pine forest. Erosion is the chief hazard, mainly because the soil is sloping. A long-term crop rotation in which close-growing crops are grown three-fourths of the time is needed. All tillage should be on the contour. Stripcropping is beneficial where feasible. Constructing terraces for diverting runoff is not practical. Permanent grass is needed in all natural draws. Capability unit IVe-1; woodland group 4c2e.

Chewacla Series

Soils of the Chewacla series are nearly level and somewhat poorly drained. They formed in loamy sediments that washed mostly from soils formed in residuum from schist, gneiss, granite, and other metamorphic and igneous rocks.

In a representative profile the surface layer is dark-brown loam about 6 inches thick. The subsoil, in sequence from the top, is 8 inches of brown silt loam mottled with light yellowish brown, 10 inches of strong-brown silty clay loam mottled with light brownish gray, 16 inches of strong-brown loam mottled with light brownish gray and reddish yellow, and 8 inches of light brownish-gray loam mottled with yellowish red and reddish yellow. The underlying material, to a depth of 61 inches, is gray sandy loam.

The Chewacla soils are near Enoree, Cartecay, Toccoa, Wehadkee, and Worsham soils. They are finer textured than the Cartecay and Toccoa soils. They are better drained than the Enoree, Wehadkee, and Worsham soils.

The Chewacla soils are moderately high in organic-matter content. Permeability is moderate, and available water capacity is high.

Native trees were gum, oak, ash, cottonwood, poplar, birch, and sycamore. The understory was reeds, brambles, briers, vines, and native grasses.

Representative profile of Chewacla loam, in Laurens County, in an improved pasture 1 mile west of Watts Mills, 150 feet south of County Road 24.

Ap—0 to 6 inches, dark-brown (10YR 4/3) loam; weak, fine, granular structure; very friable; many fine roots; few fine mica flakes; slightly acid, pH 6.5; abrupt, smooth boundary.

B1—6 to 14 inches, brown (10YR 5/3) silt loam; few, fine, faint, light yellowish-brown mottles; weak, fine, subangular blocky structure; friable; common fine roots; few fine mica flakes; slightly acid, pH 6.5; clear, smooth boundary.

B21—14 to 24 inches, strong-brown (7.5YR 5/6) silty clay loam; few, fine, distinct, light brownish-gray mottles; weak, medium and coarse, subangular blocky structure; friable; few fine roots; few fine mica flakes; slightly acid, pH 6.1; gradual, smooth boundary.

B22—24 to 40 inches, strong-brown (7.5YR 5/6) loam; common, fine, distinct, light brownish-gray mottles and few, fine, distinct, reddish-yellow mottles; weak, medium, subangular blocky structure; friable; few fine mica flakes; strongly acid, pH 5.4; gradual, smooth boundary.

B3g—40 to 48 inches, light brownish-gray (10YR 6/2) loam; few, fine, distinct, yellowish-red and reddish-yellow mottles; weak, medium, subangular blocky structure; friable; few fine mica flakes; strongly acid, pH 5.5; gradual, wavy boundary.

Cg—48 to 61 inches, gray (10YR 5/1) sandy loam; structureless; friable; common fine mica flakes; stratified; strongly acid, pH 5.3.

The A horizon is brown or dark brown. The B1 horizon is brown, dark yellowish-brown, yellowish-brown, or grayish-brown loam, silt loam, or silty clay loam. The B2 horizon is yellowish brown or strong brown mottled with light yellowish brown, light brownish gray, reddish yellow, or gray. It is loam, sandy loam, silt loam, or silty clay loam. Gray mottles are within 20 inches of the surface. Soil structure, commonly weak subangular blocky, is evident in the B horizon. The C horizon is predominantly gray and is commonly stratified. The solum ranges from 40 to 54 inches in thickness. The upper 24 inches is slightly acid to strongly acid. Below this the soil is medium acid to very strongly acid.

Chewacla loam (Cn).—This soil has the profile described as representative of the series. It is on the flood plains of medium and large streams.

Included with this soil in mapping are small areas of Cartecay, Enoree, Toccoa, and Worsham soils and 1- to 4-acre tracts of wet soils in slight depressions and recently overwashed areas.

Maintaining good tilth in the plow layer is difficult. Response to fertilizer and lime is good.

Most of the acreage is pasture or wetland hardwood forest. Poor drainage, overflow, and siltation are hazards. The management needs are a drainage system to remove excess water, diversion ditches to intercept hillside runoff, and protection from flooding (fig. 4). Capability unit IIIw-2; woodland group 1w8.

Chewacla and Worsham soils (Cw).—This mapping unit is about 40 to 60 percent Chewacla soils and 35 to 55 percent Worsham soils. It is in upland depressions and drainageways and on flood plains. Some areas are entirely Chewacla soils, some are entirely Worsham soils, and some contain both. Chewacla soils are mostly on the flood plains. They have a profile similar to that described as representative of the series, but in some areas the surface layer is fine sandy loam, silt loam, or silty clay loam. Worsham soils are mostly in upland depressions at the heads of streams. They have the profile described as representative of the series.

Included with these soils in mapping are small areas of Cartecay, Enoree, Toccoa, and Wehadkee soils; small areas that have recent colluvial deposits; some areas of Chewacla soils that have a surface layer of fine sandy loam, silt loam, or silty clay loam, and areas of Worsham soils that have a surface layer of loam, silt loam, or sandy clay loam.

Most of the acreage is used for water-tolerant hardwoods or unimproved pasture. Flooding, poor drainage, and permeability are hazards. The chief management needs are flood control, artificial drainage, and diversion ditches. Wetness is a limitation to use of these soils for pasture. Capability unit Vw-1; woodland groups 1w8 and 2w8.

Colfax Series

Soils of the Colfax series are somewhat poorly drained to moderately well drained and have a fragipan. They formed in residual material weathered from granite, gneiss, or granite gneiss.

In a representative profile the surface layer is grayish-brown loamy sand 7 inches thick. The subsurface layer is 4 inches of pale-yellow loamy sand. The subsoil extends to a depth of 44 inches. The top 4 inches is yellow sandy loam. The next 7 inches is firm, brownish-yellow sandy clay loam mottled with reddish yellow. Below this is a fragipan. The upper 11 inches of the pan is firm and brittle, brownish-yellow sandy clay loam mottled with gray and reddish yellow, and the lower 11 inches is very firm and brittle, light-gray sandy clay loam mottled with brownish yellow and yellowish red. The underlying material, to a depth of 50 inches, is weathered gneiss that crushes to sandy loam and is mottled with light gray, white, brownish yellow, and yellowish red.

Colfax soils are near Appling, Durham, Vance, and Worsham soils. They are not so well drained as Appling, Durham, and Vance soils, but they are better drained than Worsham soils.

Permeability is slow, and available water capacity is medium.

The native vegetation was chiefly hardwoods and an understory of briers, grasses, huckleberries, and reeds.

Figure 4.—**Water-retarding structure designed to prevent flooding on Chewacla loam. The dam was constructed of soil material from Cecil sandy loam, 6 to 10 percent slopes. Concrete spillway controls release of floodwater.**

Representative profile of Colfax loamy sand, 1 to 4 percent slopes, in Laurens County, 2 miles north of Laurens, 1,000 feet east of U.S. Highway 221, in an area where slope is 3 percent.

Ap—0 to 7 inches, grayish-brown (10YR 5/2) loamy sand; weak, fine, granular structure; very friable; many fine roots; few, coarse, individual sand grains; medium acid, pH 5.6; abrupt, smooth boundary.

A2—7 to 11 inches, pale-yellow (2.5Y 7/4) loamy sand; weak, fine, granular structure; very friable; common fine roots; few fine quartz pebbles; medium acid, pH 5.6; abrupt, smooth boundary.

B1t—11 to 15 inches, yellow (10YR 7/6) sandy loam; weak, fine, subangular blocky structure; friable; few fine roots; strongly acid, pH 5.1; clear, smooth boundary.

B2t—15 to 22 inches, brownish-yellow (10YR 6/6) sandy clay loam; few, fine, faint, reddish-yellow mottles; moderate, fine, subangular blocky structure; firm; few fine mica flakes; very few patchy clay films on faces of peds; very strongly acid, pH 5.0; gradual, smooth boundary.

Bx1—22 to 33 inches, brownish-yellow (10YR 6/6) sandy clay loam; common, fine, distinct, gray mottles and few, fine, distinct, reddish-yellow mottles; moderate, medium, subangular blocky structure; firm, brittle; evidence of platy structure; few fine mica flakes; few fine pebbles in the lower 2 inches of this layer; patchy clay films on faces of peds; very strongly acid, pH 4.9; abrupt, smooth boundary.

Bx2—33 to 44 inches, light-gray (10YR 7/1) sandy clay loam; common, medium, distinct, brownish-yellow (10YR 6/8) mottles and few, fine, distinct, yellowish-red mottles; weak, thick, platy structure parting to weak, coarse, angular blocky structure; very firm, brittle, somewhat cemented; few to common fine mica flakes; few pebbles; patchy clay films on some pebbles; strongly acid, pH 5.1; clear, wavy boundary.

C—44 to 50 inches, light-gray (10YR 7/1) weathered gneiss that crushes to sandy loam; common, medium, distinct mottles of white (10YR 8/2), brownish yellow (10YR 6/8), and yellowish red (5YR 4/8); firm; structureless; strongly acid, pH 5.1.

The Ap horizon is dark grayish brown, grayish brown, or dark brown. The A2 horizon is pale yellow, very pale brown, or light yellowish brown. The Bt horizon is brownish-yellow, yellow, yellowish-brown, or pale-brown sandy clay loam or clay loam. The Bx horizon is mottled with gray, brownish yellow, yellowish red, and yellowish brown. It is sandy loam or sandy clay loam that has fine gravel cemented with a colloidal substance concentrated near the top of the horizon. The fragipan is commonly 20 to 35 inches below the surface and is 8 to 24 inches thick. The C horizon contains fragments of partially weathered parent material. Reaction throughout ranges from medium acid to very strongly acid.

The Colfax soils in these counties have gray mottles at a slightly greater depth and are slightly shallower over the fragipan than is defined as the range for the series, but these differences do not alter their usefulness and behavior.

Colfax loamy sand, 1 to 4 percent slopes (CxB).—This soil is on irregularly shaped saddles between drainage systems and at the heads of intermittent drainageways.

Included with this soil in mapping are small areas of Appling, Durham, Vance, and Worsham soils; 1- to 3-acre tracts of colluvial deposits 6 to 12 inches thick in slight depressions; and small areas where the surface layer is sandy loam.

This Colfax soil is easy to keep in good tilth. Most of the acreage is wooded or pastured. The chief hazards are poor drainage, slow permeability, and a root zone restricted by a fragipan. The chief management needs are drainage, a crop rotation, contour tillage, and cover crops and crop residue to maintain the organic-matter content. Capability unit IIIw-3; woodland group 3w8.

Durham Series

Soils of the Durham series are well drained and gently sloping to sloping. They formed on broad ridges in material weathered from granite and gneiss.

In a representative profile the surface layer is grayish-brown loamy sand 7 inches thick. The subsurface layer is 7 inches of pale-yellow loamy sand. The subsoil, in sequence from the top, is 21 inches of yellow sandy clay loam, mottled in the lower 15 inches with reddish yellow; 9 inches of brownish-yellow sandy clay loam mottled with reddish yellow; and 6 inches of very pale brown sandy clay loam mottled with red and brownish yellow. The underlying material, to a depth of 60 inches, is firm, weathered parent material that crushes to sandy loam. It is mottled with yellow, very pale brown, pink, and light red.

Durham soils are near Appling, Colfax, Louisburg, and Vance soils. They are not so fine textured in the subsoil as Appling and Vance soils. They are better drained than Colfax soils. They are thicker than Louisburg soils.

Permeability is moderate, and the available water capacity is medium.

The native vegetation was oak, hickory, and pine and an understory of vines, briers, and grasses.

Representative profile of Durham loamy sand, 2 to 6 percent slopes, in Laurens County, in a cultivated field 2 miles north of Watts Mills, 150 yards east of U.S. Highway 221 near the center of a 4 percent slope:

Ap—0 to 7 inches, grayish-brown (10YR 5/2) loamy sand; weak, fine, granular structure; very friable; many fine roots; few coarse sand grains; medium acid, pH 5.6; abrupt, smooth boundary.

A2—7 to 14 inches, pale-yellow (2.5Y 7/4) loamy sand; weak, medium, granular structure; very friable; few fine roots; medium acid, pH 5.7; abrupt, smooth boundary.

B1—14 to 20 inches, yellow (10YR 7/6) sandy clay loam; weak, medium, subangular blocky structure; friable; few fine pores, few fine roots; strongly acid, pH 5.1; clear, smooth boundary.

B21t—20 to 35 inches, yellow (10YR 7/6) sandy clay loam; common, fine, distinct, reddish-yellow mottles; moderate, fine, subangular blocky structure; firm; thin, patchy clay films; strongly acid, pH 5.1; clear, smooth boundary.

B22t—35 to 44 inches, brownish-yellow (10YR 6/6) sandy clay loam; few, fine, distinct, reddish-yellow mottles; moderate, fine and medium, subangular blocky structure; firm; few fine mica flakes; thin, patchy clay films; strongly acid, pH 5.2; gradual, smooth boundary.

B3—44 to 50 inches, very pale brown (10YR 7/3) sandy clay loam; many, fine, prominent, red (2.5YR 5/8) mottles and few, fine, distinct, brownish-yellow mottles; weak, medium, subangular blocky structure; firm; few, fine mica flakes; very strongly acid, pH 5.0; clear, wavy boundary.

C—50 to 60 inches, yellow (10YR 7/6), very pale brown (10YR 8/3), pink (5YR 7/4), and light-red (2.5YR 6/8), weathered parent material that crushes to sandy loam; firm; structureless; few to common fine mica flakes; few coarse sand grains; very strongly acid, pH 5.0.

The A horizon is loamy sand or sandy loam. The A1 horizon is grayish brown, brown, or pale brown. The A2 horizon is very pale brown or pale yellow. The Bt horizon is yellow, brownish yellow, yellowish brown, or very pale brown, mottled with shades of yellow, brown, and red. It is usually sandy clay loam but ranges to clay loam. In many places the lower part of the B horizon has gray mottles that are attributed to weathered parent material rather than wetness. The C horizon is weathered granite or gneiss parent material. It is mottled with shades of yellow, brown, gray, or red and crushes to sandy loam or loamy sand. The solum ranges from about 42 to 60 inches in thickness. The A horizon is medium acid to very strongly acid, and the B and C horizons are strongly acid to very strongly acid.

Durham loamy sand, 2 to 6 percent slopes (DuB).—This soil has the profile described as representative of the series. It is on irregularly shaped areas at the heads of shallow drainageways and on sides of wide ridges.

Included with this soil in mapping are small areas of Appling, Colfax, and Vance soils and some depressions where the topsoil is 15 to 20 inches thick.

This Durham soil is easy to keep in good tilth. The plow layer does not clod or crust if tilled within a medium range of moisture content.

Most of the acreage is cultivated or pastured. Erosion control is needed. A crop rotation that includes perennial grasses is sufficient to control erosion in some fields, but in others a water-disposal system of terraces, grassed waterways, and contour tillage is needed in addition to a suitable crop rotation. Crop residue left on or near the surface increases infiltration and helps control erosion. Capability unit IIe-2; woodland group 3o7.

Durham sandy loam, 2 to 6 percent slopes (DvB).—This soil is on irregularly shaped medium ridges and gentle side slopes at the heads of drainageways. It has a profile similar to the one described as representative of the series, but the surface layer is sandy loam.

Included with this soil in mapping are small areas of Appling, Colfax, and Vance soils and small areas where slopes are 6 to 10 percent. Also included are 1- to 2-acre tracts where the surface layer is 15 to 20 inches thick and small areas where the surface layer is loamy sand.

This Durham soil is easy to keep in good tilth. Response to fertlizer and lime is good.

Most of the acreage is wooded or pastured. A crop rotation in which close-growing crops are grown half the time is needed. A water-disposal system of grassed waterways and terraces is essential for erosion control, and contour tillage, stripcropping, and crop residue left on or near the surface help in controlling erosion. Capability unit IIe-2; woodland group 3o7.

Durham sandy loam, 6 to 10 percent slopes (DvC).—This soil is on irregularly shaped ridges of medium width and is at the heads of drainageways. It has a profile similar to the one described as representative of the series, but the surface layer is sandy loam.

Included with this soil in mapping are small areas of Appling, Vance, and Louisburg soils; small areas where slopes are 2 to 6 percent; and small areas where the surface layer is loamy sand.

This Durham soil is easy to keep in good tilth. Response to fertilizer and lime is good.

Most of the acreage is wooded. Erosion is the chief hazard. Management is needed that provides a crop rotation in which close-growing crops are grown two-thirds of the time and a water-disposal system of grassed waterways, terraces, and contour tillage. Stripcropping or growing sod crops in the rotation can be used alone or in combination with other practices to help control erorsion. Capability unit IIIe-2; woodland group 3o7.

Enon Series

Soils of the Enon series are gently sloping to sloping on medium and narrow ridges and strongly sloping to moderately steep on side slopes adjacent to streams. They are well drained and deep to moderately deep over weathered rock. They formed in material weathered from gneiss and schist containing intrusions of diorite, hornblende, or gabbro.

In a representative profile the surface layer is brown sandy loam 5 inches thick. The upper 24 inches of the subsoil is strong brown mottled with yellowish red, brownish yellow, and pale brown. The lower 9 inches is yellowish-brown clay loam mottled with very pale brown. The underlying material, to a depth of 48 inches, is mottled brown, yellow, black, and green weathered rock material that crushes to sandy loam.

Enon soils are near Cataula, Cecil, Hiwassee, Iredell, Mecklenburg, Pacolet, and Wilkes soils. In contrast to Cataula soils, they have a plastic subsoil and no fragipan. They have a more plastic subsoil than Cecil, Mecklenburg, Pacolet, and Hiwassee soils and a less plastic subsoil than Iredell soils. They have a thicker subsoil than Wilkes soils.

Permeability is slow and available water capacity is medium.

The native vegetation was oak, gum, elm, redcedar, and pine and an understory of briers, vines, and grasses.

Representative profile of Enon sandy loam, 2 to 6 percent slopes, in Laurens County, in a pine forest 1 mile northwest of Floyds Landing, 30 feet south of County Road 87 near the crest of a 4 percent slope:

Ap—0 to 5 inches, brown (10YR 5/3) sandy loam; weak, fine, granular structure; very friable; many fine roots; few quartz fragments; few manganese concretions; slightly acid, pH 6.5; abrupt, smooth boundary.

B1—5 to 8 inches, strong-brown (7.5YR 5/6) clay loam; few, fine, faint, yellowish-brown mottles; weak, medium and fine, subangular blocky structure; friable; common fine roots; few medium roots; common manganese concretions; medium acid, pH 6.0; abrupt, smooth boundary.

B21t—8 to 17 inches, strong-brown (7.5YR 5/6) clay; common, medium, prominent, yellowish-red (5YR 5/8) mottles, and few, fine, distinct, brownish-yellow mottles; moderate, medium, angular blocky structure; hard, firm, sticky and plastic; few fine and medium roots; common manganese concretions; thin, continuous clay films on faces of peds; slightly acid, pH 6.5; clear, smooth boundary.

B22t—17 to 29 inches, strong-brown (7.5YR 5/8) clay; few, fine, distinct, pale-brown mottles; strong, coarse, angular blocky structure; hard, very firm, plastic and sticky; continuous clay films on faces of peds; neutral, pH 7.0; clear, wavy boundary.

B3t—29 to 38 inches, yellowish-brown (10YR 5/6) clay loam; common, fine, distinct, very pale brown mottles; weak, coarse, angular blocky structure; hard, very firm; many clay films; few fragments of dark-colored weathered rock; neutral, pH 7.0; clear, wavy boundary.

C—38 to 48 inches, mottled brown (10YR 5/3), yellow (10YR 7/6), black (10YR 2/1), and pale-green (5G 6/2) weathered rock material that crushes to sandy loam texture; structureless; friable; contains fragments of parent rock; neutral, pH 7.0.

The A horizon is dark grayish brown, grayish brown, brown, pale brown, or light yellowish brown. In some places the A horizon contains quartz pebbles and manganese concretions. The Bt horizon is dark brown, strong brown, or yellowish brown and is mottled with lighter shades of red, brown, or yellow. Consistency ranges from firm to very firm. The B3t horizon is dark-brown, yellowish-brown, or yellowish-red clay loam to clay with a wide range of mottles. The C horizon is strong brown to gray with a wide range of mottles. It is clay loam, silt loam, or sandy loam and contains varying amounts of rock fragments. In some places the C horizon is strongly weathered rock, but in other places large fragments of partially weathered rock are present. The solum ranges from 24 to 42 inches in thickness. The A, B1, and B2t horizons are medium acid to neutral, and the B3t and C horizons are slightly acid to mildly alkaline.

The base saturation of these soils is greater than is defined as the range for the series, but this difference does not alter their usefulness and behavior.

Enon sandy loam, 2 to 6 percent slopes (EnB).—This soil has the profile described as representative of the series. It is on irregularly shaped medium ridges.

Included with this soil in mapping are small areas of Cataula, Cecil, and Mecklenburg soils and small areas where slopes are 6 to 10 percent.

Maintaining good tilth is fairly easy. Most of the acreage is pastured or cultivated. If well managed, this soil is suited to a 2- to 4-year crop rotation in which close-growing crops are grown half the time. Contour tillage, terraces, and grassed waterways are needed for erosion control. Capability unit IIe-3; woodland group 4o1.

Enon sandy loam, 6 to 10 percent slopes (EnC).—This soil is on irregularly shaped ridges and side slopes adjacent to small streams.

Included with this soil in mapping are small areas of Cataula, Cecil, Mecklenburg, and Wilkes soils; small areas where slopes are 2 to 6 percent; and other areas where they are 10 to 15 percent.

This Enon soil is easy to keep in good tilth. Response to fertilizer and lime is good.

Most of the acreage is pastured or cultivated. Erosion is the chief hazard, but management is also affected by the plastic subsoil. A crop rotation in which close-growing crops are grown two-thirds of the time is needed. Grassed waterways, terraces, and contour tillage are essential in controlling erosion. Capability unit IIIe-3; woodland group 4o1.

Enon sandy loam, 10 to 15 percent slopes (EnD).—This soil is on regularly shaped side slopes adjacent to streams.

Included with this soil in mapping are small areas of Cecil or Wilkes soils, small areas where slopes are 6 to 10 percent; other areas where they are 15 to 25 percent; and a few moderately deep gullies. A small acreage of Meckenburg soils is included in Union County.

This soil is suitable for only limited cultivation because slopes are strong and the erosion hazard is severe. Most of the acreage is wooded. In a suitable long-term crop rotation, close-growing crops are grown three-fourths of the time. Constructing terraces is not practical, but contour tillage and grassed waterways are needed for erosion control. Rotation grazing is practiced in pastures to maintain a good sod cover. Capability unit IVe-2; woodland group 4o1.

Enon sandy loam, 15 to 25 percent slopes (EnE).—This soil is on irregularly shaped side slopes adjacent to streams.

Included with this soil in mapping are small areas of Pacolet and Wilkes soils, small areas where slopes are less than 15 percent, and a few moderately deep gullies.

Most of the acreage is wooded. It is not practical to cultivate this soil, and use for pasture is limited. If this soil is used for summer pasture, grazing must be controlled to keep a good plant cover. This soil is better suited to trees than to other uses. Capability unit VIe-3; woodland group 4r2.

Enoree Series

Soils of the Enoree series are nearly level and poorly drained. They formed in sandy or loamy alluvial sediments.

In a representative profile the surface layer is grayish-brown silt loam, 7 inches thick, mottled with reddish brown. The underlying material, in sequence, is 8 inches of grayish-brown sandy clay loam mottled with reddish brown and strong brown, 12 inches of mottled light brownish-gray and brown sandy loam, and 23 inches of grayish-brown loamy sand.

The Enoree soils are near Cartecay, Chewacla, Toccoa, and Buncombe soils. In contrast with those soils, they are not so well drained.

Enoree soils are medium in organic-matter content. Permeability is moderate to moderately rapid, and available water capacity is medium. Frequent overflow is a hazard.

These soils are not well suited to native pasture plants. The native vegetation was ash, willow, and gum trees and an understory of bulrush.

Representative profile of Enoree silt loam in Laurens County, in a pasture 5 miles north of Clinton, 650 feet east of State Highway 56, and 450 feet south of Duncan Creek:

Ap—0 to 7 inches, grayish-brown (2.5Y 5/2) silt loam; many, fine, prominent, reddish-brown mottles; weak, medium, subangular blocky structure; friable; many roots; few fine pebbles; slightly acid, pH 6.2; clear, smooth boundary.

C1g—7 to 15 inches, grayish-brown (2.5Y 5/2) sandy clay loam; many, medium, prominent, reddish-brown (5YR 4/4) mottles and few, fine, prominent, strong-brown mottles; structureless; friable; many roots; few soft manganese concretions; medium acid, pH 5.7; gradual, smooth boundary.

C2g—15 to 27 inches, mottled, light brownish-gray (10YR 6/2) and brown (7.5YR 5/4) sandy loam; thin strata of sandy clay loam and loamy coarse sand; structureless; very friable; many roots; common fine and medium pebbles; many fine mica flakes; strongly acid, pH 5.4; gradual, smooth boundary.

C3g—27 to 50 inches, grayish-brown (2.5Y 5/2) loamy sand; thin strata of sandy loam and sandy clay loam; structureless; single grained; very friable; few fine roots; few brown stains around old root channels; few, fine, black stains of organic matter; slightly acid, pH 6.1.

Stratification or bedding planes are evident in many profiles. Mica flakes range from few to many throughout some profiles, and a few soft manganese concretions occur in some. The A horizon is grayish brown, dark grayish brown, brown, reddish brown, dark brown, or pale brown and is mottled in many profiles. It is silt loam, silty clay loam, loam, or sandy loam. The C horizon is predominantly brown and dark grayish brown and is mottled with brown, reddish brown, strong brown, or yellowish brown within 30 inches of the surface. Colors of light brownish gray, gray, and light gray are evident to a depth of 30 inches. The control section is sandy loam or loam that is 10 to 18 percent clay and is stratified with loamy coarse sand, sandy loam, sandy clay loam, loam, or silty clay loam. Reaction throughout ranges from slightly acid to very strongly acid.

Enoree soils (Eo).—These soils are on the flood plains of medium and large streams. Included in mapping are small areas of Cartecay, Toccoa, Chewacla, and Buncombe soils.

These Enoree soils are frequently flooded, and the water table is near the surface for about 6 months of each year. Tilth cannot be maintained under these conditions.

Most of the acreage is in wetland hardwoods. A small percentage is unimproved pasture. Flooding, poor drainage, a high water table, and siltation are hazards. Managing these soils for pasture is difficult. Drainage is not practical because outlets are not adequate. Capability unit Vw-2; woodland group 2w6.

Gullied Land

Gullied land consists of areas so severely eroded that the original soil profile has been destroyed and many deep gullies have formed.

Gullied land-Pacolet soils complex (Gp).—This complex is about 35 to 65 percent Gullied land and 25 to 50 percent Pacolet soils. Areas are intricately mixed and range from one-half acre to 5 acres in size. The soil material in the gullied areas is variable, depending on the original soil and the depth to which it has been eroded. It is mostly yellowish-red to red clay loam or sandy clay loam that contains much weathered rock. The Pacolet soil has a profile similar to the one described as representative of the series, but the surface layer is thinner and finer textured.

Some areas have been stabilized, but some are still eroding. Most of the acreage is forest. Reclaiming this land for farming is not economically feasible (fig. 5). Erosion is the chief hazard. Pine trees should be planted in open areas and the existing trees protected. No capability unit or woodland group classifications.

Figure 5.—**Gullied land-Pacolet soils complex. Smoothing and reshaping are needed before any vegetation can be planted.**

Hiwassee Series

Soils of the Hiwassee series are gently sloping to strongly sloping, dark red, and well drained. They formed in material weathered from gneiss, schist, or from old general alluvium that was more than 10 percent weatherable minerals.

In a representative profile the surface layer is dark reddish-brown sandy loam 6 inches thick. The subsoil, in sequence from the top, is 13 inches of dark-red clay and 34 inches of dark-red clay loam that has yellowish-red mottles in the lower 12 inches. The underlying material, to a depth of 63 inches, is red fine sandy loam mottled with yellowish red and very pale brown.

Hiwassee soils are near Cecil, Enon, Madison, and Wilkes soils. They have a darker red subsoil than Cecil and Enon soils. They are darker red than Madison soils and lack the mica throughout the profile that is typical of those soils. They are thicker than Wilkes soils.

Permeability is moderate, and the available water capacity is medium.

The native vegetation was oak, hickory, dogwood, sourwood, holly, redcedar, and pine and an understory of brambles, shrubs, briers, vines, and grasses.

Representative profile of Hiwassee sandy loam, 2 to 6 percent slopes, in Union County, in an improved pasture 2.5 miles northwest of Jonesville, 200 feet north of unimproved road near the crest of a 4 percent slope:

Ap—0 to 6 inches, dark reddish-brown (5YR 3/4) sandy loam; weak, fine, granular structure; very friable; many fine roots; slightly acid, pH 6.4; abrupt, smooth boundary.

B21t—6 to 19 inches, dark-red (10R 3/6) clay; moderate, medium, subangular blocky structure; firm; many fine roots; common fine pores; few fine mica flakes; thin, continuous clay films on faces of peds; slightly acid, pH 6.4; gradual, smooth boundary.

B22t—19 to 41 inches, dark-red (10R 3/6) clay loam; moderate, fine and medium, subangular blocky structure; firm, slightly sticky; few small feldspar fragments; common fine pores; common fine mica flakes; few dark-colored minerals; continuous clay films on faces of peds; slightly acid, pH 6.2; clear, wavy boundary.

B3t—41 to 53 inches, dark-red (2.5YR 3/6) clay loam; few, fine, faint yellowish-red mottles; weak, medium, subangular blocky structure; firm; common fine mica flakes; common dark minerals; patchy clay films; slightly acid, pH 6.1; clear, wavy boundary.

C—53 to 63 inches, red (2.5YR 4/6) fine sandy loam; common, medium, distinct yellowish-red (5YR 5/8) mottles and few, fine, distinct very pale brown mottles; weak, medium, subangular blocky structure; friable; streaks of dark-colored minerals; common fine mica flakes; slightly acid, pH 6.2.

The A horizon is dark-brown, brown, dark-red, or dark reddish-brown sandy loam or sandy clay loam. Moist and dry color values differ by one or less. The Bt horizon is clay or clay loam. The lower part of the B horizon has few to common very pale brown or yellowish-red mottles. More than 10 percent of weatherable minerals are in the argillic horizon. The solum ranges from 40 to more than 60 inches in thickness. Reaction throughout ranges from slightly acid to medium acid.

Hiwassee sandy loam, 2 to 6 percent slopes (HwB).—This soil is on broad ridges. It has the profile described as representative for the series. Included in mapping are small areas of Cecil, Enon, and Madison soils; small areas where slopes are 6 to 10 percent; and small areas where the surface layer is sandy clay loam.

It is fairly easy to keep this soil in good tilth except in areas that have a sandy clay loam surface layer. Response to fertilizer and lime is good.

Most of the acreage is cultivated or pastured. Erosion is the chief hazard. A crop rotation of 2 to 4 years is needed in which close-growing crops are grown half the time. A water-disposal system of contour tillage, terraces, and grassed waterways also is needed. Crop residue and green manure crops left on or near the surface help control erosion. Capability unit IIe-1; woodland group 3o7.

Hiwassee sandy loam, 6 to 10 percent slopes, eroded (HwC2).—This soil is on medium ridges and in areas adjacent to drainageways.

Included with this soil in mapping are areas of Cecil, Enon, and Madison soils; small areas where slopes are 2 to 6 percent; other areas where they are 10 to 15 percent; and small areas where the surface layer is sandy clay loam. Also included are areas where an estimated 20 to 30 percent of the surface layer is a dark reddish color when freshly plowed.

It is fairly easy to keep this soil in good tilth except in areas where the surface layer is sandy clay loam.

Most of the acreage is cultivated or pastured. Erosion is the chief hazard. A crop rotation is needed in which close-growing crops are grown two-thirds of the time. A water-disposal system of contour tillage, terraces, and grassed waterways also is needed. Crop residue and green manure crops left on or near the surface help control erosion. Capability unit IIIe-1; woodland group 3o7.

Hiwassee sandy loam, 10 to 15 percent slopes, eroded (HwD2).—This soil is on irregularly shaped side slopes adjacent to streams. Included with this soil in mapping are small areas of Cecil, Enon, Madison, and Wilkes soils; small areas where slopes are less than 10 percent; and small areas where the surface layer is sandy clay loam.

This soil is so steep that it is suitable for only limited cultivation. Most of the acreage is wooded or pastured. Erosion is the chief hazard. A crop rotation is needed in which close-growing crops are grown three-fourths of the time. Terracing is not practical, but contour tillage and grassing all natural draws help control erosion. Capability unit IVe-1; woodland group 3o7.

Hiwassee sandy clay loam, 2 to 6 percent slopes, eroded (HyB2).—This soil is on irregularly shaped, medium ridges. It has a profile similar to the one described as representative of the series, but the surface layer is dark-red sandy clay loam. Galled areas and rills are common.

Included with this soil in mapped are small areas of Cecil, Enon, and Madison soils; small areas where the surface layer is sandy loam or clay loam; and small areas where slopes are 6 to 10 percent.

Maintaining good tilth in the plow layer without clodding or crusting is difficult. Uniform crop stands are difficult to obtain.

Most of the acreage has been cleared and planted, chiefly to cotton. Erosion is the chief hazard. In a suitable crop rotation, close-growing crops are grown two-thirds of the time. Grassed waterways and terraces are essential to a water-disposal system. All tillage should be on the contour. Capability unit IIIe-1; woodland group 4c2e.

Hiwassee sandy clay loam, 6 to 10 percent slopes, eroded (HyC2).—This soil is on irregularly shaped areas that slope down to drainageways. It has a profile similar to the one described as representative of the series, but the surface layer is dark-red sandy clay loam. Galled areas and rills are common.

Included with this soil in mapping are small areas of Cecil, Enon, Madison, and Wilkes soils; small areas where the surface layer is clay loam or sandy loam; a few small areas where slopes are 2 to 6 percent; and other areas where they are 10 to 15 percent.

Maintaining good tilth is difficult. Most of the acreage was once cleared and cultivated, but has reverted or been planted to pine forest. Erosion is the chief hazard. In a suitable long-term crop rotation, close-growing crops are grown three-fourths of the time. Constructing terraces is not practical, but contour tillage and grassed waterways are needed for erosion control. Rotation grazing is practiced in pastures to keep a good sod. Capability unit IVe-1; woodland group 4c2e.

Hiwassee sandy clay loam, 10 to 15 percent slopes, eroded (HyD2).—This soil is on irregularly shaped breaks to streams. It has a profile similar to the one described as representative of the series, but the surface layer is dark-red sandy clay loam. Small galled areas and a few moderately deep gullies have formed.

Included with this soil in mapping are small areas of Enon, Madison, and Wilkes soils and small areas where slopes are 6 to 10 percent.

It is not practical to disturb the surface layer of this soil.

Most of the acreage is pine forest. Erosion is the chief hazard. Controlled grazing to keep a good sod cover is needed where this soil is used for pasture. This soil is better suited to trees than to pasture. Capability unit VIe-1; woodland group 4c2e.

Iredell Series

Soils of the Iredell series are gently sloping, moderately deep over weathered rock material, and moderately well drained to somewhat poorly drained. They formed in material weathered from diorite, gabbro, hornblende gneiss, and similar dark-colored rocks.

In a representative profile the surface layer is dark-brown fine sandy loam about 6 inches thick. The upper part of the subsoil is 15 inches of extremely firm, light olive-brown, plastic clay. The lower 4 inches is very firm, olive clay loam that has yellowish-brown mottles. At a depth of 25 inches is weathered rock material that crushes to sandy loam. At a depth of 42 inches is hard bedrock.

Iredell soils are near Cecil, Enon, and Mecklenburg soils. They do not have the red subsoil that is typical of

Cecil soils. They have a more plastic subsoil than Enon and Mecklenburg soils.

Permeability is slow, and available water capacity is high. The shrink-swell potential is high.

The native vegetation was oak, redcedar, and hickory and an understory of grasses and shrubs.

Representative profile of Iredell fine sandy loam, 2 to 6 percent slopes, in Union County, in an idle field 1½ miles northeast of Carlisle, about 75 feet north of County Road 113 near the center of a 3 percent slope:

Ap—0 to 6 inches, dark-brown (10YR 4/3) fine sandy loam; weak, fine, granular structure; friable; many fine roots; few medium roots; few dark-colored concretions; medium acid, pH 6.0; abrupt, smooth boundary.

B2t—6 to 21 inches, light olive-brown (2.5Y 5/4) clay; strong, medium, angular blocky structure; extremely firm, hard, very plastic and very sticky; common fine roots and pores; few dark-colored concretions; continuous clay films on faces of peds; slightly acid, pH 6.5; gradual, smooth boundary.

B3t—21 to 25 inches, olive (5Y 5/4) clay loam; few, fine, faint yellowish-brown mottles; weak, medium, angular blocky structure; very firm, very plastic and sticky; common dark-colored concretions; few feldspar fragments; few fine pores; thin clay films on faces of peds and in pores; neutral, pH 6.8; clear, wavy boundary.

C—25 to 42 inches, soft rock material, black, grayish, strong brown, and greenish; when crushed, breaks to sandy loam texture; structureless; neutral, pH 7.0.

R—42 inches, hard bedrock.

The A horizon is dark grayish-brown, dark-brown, or olive-brown sandy loam or loam. The B2t horizon is very firm to extremely firm and is yellowish brown, brownish yellow, brown, olive, or light olive brown. In some places stones occur in this horizon. The B3t horizon is brownish-yellow, yellowish-brown, and olive clay loam or clay mottled with shades of yellow, brown, or olive. Faint to distinct gray mottles are in the lower part of the horizon. Stones also occur in this horizon in some places. Dark-colored concretions ranging from few to common are evident in any or all horizons. The Bt horizon cracks when dry and swells when wet. The C horizon is partially weathered basic rock and local intrusions of acid rock. The solum ranges from about 22 to 36 inches in thickness. The A horizon is medium acid to slightly acid, and the B and C horizons are slightly acid to neutral.

Iredell fine sandy loam, 2 to 6 percent slopes (IdB).—This soil has the profile described as representative of the series. It is on broad ridges.

Included with this soil in mapping are small areas of Cecil, Enon, and Mecklenburg soils. A few 1- to 3-acre tracts of somewhat poorly drained unclassified soils are included in Union County. They are identified on the map by wet spot symbols.

Maintaining good tilth is difficult. Clods form unless the soil is tilled within only a narrow range of moisture content.

Most of the acreage is in pasture. Maintaining workability and controlling erosion are the main management concerns. A 2- to 4-year crop rotation is needed in which close-growing crops are grown half the time. Contour tillage and grassed waterways are needed for erosion control. The plastic clay subsoil makes the construction and maintenance of terraces difficult. Capability unit IIe-4; woodland group 4c2.

Iredell stony loam, 2 to 6 percent slopes (IrB).—This soil has a profile similar to the one described as representative of the series, but has stones on the surface and throughout the profile. These stones make up 20 to 30 percent of the soil mass and range from about 5 inches to more than 24 inches in diameter. This soil is on breaks from the broad areas of other Iredell soils in the northwestern part of Union County.

Included with this soil in mapping are small areas of Enon, Wilkes, and Mecklenburg soils.

Stones interfere with tillage. Most of the acreage is in hardwoods. Stones and erosion are the chief hazards. Rotation grazing is needed to keep a sod cover on this soil. Capability unit VIs-1; woodland group 4x2.

Louisburg Series

Soils of the Louisburg series are sloping to steep, shallow over weathered rock material, and well drained to excessively drained. They formed in material weathered from granite, gneiss, or schist.

In a representative profile the surface layer is dark-brown loamy sand 7 inches thick. The subsoil is about 9 inches of yellowish-brown sandy clay loam. The underlying material, to a depth of 26 inches, is mottled, weathered gneiss that crushes to loamy coarse sand. Hard granite rock is at a depth of 26 inches.

Louisburg soils are near Appling, Cecil, Pacolet, and Durham soils. Louisburg soils are shallower over weathered rock material than any of these soils.

Permeability is moderately rapid, and available water capacity is low.

The native vegetation was oak, hickory, and pine and an understory of briers, vines, shrubs, and grasses.

Representative profile of Louisburg loamy sand, 10 to 40 percent slopes, in Laurens County, in a pasture 4 miles northeast of Fountain Inn, near the crest of a 23 percent slope:

Ap—0 to 7 inches, dark-brown (10YR 4/3) loamy sand; weak, fine, granular structure; very friable; many fine roots; common fine mica flakes; few fine quartz pebbles; medium acid, pH 5.8; abrupt, smooth boundary.

Bt—7 to 16 inches, yellowish-brown (10YR 5/4) sandy clay loam; weak, fine, subangular blocky structure; friable; many fine roots; few feldspar crystals and few to common fine mica flakes; strongly acid, pH 5.3; clear, wavy boundary.

C—16 to 26 inches, yellowish-brown (10YR 5/6), light yellowish-brown (10YR 6/4), and yellowish-red (5YR 5/6) weathered gneiss that crushes to loamy coarse sand; structureless; friable; fragments of weathered gneiss; strongly acid, pH 5.4.

R—26 inches +, hard granite rocks.

The A horizon is dark grayish brown, dark brown, brown, or pale brown. The B horizon is dominantly yellowish brown, but ranges to pale brown and, in places, to yellowish red or red or reddish yellow. The B horizon is discontinuous. The C horizon is partly weathered granite, gneiss, or schist. Depth to hard bedrock is 24 to 48 inches. The solum ranges from about 9 to 30 inches in thickness. Reaction throughout is medium acid to strongly acid.

Louisburg loamy sand, 6 to 10 percent slopes (LoC).—This soil is on the breaks to small streams. Included in mapping are small areas of Cecil, Appling, and Durham soils; small areas where the surface layer is sandy loam; small areas where slopes are 2 to 6 percent; other areas where they are 10 to 15 percent; and small areas that have boulders on the surface and are identified on the map by boulder symbols.

This Louisburg soil is easy to keep in good tilth. The plow layer can be tilled within a wide range of moisture content without clodding or crusting.

Most of the acreage is forest. Droughtiness and erosion are the chief hazards. A long-term crop rotation in which close-growing crops are grown three-fourths of the time is needed. It is not feasible to terrace this soil, but some fields can be contour stripcropped. Seeding grass in natural draws is beneficial for erosion control. Pasture should be grazed in rotation. Capability unit IVe-3; woodland group 3o7.

Louisburg loamy sand, 10 to 40 percent slopes (LoF).—This soil has the profile described as representative of the series. It is on side slopes adjacent to bottom lands.

Included with this soil in mapping are small areas of Pacolet soils; small areas where the surface layer is sandy loam; small areas of rock outcrops and boulders, which are identified on the map by boulder symbols; and a few 1- to 4-acre tracts of moderately deep to deep gullies, which also are identified on the map by gully symbols.

Most of the acreage is in hardwoods. Droughtiness and erosion are the chief hazards. Planting trees in the open areas and protecting the existing trees are the chief management needs. Capability unit VIIe-2; woodland group 3r8.

Madison Series

Soils of the Madison series are gently sloping to steep, moderately deep to deep, and well drained. They formed in material weathered from quartz-mica gneiss or quartz-mica schist and quartz-diorite pegmatite high in feldspar and mica.

In a representative profile the surface layer is grayish-brown sandy loam 6 inches thick. The subsoil, in sequence from the top, is 11 inches of red clay loam, 14 inches of red clay, and 8 inches of red clay loam mottled with reddish yellow. The underlying material, to a depth of 54 inches, is red, reddish-yellow, and pink sandy clay loam.

Madison soils are near Appling, Cecil, Hiwassee, Louisburg, and Pacolet soils. They contain more mica throughout than Appling, Ceil, Hiwassee, and Pacolet soils and are thicker than Louisburg soils.

Permeability is moderate, and available water capacity is medium.

Native vegetation was oak, hickory, maple, elm, and pine and an understory of shrubs, vines, briers, and grasses.

Representative profile of Madison sandy loam, 2 to 6 percent slopes, in Laurens County, in a pine forest 1½ miles northeast of Princeton, one-fourth mile northwest of Prospect Church near the crest of a 4 percent slope:

Ap—0 to 6 inches, grayish-brown (10YR 5/2) sandy loam; weak, fine, granular structure; very friable; many fine roots; few fine pores; few fine quartz pebbles; few fine mica flakes; strongly acid, pH 5.5; abrupt, smooth boundary.

B21t—6 to 17 inches, red (2.5YR 4/6) clay loam; moderate, medium, subangular blocky structure; friable; many fine and few medium roots; common fine mica flakes that give the soil a greasy feel; patchy clay films; strongly acid, pH 5.4; clear, smooth boundary.

B22t—17 to 31 inches, red (2.5YR 4/6) clay; moderate, medium, subangular blocky structure; firm; few medium roots; many fine mica flakes that give the soil a greasy feel; distinct, continuous clay films; medium acid, pH 5.6; clear, wavy boundary.

B3t—31 to 39 inches, red (2.5YR 5/8) clay loam; few, fine, distinct, reddish-yellow mottles; weak, medium, subangular blocky structure; friable; many fine mica flakes that give the soil a greasy feel; few fragments of weathered schist rock; patchy clay films; strongly acid, pH 5.4; clear, wavy boundary.

C—39 to 54 inches, red (2.5YR 5/8), reddish-yellow (7.5YR 7/8), and pink (7.5YR 8/4) weathered quartz-mica schist that crushes to sandy clay loam; medium size fragments of less weathered material; structureless; friable; many fine mica flakes; strongly acid, pH 5.3.

The A horizon is dark-brown, grayish-brown, or brown sandy loam. In eroded areas where the original surface layer has been lost through accelerated erosion, the A horizon is reddish-brown sandy clay loam. Rock fragments and quartz gravel are commonly on the surface. The Bt horizon is clay or clay loam. Mica flakes range from common to many with increasing depth. The C horizon is multicolored, highly weathered quartz-mica schist, quartz-mica gneiss, or quartz-diorite pegmatite. In areas where it is quartz-diorite pegmatite, the regolith contains many feldspar crystals. The solum ranges from 25 to 48 inches in thickness. Reaction is medium acid to very strongly acid throughout.

Madison sandy loam, 2 to 6 percent slopes (MdB).—This soil has the profile described as representative of the series. It is on medium and broad ridges.

Included with this soil in mapping are small areas of Appling, Cecil, and Hiwassee soils; a few small areas where the subsoil is dark red; small areas where slopes are 6 to 10 percent; and small areas where the surface layer is sandy clay loam.

This Madison soil is easy to keep in good tilth. It can be worked throughout a medium range of moisture content. Tilth is poor in areas where the surface layer is sandy clay loam.

Most of the acreage is cultivated or pastured. Erosion is the chief hazard. A crop rotation of 2 to 4 years in which close-growing crops are grown one-half of the time is needed. Tillage on the contour, terraces, grassed waterways, and crop residue and green manure crops on or near the surface all help in controlling erosion. Controlled grazing of pasture is needed to keep a good plant cover on the soil. Capability unit IIe-1; woodland group 3o7.

Madison sandy loam, 6 to 10 percent slopes (MdC).—This soil is on medium ridges and areas adjacent to drainageways. Included in mapping are small areas of Cecil and Hiwassee soils, small areas where the surface layer is sandy clay loam, areas where slopes are 2 to 6 percent, and other areas where they are 10 to 15 percent.

This Madison soil is fairly easy to keep in good tilth. It can be tilled without clodding within a medium range of moisture content.

Most of the acreage is cultivated or pastured. Erosion is the chief hazard. A long-term crop rotation in which close-growing crops are grown two-thirds of the time is needed. Stripcropping, contour tillage, terraces, and grassed waterways help control erosion. Controlled grazing helps keep a good cover on this soil. Capability unit IIIe-1; woodland group 3o7.

Madison sandy loam, 10 to 15 percent slopes (MdD).—This soil is on irregularly shaped areas adjacent to streams. Included in mapping are small areas of Cecil, Hiwassee, and Louisburg soils; small areas where slopes are 6 to 10 percent; and small areas where the surface layer is sandy clay loam.

This soil is suitable for only limited cultivation because slopes are strong. Most of the acreage is mixed hardwood and pine forest or pasture. Erosion is the chief hazard. A long-term crop rotation in which close-growing crops are grown three-fourths of the time is needed. It is not practical to terrace this soil, but all tillage should be on the contour, and grass should be seeded in all natural draws. Rotation grazing of pasture helps keep a good ground cover. Capability unit IVe–1; woodland group 3o7.

Madison sandy clay loam, 2 to 6 percent slopes, eroded (MeB2).—This soil has a profile similar to the one described as representative of the series, but the surface layer is reddish-brown sandy clay loam. This soil is on irregularly shaped, medium and broad, eroded ridges. Galled areas on ridge crests are common.

Included with this soil in mapping are small areas of Cecil and Hiwassee soils, a few 1- to 4-acre tracts where the subsoil is dark red and contains many fine mica flakes, small areas where slopes are 6 to 10 percent, and a few areas where the surface layer is sandy loam.

Maintaining good tilth is difficult. Clodding and crusting are common unless the soil is tilled within only a narrow range of moisture content.

Most of the acreage has been cleared and cultivated, chiefly to cotton, but it is now mostly pine forest. Erosion is the chief hazard. A long-term crop rotation in which close-growing crops are grown two-thirds of the time is needed. A water-disposal system of terraces and grassed waterways along with contour tillage are essential for erosion control. Crop residue or green manure crops left on or near the surface also help control erosion. Controlled grazing of pastures helps keep a good sod cover. Capability unit IIIe–1; woodland group 4c2e.

Madison sandy clay loam, 6 to 10 percent slopes, eroded (MeC2).—This soil has a profile similar to the one described as representative of the series, but the surface layer is reddish-brown sandy clay loam. This soil is on medium ridges and sides of drainageways. Shallow gullies, rills, and galled areas are common (fig. 6).

Included with this soil in mapping are small areas of Cecil and Hiwassee soils, a few 1- to 4-acre tracts where the subsoil is dark red and contains many fine mica flakes, and small areas where the surface layer is sandy loam. Also included are small areas where slopes are 2 to 6 percent and other areas where they are 10 to 15 percent.

Maintaining good tilth is difficult. Most of the acreage has been cleared and cultivated, but is now mostly pine forest. Erosion is the chief hazard. A long-term crop rotation in which close-growing crops are grown three-fourths of the time is needed. It is not practical to terrace this soil. Stripcropping, contour tillage, grassed natural draws, and crop residue and green manure crops kept on or near the surface all help in controlling erosion. Rotation grazing of pastures helps keep a good sod cover. Capability unit IVe–1; woodland group 4c2e.

Madison sandy clay loam, 10 to 15 percent slopes, eroded (MeD2).—This soil has a profile similar to the one described as representative of the series, but the surface layer is reddish-brown sandy clay loam. The soil is on areas adjacent to drainageways and streams. Shallow gullies, rills, and sheet erosion are common.

Included with this soil in mapping are small areas of Cicil, Pacolet, and Louisburg soils; small areas where the surface layer is sandy loam; a few small areas where slopes are 6 to 10 percent; and other areas where they are more than 15 percent.

It is not practical to cultivate this soil. Most of the acreage is pine forest. Erosion is the chief hazard. Controlled grazing helps stop erosion in pastures. Capability unit VIe–1; woodland group 4c2e.

Madison and Pacolet soils, 15 to 40 percent slopes (MhF).—This mapping unit is about 40 to 65 percent Madison soils and 30 to 55 percent Pacolet soils. It is adjacent to streams. Some areas are entirely Madison soils, some are entirely Pacolet soils, and some contain both. The Madison soil has a profile similar to the one described as representative of the Madison series, but in some areas the surface layer is gravelly sandy loam. The Pacolet soil has the profile similar to the one described as representative of the Pacolet series. A few moderately deep gullies have formed.

Included with these soils in mapping are small areas of Louisburg soils; areas that have a dark-red subsoil; 1- to 4-acre tracts of a somewhat poorly drained, unclassified soil in narrow depressions; areas where slopes are 10 to 15 percent; areas of escarpments other than bedrock; and small areas where the surface layer is gravelly or stony sandy loam or sandy clay loam.

Most of the acreage is hardwood and pine forest. Erosion is the chief hazard. Capability unit VIIe–1; woodland group 3r8.

Mecklenburg Series

Soils of the Mecklenburg series are gently sloping to sloping, deep to moderately deep over weathered rock material, and well drained. They formed in material weathered from hornblende gneiss, hornblende schist, gabbro, or diorites.

In a representative profile the surface layer is dark-brown sandy loam 6 inches thick. The subsoil, in sequence from the top, is 23 inches of yellowish-red clay mottled with strong brown in the lower part and 8 inches of strong-brown clay loam mottled with yellowish red. The underlying material, to a depth of 46 inches, is strong-brown, yellowish-brown, pale-brown, and yellowish-red loam.

Mecklenburg soils are near Cecil, Hiwassee, Enon, Iredell, and Wilkes soils. Mecklenburg soils are not so red in the subsoil as Cecil and Hiwassee soils, and not so sticky and plastic in the subsoil as Enon soils. They are not plastic and do not have the high shrink-swell properties of Iredell soils. Mecklenburg soils have a thicker solum than Wilkes soils.

Permeability is slow, and available water capacity is medium.

The native vegetation was oak, hickory, redcedar, and pine and an understory of shrubs, vines, briers, and grasses.

Representative profile of Mecklenburg sandy loam, 2 to 6 percent slopes, in Union County, in a cultivated field about eight-tenths of a mile south of State Highway 215

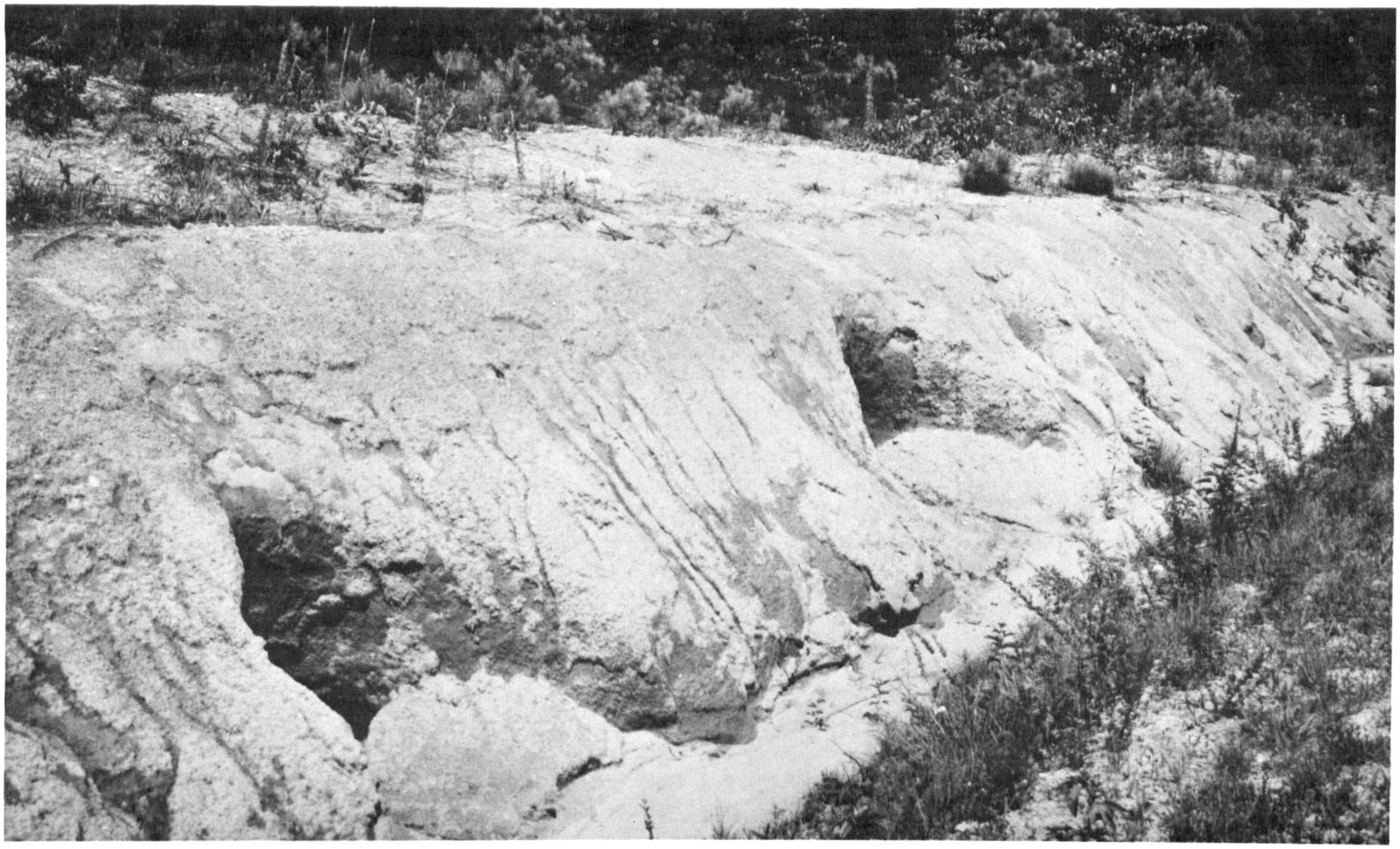

Figure 6.—**Roadbank erosion on Madison sandy clay loam, 6 to 10 percent slopes, eroded.**

and 15 feet west of County Road 52 near the crest of a 4 percent slope:

Ap—0 to 6 inches, dark-brown (10YR 4/3) sandy loam; weak, fine, granular structure; very friable; many fine roots; few manganese concretions; slightly acid, pH 6.2; abrupt, smooth boundary.

B21t—6 to 18 inches, yellowish-red (5 YR 5/6) clay; moderate, medium, subangular blocky structure; firm, slightly plastic; common fine roots; few fine pores; few manganese concretions; continuous clay films; slightly acid, pH 6.3; clear, smooth boundary.

B22t—18 to 29 inches, yellowish-red (5YR 5/8) clay; common, fine, distinct strong-brown mottles; strong, fine and medium, subangular blocky structure; firm and slightly plastic; few fine pores; continuous clay films; slightly acid, pH 6.3; clear, smooth boundary.

B3t—29 to 37 inches, strong-brown (7.5YR 5/6) clay loam; common, fine, distinct yellowish-red mottles; weak, medium, subangular blocky structure; firm; patchy clay films on faces of peds; slightly acid, pH 6.4; clear, wavy boundary.

C—37 to 46 inches, mottled strong-brown (7.5YR 5/6), yellowish-brown (10YR 5/6), pale-brown (10YR 6/3), and yellowish-red (5YR 5/6) weathered material that crushes to loam; structureless; firm; few feldspar fragments and few fine mica flakes; streaks of dark-colored minerals; slightly acid, pH 6.5.

The A horizon is dark grayish brown, dark brown, reddish brown, or yellowish red. The B2t horizon is yellowish red, reddish yellow, reddish brown, or dark reddish brown and has few to many mottles. The B3t horizon is yellowish red, strong brown, or yellowish brown and contains mottles. It also contains few to common rock fragments. The B3 horizon is sandy clay loam, clay loam, or clay. The C horizon is mottled, weathered basic rock that contains few to many dark-colored minerals. The solum ranges from 28 to 42 inches in thickness and contains manganese concretions in most profiles. Reaction throughout ranges from slightly acid to medium acid.

Some of these soils have a higher base saturation than is defined in the range for the series, but this difference does not alter their usefulness or behavior.

Mecklenburg sandy loam, 2 to 6 percent slopes (MkB).—This soil has the profile described as representative of the series. It is on irregularly shaped broad ridges.

Included with this soil in mapping are small areas of Cecil, Hiwassee, Enon, and Iredell soils; small areas where the surface layer is loam; and small areas where slopes are 6 to 10 percent.

This Mecklenburg soil is fairly easy to keep in good tilth. It can be tilled without clodding within a medium range of moisture content.

Most of the acreage is cultivated or pastured. Erosion is the chief hazard. A 2- to 4-year crop rotation in which close-growing crops are grown half the time is needed. A water-disposal system of terraces and grassed waterways, along with contour tillage and crop residue on or near the surface, help in controlling erosion. Rotation grazing of pastures helps keep a good ground cover. Capability unit IIe-3; woodland group 4o1.

Mecklenburg sandy loam, 6 to 10 percent slopes (MkC).—This soil is on the sides of broad ridges along drainageways. A few galled areas have formed.

Included with this soil in mapping are small areas of Cecil, Hiwassee, Enon, and Wilkes soils; small areas where the surface layer is sandy clay loam or clay loam; small areas where slopes are 2 to 6 percent; and a few small areas where slopes are 10 to 15 percent.

This Mecklenburg soil is fairly easy to keep in good tilth, except in galled areas. It can be worked without clodding within a medium range of moisture content.

Most of the acreage is forested or pastured. Erosion is the chief hazard. A long-term crop rotation in which close-growing crops are grown two-thirds of the time is needed. A water-disposal system of terraces and grassed waterways along with contour tillage and crop residue on or near the surface help control erosion. Rotation grazing of pastures helps keep a good ground cover. Capability unit IIIe-3; woodland group 4o1.

Pacolet Series

Soils of the Pacolet series are strongly sloping to steep, moderately deep over weathered rock material, and well drained. They formed in material weathered from granite, gneiss, or schist.

In a representative profile the surface layer is dark-brown sandy loam 5 inches thick. The upper 22 inches of the subsoil is red clay loam mottled with reddish yellow in the lower part. The lower 9 inches is red sandy clay loam mottled with reddish yellow. The underlying material, to a depth of 53 inches, is mottled, weathered gneiss that crushes to sandy clay loam.

Pacolet soils are near Cecil, Hiwassee, Enon, Madison, Louisburg, and Wilkes soils. They are not so deep as Cecil and Hiwassee soils and not so plastic as Enon soils. Pacolet soils lack the common to many mica flakes that are typical of Madison soils, and they are deeper than Louisburg and Wilkes soils.

Permeability is moderate, and available water capacity is medium.

The native vegetation was oak, hickory, and pine trees and an understory of vines, shrubs, briers, and grasses.

Representative profile of Pacolet sandy loam, in Laurens County, in an area of Madison and Pacolet soils, 15 to 40 percent slopes, about 2 miles northeast of Friendship Church, 25 feet north of County Road 25, where the slope is 19 percent:

Ap—0 to 5 inches, dark-brown (10YR 4/3) sandy loam; weak, fine, granular structure; very friable; many fine roots; few fine quartz pebbles; strongly acid, pH 5.1; abrupt, smooth boundary.

B21t—5 to 13 inches, red (2.5YR 4/8) clay loam; moderate, medium, subangular blocky structure; friable; common, fine and few medium roots; few fine mica flakes; thin continuous clay films on faces of peds; strongly acid, pH 5.4; gradual, smooth boundary.

B22t—13 to 27 inches, red (2.5YR 4/6) clay loam; few, fine, faint reddish-yellow mottles; moderate, medium, subangular blocky structure; firm; few medium roots; few fine mica flakes; continuous clay films on faces of peds; strongly acid, pH 5.2; clear, smooth boundary.

B3t—27 to 36 inches, red (2.5YR 5/6) sandy clay loam; few, fine, faint reddish-yellow mottles; weak, fine and medium, subangular blocky structure; firm; few fine mica flakes; fragments of partially weathered gneiss; strongly acid, pH 5.2; clear, wavy boundary.

C—36 to 53 inches, red (2.5YR 5/6) and reddish-yellow (5YR 7/8 and 7.5YR 6/8) weathered gneiss that crushes to sandy clay loam; structureless; friable; strongly acid, pH 5.3.

The A horizon is dark brown, yellowish red, or reddish yellow. The B horizon is yellowish red to red sandy clay loam, clay loam, or clay. In most places the B horizon contains few fine mica flakes. In some places it contains few to common fragments of feldspar. The C horizon is weathered granite, gneiss, schist, or pegmatite. The solum ranges from about 22 to 40 inches in thickness. Reaction throughout ranges from strongly acid to very strongly acid.

Pacolet sandy clay loam, 10 to 15 percent slopes, eroded (PaD2).—This soil has a profile similar to the one described as representative of the series, but the surface layer is yellowish-red sandy clay loam. This soil is on eroded, short areas adjacent to streams. Rills, galled areas, and shallow gullies are common.

Included with this soil in mapping are small areas of Cecil, Hiwassee, Enon, Madison, and Wilkes soils; small areas that have a dark-red subsoil; 1- to 4-acre tracts where slopes are 6 to 10 percent; and others where they are 15 to 25 percent.

Maintaining good tilth is difficult. It is not practical to disturb the surface layer of this soil because the erosion hazard is severe.

Most of the acreage is pine forest. Erosion is the chief hazard. Rotation grazing of pastures helps keep a good ground cover. Capability unit VIe-1; woodland group 4c2e.

Toccoa Series

Soils of the Toccoa series are nearly level and well drained. They formed in thick loamy alluvium. They are subject to flooding for short periods.

In a representative profile the surface layer is brown sandy loam 8 inches thick. The underlying material is about 23 inches of yellowish-red sandy loam, 12 inches of reddish-brown sandy loam mottled with pale brown, and 9 inches of stratified reddish-brown loamy sand.

Toccoa soils are near Buncombe, Cartecay, Chewacla, Enoree, and Wehadkee soils. They are not so sandy as Buncombe soils and are better drained than Cartecay, Enoree, and Wehadkee soils.

Toccoa soils are medium in organic-matter content. Permeability is moderately rapid, and available water capacity is low to medium.

The native vegetation was mixed hardwoods and an understory of vines, shrubs, briers, canes, and grasses.

The Toccoa soils in these counties are mapped with Cartecay soils.

Representative profile of Toccoa sandy loam, in Laurens County, in an area of Cartecay-Toccoa complex in an improved pasture 3 miles west of Lanford Station, 150 yards west of County Road 399 near the center of a 1.5 percent slope:

Ap—0 to 8 inches, brown (7.5YR 5/4) sandy loam; weak, fine, granular structure; very friable; many fine roots; few fine mica flakes; few fine quartz pebbles; medium acid, pH 6.0; abrupt, smooth boundary.

C1—8 to 18 inches, yellowish-red (5YR 5/8) sandy loam; structureless and stratified; very friable; common fine roots at top of horizon, decreasing to few with increasing depth; few fine mica flakes; medium acid, pH 6.0; gradual, smooth boundary.

C2—18 to 31 inches, yellowish-red (5YR 4/6) sandy loam; structureless and stratified; very friable; many fine mica flakes; medium acid, pH 5.6; clear, smooth boundary.

C3—31 to 43 inches, reddish-brown (5YR 4/4) sandy loam; few, fine, distinct, pale-brown mottles; structureless and stratified; very friable; common fine mica flakes; medium acid, pH 5.6; clear, smooth boundary.

C4—43 to 52 inches, reddish-brown (5YR 4/4) loamy sand that has pockets of sandy loam; few, fine, distinct, light yellowish-brown mottles; structureless and stratified; very friable; many fine mica flakes; medium acid, pH 5.7.

The surface layer is dark reddish brown, reddish brown, or brown. Stratification of sandy and silty bedding planes of contrasting texture is evident throughout the soil. Content of mica and other weatherable minerals ranges from few to many in all horizons. The average content of clay between depths of 10 and 40 inches is 8 to 18 percent. The upper 40 inches of the soil is typically yellowish red to reddish brown. Below a depth of 40 inches the soil is typically mottled with yellow or brown. Reaction throughout ranges from medium acid to very strongly acid.

Vance Series

Soils of the Vance series are gently sloping to sloping, deep to moderately deep over weathered rock material, and well drained. They formed in material weathered from granite and gneiss.

In a representative profile the surface layer is grayish-brown sandy loam 6 inches thick. The subsoil, in sequence from the top, is 11 inches of very firm, yellowish-brown clay mottled with yellowish red; 14 inches of very firm, strong-brown clay mottled with yellowish red and pale brown; and 9 inches of firm, brownish-yellow clay loam mottled with red and pale brown. The underlying material, to a depth of 55 inches, is firm mottled brownish-yellow, very pale brown, red, and white weathered gneiss that crushes to sandy clay loam.

Vance soils are near Appling, Cataula, Cecil, and Colfax soils. They have a firmer subsoil than Appling soils. Vance soils are not so red as Cataula soils and do not have a fragipan. They are firmer than Cecil soils and do not have a red subsoil. They are better drained than Colfax soils.

Permeability is slow and available water capacity is medium.

The native vegetation was oak, elm, hickory, and some pine and an understory of vines, shrubs, briers, and grasses.

Representative profile of Vance sandy loam, 2 to 6 percent slopes, in Laurens County, 2 miles northwest of Joanna, 30 feet north of U.S. Highway 76 near the center of a 4 percent slope:

Ap—0 to 6 inches, grayish-brown (10YR 5/2) sandy loam; weak, fine, granular structure; very friable; many fine roots; few small quartz pebbles; few fine pores; medium acid, pH 5.8; abrupt, smooth boundary.

B21t—6 to 17 inches, yellowish-brown (10YR 5/8) clay; few, fine, distinct, yellowish-red mottles; moderate, medium, angular blocky structure; very firm, hard, plastic and sticky; thin, nearly continuous clay films on faces of peds; strongly acid, pH 5.5; gradual, smooth boundary.

B22t—17 to 31 inches, strong-brown (7.5YR 5/8) clay; common, fine, distinct, yellowish-red mottles and few, fine, distinct, pale-brown mottles; strong, medium and coarse, angular blocky structure; very firm, hard, plastic and sticky; few fine mica flakes; few fine pores; continuous clay films on faces of peds; strongly acid, pH 5.3; clear, smooth boundary.

B3t—31 to 40 inches, brownish-yellow (10YR 6/8) clay loam; common, fine and medium, distinct, red mottles and common, fine, distinct, pale-brown mottles; weak, fine and medium, angular blocky structure; firm, hard, plastic and sticky; few fine pores; few fine mica flakes; patchy clay films on faces of peds; strongly acid, pH 5.1; clear, wavy boundary.

C—40 to 55 inches, mottled brownish-yellow (10YR 6/8), very pale brown (10YR 7/3), red (2.5YR 5/8), and white (10YR 8/2) weathered gneiss; when crushed breaks to sandy clay loam; structureless; firm; few fine mica flakes; very strongly acid, pH 5.0.

The A horizon is grayish brown, brown, or yellowish brown. The Bt horizon is brownish yellow, yellowish brown, strong brown, or reddish yellow. Red, brown, and yellowish mottles are common throughout the Bt horizon. The lower part of the Bt horizon has pale-brown or white streaks and mottles in some profiles. The solum ranges from 36 to 45 inches in thickness. Reaction throughout ranges from medium acid to very strongly acid.

Vance sandy loam, 2 to 6 percent slopes (VaB).—This soil is on broad ridges. Included in mapping are small areas of Appling, Cataula, Cecil, and Colfax soils and small areas where slopes are 6 to 10 percent.

This Vance soil is easy to keep in good tilth. It is slower to warm early in spring than surrounding soils.

Most of the acreage is pastured or cultivated. Erosion is the chief hazard. A crop rotation lasting 2 to 4 years in which close-growing crops are grown half the time is needed. A water-disposal system of terraces and grassed waterways along with contour tillage and crop residue on or near the surface help control erosion. Rotation grazing helps keep a good ground cover. Capability unit IIe-3; woodland group 3o7.

Vance sandy loam, 6 to 10 percent slopes (VaC).—This soil is on irregularly shaped medium to narrow ridges and side slopes adjacent to drainageways. Included in mapping are small areas of Cataula, Cecil, and Appling soils and small areas where slopes are 2 to 6 percent.

This Vance soil is easy to keep in good tilth. It is slower to warm up in spring than surrounding soils.

Most of the acreage is pastured or cultivated. Erosion is the chief hazard. A crop rotation in which close-growing crops are grown two-thirds of the time is needed. A water-disposal system of terraces and grassed waterways along with contour tillage and crop residue on or near the surface help control erosion. Rotation grazing helps protect ground cover in pastures. Capability unit IIIe-3; woodland group 3o7.

Wehadkee Series

Soils of the Wehadkee series are nearly level and poorly drained. They formed in loamy sediments washed from soils that formed in material weathered from granite, gneiss, schist, and other rock.

In a representative profile the surface layer is about 7 inches of grayish-brown loam mottled with dark gray. The upper 11 inches of the subsoil is gray loam mottled with brownish yellow, and the lower 23 inches is gray sandy clay loam mottled with yellowish brown. The underlying material, to a depth of 56 inches, is stratified gray sandy loam mottled with yellowish brown and pale brown.

Wehadkee soils are near Buncombe, Cartecay, Chewacla, Enoree, and Toccoa soils. They are not so well drained as Buncombe, Cartecay, Chewacla, and Toccoa soils. They are less stratified in the upper part of the subsoil than Enoree soils.

Wehadkee soils are inherently wet. Their organic-matter content is medium. Permeability is moderate, and available water capacity is high.

The native trees were gum, water oak, ash, elm, and alder; the understory consisted of vines, briers, and wetland grasses.

Representative profile of Wehadkee loam in Union County, in an area of Wehadkee-Chewacla complex, 200 feet north of Sugar Creek and 150 feet west of Fairforest Creek near the center of a nearly level wooded area:

Ap—0 to 7 inches, grayish-brown (10YR 5/2) loam; few, fine, distinct, dark-gray mottles; weak, fine, granular structure; friable; many fine roots; few fine mica flakes; medium acid, pH 5.8; abrupt, smooth boundary.

Blg—7 to 18 inches, gray (10YR 5/1) loam; common, medium, distinct, brownish-yellow (10YR 6/6) mottles; weak, medium, subangular blocky structure; friable; many fine roots; few coarse sand grains; common fine mica flakes; medium acid, pH 5.8; clear, smooth boundary.

B2g—18 to 41 inches, gray (10YR 5/1) sandy clay loam; few, fine, distinct, yellowish-brown mottles; weak, medium, subangular blocky structure; friable; common mica flakes; medium acid, pH 5.7; clear, smooth boundary.

Cg—41 to 56 inches, gray (10YR 6/1) sandy loam; common, medium, distinct, yellowish-brown (10YR 5/6) and few, fine, faint, pale-brown mottles; structureless; evidence of stratification; friable; many fine mica flakes; medium acid, pH 5.6.

The A horizon is very dark grayish brown, dark grayish brown, grayish brown, dark brown, or brown mottled with gray. In areas of recent deposition, it is mottled with reddish gray or reddish brown. The B horizon is gray mottled with brown and yellow. It is loam, clay loam, silty clay loam, or sandy clay loam. The clay content of this horizon ranges from 18 to 30 percent. The C horizon is sandy loam or is stratified with sand, silt, clay, and gravel. Fine mica flakes range from few in the upper part of the profile to many in the lower part. Some profiles contain brown concretions. Reaction throughout ranges from slightly acid to strongly acid.

Wehadkee-Chewacla complex (Wc).—This mapping unit is 45 to 60 percent Wehadkee soils and 25 to 50 percent Chewacla soils. The Wehadkee soil has the profile described as representative of the series. The Chewacla soil is described under the heading "Chewacla Series." These soils are on the flood plains of the larger streams in Union County.

Included with these soils are small areas of Buncombe, Cartecay, Enoree, and Toccoa soils; small areas of recent deposits, 1 to 6 inches thick, where the surface layer is gravelly sandy loam; and some areas where the surface layer is fine sandy loam or silty clay loam.

In most areas tilth is poor and difficult to maintain. Most of the acreage is used for water-tolerant hardwoods. Poor drainage and flooding are hazards. The chief management need is drainage by open ditches or tile to improve the capacity for pasture. Capability unit IVw-1; woodland groups 1w9 and 1w8.

Wilkes Series

Soils of the Wilkes series are sloping to steep, shallow over weathered rock material, and well drained. They formed in material weathered from diorite, hornblende gneiss, and hornblende schist.

In a representative profile the surface layer is sandy loam about 7 inches thick. The subsoil is 5 inches of yellowish-brown sandy clay loam mottled with green and dark brown. The mottles appear to be partly weathered primary minerals. The underlying material, to a depth of 32 inches, is weathered parent rock that crushes to sandy loam. Hard bedrock is at a depth of 32 inches.

Wilkes soils are near Cataula, Cecil, Enon, Hiwassee, Mecklenburg, and Pacolet soils. They are shallower over weathered material than those soils.

Permeability is moderately slow, and available water capacity is low to very low.

The native vegetation was oak, gum, and some pine and an understory of shrubs, briers, vines, and grasses.

Representative profile of Wilkes sandy loam, 6 to 15 percent slopes, in Laurens County, in a cultivated field 3 miles west of Cold Point near the center of a 12 percent slope:

Ap—0 to 7 inches, brown (7.5YR 5/4) sandy loam; weak, fine and medium, granular structure; very friable; many fine roots; many fine pores; few quartz pebbles; medium acid, pH 6.0; abrupt, smooth boundary.

B2t—7 to 12 inches, yellowish-brown (10YR 5/4) sandy clay loam; few, fine, prominent, green and common, fine, faint, dark-brown mottles that appear to be weathered primary minerals; weak, medium, subangular blocky structure; firm; few fine roots; common fine pores; few fine quartz pebbles; thin, patchy clay films on faces of peds; slightly acid, pH 6.2; clear, wavy boundary.

C—12 to 32 inches, mottled grayish-brown (10YR 5/2), yellowish-brown (10YR 5/6), and brownish-yellow (10YR 6/8), weathered rock material that crushes to sandy loam; structureless; friable; many fragments of gneiss rock; neutral, pH 6.7.

R—32 inches +, hard bedrock.

The A horizon is dark brown, grayish brown, or brown. The Bt horizon has varying colors of red, brown, and yellow or is mottled. It is sandy loam, sandy clay loam, clay loam, or clay. The subsoil is discontinuous in some areas. The C horizon varies in color and texture. Cobblestones and stones are on the surface and throughout some profiles. Rock crops out on the steeper slopes. The solum is less than 20 inches in thickness. The A horizon is medium acid to slightly acid, and the B and C horizons are slightly acid to neutral.

Wilkes sandy loam, 6 to 15 percent slopes (WkD).—This soil has the profile described as representative of the series. It is adjacent to streams.

Included with this soil in mapping are small areas of Cataula, Cecil, Hiwassee, Enon, Mecklenburg, and Pacolet soils; small areas where slopes are 15 to 40 percent; some areas that have stones on the surface and throughout the profile; and some areas where the surface layer is sandy clay loam.

Most of the acreage is wooded. Erosion, poor workability, a shallow root zone, and droughtiness are the chief management concerns. Controlling grazing to keep a good plant cover on this soil helps prevent erosion. Capability unit VIe-2; woodland group 4o1.

Wilkes soils, 15 to 40 percent slopes (WlF).—These soils have a profile similar to the one described as representative of the series, but the subsoil is shallower and is discontinuous in places and the surface layer is sandy clay loam or gravelly sandy loam in some areas. The soils are on side slopes adjacent to streams.

Included with these soils in mapping are small areas of Enon, Louisburg, and Pacolet soils; small areas where the surface layer is loamy sand or clay loam; and some areas that have stones on the surface and throughout the profile.

Most of the acreage is in hardwoods. Growth is spotty in places because the root zone varies in thickness. Erosion, poor workability, a shallow root zone, and droughtiness are the chief concerns of management. Capability unit VIIe-2; woodland group 4r2.

Worsham Series

Soils of the Worsham series are nearly level and poorly drained. They formed in material weathered from granite, gneiss, or schist, or in a mixture of colluvium and local alluvium.

In a representative profile the surface layer is grayish-brown sandy loam about 6 inches thick. The subsoil, in sequence from the top, is 8 inches of light brownish-gray sandy clay loam, 15 inches of light brownish-gray sandy clay mottled with brownish yellow, and 12 inches of gray sandy clay loam mottled with brownish yellow and very pale brown. The underlying material, between depths of 41 and 48 inches, is light-gray weathered material that is sandy loam when crushed. It is mottled with brownish yellow.

Worsham soils are near Appling, Chewacla, Colfax, Durham, and Vance soils. They are more poorly drained than any of those soils.

Worsham soils are inherently wet and are low in organic-matter content. Permeability is slow. Available water capacity is only medium, but is adequate except during periods of extreme drought.

The native vegetation was gum, elm, birch, and willows and an understory of brambles, vines, and grasses.

The Worsham soils in these counties are mapped with Chewacla soils.

Representative profile of Worsham sandy loam, in Laurens County, in an area of Chewacla and Worsham soils, 1½ miles west of Mountville, 30 feet north of State Highway 30, near the bottom of a 2 percent slope:

Ap—0 to 6 inches, grayish-brown (10YR 5/2) sandy loam; weak, fine, granular structure; very friable; many fine roots; few fine mica flakes; medium acid, pH 5.9; abrupt, smooth boundary.

B21tg—6 to 14 inches, light brownish-gray (2.5Y 6/2) sandy clay loam; moderate, medium, angular blocky structure; friable; thin, patchy clay films on faces of peds; few roots; few fine mica flakes; medium acid, pH 5.6; gradual, smooth boundary.

B22tg—14 to 29 inches, light brownish-gray (2.5Y 6/2) sandy clay; few, fine, distinct, brownish-yellow mottles; moderate, fine, angular blocky structure; firm; thin, patchy clay films on faces of peds; common fine mica flakes; strongly acid, pH 5.2; clear, smooth boundary.

B3g—29 to 41 inches, gray (5Y 6/1) sandy clay loam; few, fine, distinct, brownish-yellow mottles and few, fine, faint, very pale brown mottles; weak, medium, angular blocky structure; firm; many fine mica flakes; very strongly acid, pH 4.9; clear, wavy boundary.

Cg—41 to 48 inches, light-gray (5Y 7/1) regolith that crushes to sandy loam; common, fine, distinct, brownish-yellow mottles; structureless; firm; few fine quartz pebbles; many fine mica flakes; very strongly acid, pH 4.8.

The Ap horizon is dark grayish brown, grayish brown, or light brownish gray. The B2tg horizon is mainly sandy clay, but grades to clay loam, sandy clay loam, and clay. The B2tg color is mainly gray, but ranges to light grayish brown, grayish brown, gray, light gray, and light brownish gray with mottles in shades of yellow or brown. The regolith is light gray or gray with mottles in shades of yellow or brown. It crushes to sandy loam or sandy clay loam and contains coarse sand grains or quartz pebbles. Most profiles contain few to many mica flakes. The solum ranges from 40 to 52 inches in thickness. Reaction throughout ranges from medium acid to very strongly acid.

Use and Management of the Soils

This section has four main parts. The first part classifies the soils by capability class, subclass, and unit and briefly describes each capability unit in Laurens and Union Counties. The second part contains tables 2 and 3. Table 2 rates each mapping unit in capability classes I through IV on its suitability for certain crops, and table 3 shows the estimated average acre yields of certain crops for all the arable soils under two levels of management. The third part contains information on the suitability of soils for wildlife. The fourth part contains information on the suitability of the soils for woodland and describes the woodland suitability groups.

Capability Grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. It is a practical classification based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. The soils are classified according to degree and kind of permanent limitation, but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soils; and without consideration of possible, but unlikely, major reclamation projects.

In the capability system, all kinds of soil are grouped at three levels—the capability class, the subclass, and the unit. The eight capability classes in the broadest grouping are designated by Roman numerals I through VIII. 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 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.

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

In class I there are no subclasses, because the soils of this class have few limitations.

Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in Class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture or range, woodland, wildlife, or recreation.

Capability units are soil groups within the subclasses. The soils in one capability unit are 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 for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–1, or IVe–2, or IIIe–3. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

The capability classes, subclasses, and units in the capability system in Laurens and Union Counties are described in the list that follows. Use and management of the soils is suggested in the section "Descriptions of the Soils."

Class I. Soils have few limitations that restrict their use. (No Class I soils in Laurens and Union Counties.)

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

- Subclass IIe. Soils subject to moderate erosion unless they are protected.
  - Unit IIe–1. Deep to moderately deep, gently sloping, well-drained soils that have a sandy loam surface layer and a clay or clay loam subsoil.
  - Unit IIe–2. Deep, gently sloping, well-drained soils that have a loamy sand or sandy loam surface layer and a sandy clay loam to clay subsoil.
  - Unit IIe–3. Moderately deep to deep, gently sloping, well-drained soils that have a sandy loam surface layer and a slightly plastic to plastic clay subsoil.
  - Unit IIe–4. A moderately deep, gently sloping, moderately well drained to somewhat poorly drained soil that has a fine sandy loam surface layer and a very plastic clay subsoil.

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

- Subclass IIIe. Soils subject to severe erosion unless they are protected.
  - Unit IIIe–1. Deep to moderately deep, gently sloping eroded soils and sloping eroded and uneroded soils that are well drained and have a sandy clay loam or sandy loam surface layer and a clay or clay loam subsoil.
  - Unit IIIe–2. Deep, sloping, well-drained soils that have a loamy sand or sandy loam surface layer and a sandy clay loam to clay subsoil.
  - Unit IIIe–3. Moderately deep to deep, or moderately deep over a fragipan, gently sloping eroded soils and sloping uneroded soils that are well drained and have a sandy loam surface layer and a sandy clay loam, clay loam, or clay subsoil.
- Subclass IIIw. Soils have wetness limitations because of flooding or imperfect drainage.
  - Unit IIIw–2. Nearly level, well-drained to somewhat poorly drained soils that are subject to overflow. Texture varies.
  - Unit IIIw–3. A gently sloping, somewhat poorly drained to moderately well drained soil that has a loamy sand surface layer and a sandy loam to a sandy clay loam subsoil and is moderately deep over a fragipan.
- Subclass IIIs. Soils are severely limited by droughtiness and low fertility.
  - Unit IIIs–2. Deep, nearly level, excessively drained sandy soils on first bottoms of large streams.

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

- Subclass IVe. Soils subject to very severe erosion unless they are protected, have little subsoil development, or have a firm subsoil.
  - Unit IVe–1. Deep to moderately deep, well-drained, sloping eroded soils and strongly sloping uneroded or eroded soils that have a sandy clay loam or sandy loam surface layer and a clay loam to clay subsoil.
  - Unit IVe–2. Gently sloping to sloping, well-drained, eroded soils that have a sandy clay loam or sandy loam surface layer and a sandy clay loam, clay loam, or clay subsoil and are moderately deep over a fragipan; and strongly sloping, well-drained, moderately deep to deep soils that have a sandy loam surface layer and a plastic clay subsoil.
  - Unit IVe–3. A shallow, sloping, well-drained to excessively drained soil that has a loamy sand surface layer and a sandy clay loam subsoil.
- Subclass IVw. Soils have wetness limitations because of frequent flooding.
  - Unit IVw–1. Nearly level, poorly drained to somewhat poorly drained soils that have a loamy surface layer and a loamy subsoil. These soils are frequently flooded and have a seasonal high water table.

Class V. Soils subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture or range, woodland, or wildlife.

- Subclass Vw. Soils have severe wetness limitations because of poor drainage, frequent flooding, or both.
  - Unit Vw–1. Deep, nearly level, somewhat poorly drained soils that have a loamy surface layer and a loamy and clayey subsoil.
  - Unit Vw–2. Nearly level, poorly drained soils that are subject to frequent flooding, have a loamy surface layer, and are underlain by stratified material that is typically loamy.

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

Subclass VIe. Soils are severely limited by excess slope, erosion, little subsoil development, or a firm subsoil.

Unit VIe-1. Moderately deep to deep, strongly sloping, well-drained soils that have a sandy clay loam surface layer and a sandy clay loam, clay loam, or clay subsoil.

Unit VIe-2. Shallow, sloping, well-drained soils that have a sandy loam surface layer and a sandy clay loam, clay loam, or clay subsoil.

Unit VIe-3. Sloping, well-drained soils that have a sandy clay loam surface layer and a sandy clay loam or a clay loam to clay subsoil and are moderately deep over a fragipan; and strongly sloping to moderately steep, moderately deep, well-drained soils that have a sandy loam surface layer and a plastic clay subsoil.

Subclass VIs. Soils are severely limited by excess stoniness.

Unit VIs-1. Moderately deep, gently sloping, moderately well drained to somewhat poorly drained soils that have a stony loam surface layer and a very plastic clay subsoil.

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

Subclass VIIe. Soils are severely limited by steep slopes, little subsoil development, or both.

Unit VIIe-1. Moderately deep to deep, steep to moderately steep, well-drained soils that typically have a sandy loam surface layer and a clay loam or clay subsoil. In some places the surface layer is sandy clay loam or stony loam.

Unit VIIe-2. Shallow, strongly sloping to deep, well-drained to excessively drained soils that have a loamy sand surface layer or a variable-textured surface layer and a variable-textured, discontinuous subsoil.

Class VIII. Soils and landforms have limitations that preclude their use for commercial crop production and restrict their use to recreation, wildlife, or water supply, or to use for esthetic purposes. (No Class VIII soils in Laurens and Union Counties.)

Suitability of the Soils for Crops

Table 2 rates the suitability of soils for stated crops. A rating of *1* indicates that the soil is well suited to the stated crop; hazards are few, intensive management is unnecessary, and favorable yields are likely. A rating of *2* indicates that the soil is fairly well suited; use of the soil is limited by excessive moisture, too little moisture, a shallow root zone, low fertility, or some other limitation. A rating of *3* indicates that the soil is not well suited; favorable yields are unlikely unless intensive management is practiced. In general this management is not economically feasible. A rating of *4* indicates that the soil is poorly suited to the stated crop, and that growing the crop on this soil is not practical.

Estimated Yields

Table 3 gives estimated average acre yields of principal crops grown under two levels of management in Laurens and Union Counties. The yields in columns A are average yields obtained through management that is prevalent in these counties. The yields in columns B are to be expected under improved management.

The estimates in columns A are based largely on observations by members of the soil survey party, on information obtained by interviewing farmers and other agricultural workers who have had experience with the soils and crops of these counties, and on comparison with crop yields obtained from similar soils in other counties in South Carolina.

The practices used in improved management vary according to the soils. The following practices are necessary for obtaining the yields in columns B: (1) proper choice and rotation of crops; (2) correct use of commercial fertilizer, lime, and manure; (3) correct method of tillage; (4) proper use of herbicide and pesticide; (5) return of organic matter to the soil; (6) adequate water control; (7) maintenance or improvement of workability of the soil; and (8) conservation of soil material, plant nutrients, and soil moisture.

The response of a soil to management can be measured in part by comparing yields in columns B with those in columns A. Higher yields can be obtained from nearly all soils in these counties through improved management.

Wildlife [4]

The wildlife population of any area depends upon the availability of food, cover, and water in a suitable combination. Habitat is created, improved, or maintained by establishing desirable vegetation and developing water supplies in suitable places.

Table 4 rates each of the soils in Laurens and Union Counties according to its suitability for three classes of wildlife. These ratings refer only to the suitability of the soil and do not take into account climate, present use of the soil, or the distribution of wildlife and human populations. The suitability of individual sites has to be determined by onsite inspection.

A rating of *Well suited* in table 4 means that habitat is, in general, easily created, improved, or maintained; that the soil has few or no limitations that affect management; and that satisfactory results can be expected. *Suited* means that habitat can be created, improved, or maintained in most places; that the soil has moderate limitations that affect management; and that moderate intensity of management and fairly frequent attention may be required for satisfactory results. *Poorly suited* indicates that habitat can be created, improved, or maintained in most places; that the soil has rather severe limitations; that habitat management is difficult and expensive and requires intensive effort; and that results are not always satisfactory. *Unsuited* indicates that it is impractical or perhaps impossible to create, improve, or maintain habitat, and that unsatisfactory results are probable.

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[4] By William W. Neely, biologist, Soil Conservation Service.

TABLE 2.—*Suitability for stated crops of soils in capability classes I through IV*

[Numeral 1 means well suited; 2 fairly well suited; 3 not well suited; and 4 poorly suited]

Soil	Cotton	Corn	Soybeans	Grain sorghum	Oats	Wheat	Pasture: Summer bermudagrass	Pasture: Winter fescue and white clover
Appling loamy sand, 2 to 6 percent slopes	1	1	1	1	1	1	1	2
Appling loamy sand, 6 to 10 percent slopes	2	2	2	2	2	2	2	3
Buncombe sand	4	4	4	4	4	4	3	4
Cartecay-Toccoa complex	4	2	4	2	4	4	1	1
Cataula sandy loam, 2 to 6 percent slopes, eroded	2	3	3	3	3	3	2	2
Cataula sandy loam, 6 to 10 percent slopes, eroded	4	3	3	3	3	3	2	2
Cataula sandy clay loam, 2 to 6 percent slopes, eroded	4	3	3	3	3	3	2	2
Cecil sandy loam, 2 to 6 percent slopes	1	1	1	1	1	1	1	1
Cecil sandy loam, 6 to 10 percent slopes, eroded	2	2	2	2	2	2	2	2
Cecil sandy loam, 10 to 15 percent slopes	4	4	4	4	3	3	2	2
Cecil sandy clay loam, 2 to 6 percent slopes, eroded	2	2	2	2	2	2	2	2
Cecil sandy clay loam, 6 to 10 percent slopes, eroded	4	4	4	4	3	3	2	2
Chewacla loam	4	2	4	2	4	4	1	1
Colfax loamy sand, 1 to 4 percent slopes	3	2	3	2	2	2	2	2
Durham loamy sand, 2 to 6 percent slopes	1	1	1	1	1	1	1	2
Durham sandy loam, 2 to 6 percent slopes	1	1	1	1	1	1	1	2
Durham sandy loam, 6 to 10 percent slopes	2	2	2	2	2	2	2	3
Enon sandy loam, 2 to 6 percent slopes	2	2	2	2	2	2	1	1
Enon sandy loam, 6 to 10 percent slopes	2	3	3	3	3	3	2	2
Enon sandy loam, 10 to 15 percent slopes	4	3	3	3	3	3	2	2
Hiwassee sandy loam, 2 to 6 percent slopes	1	1	1	1	1	1	1	1
Hiwassee sandy loam, 6 to 10 percent slopes, eroded	2	2	2	2	2	2	2	2
Hiwassee sandy loam, 10 to 15 percent slopes, eroded	4	4	4	4	3	3	2	2
Hiwassee sandy clay loam, 2 to 6 percent slopes, eroded	2	2	2	2	2	2	2	2
Hiwassee sandy clay loam, 6 to 10 percent slopes, eroded	4	4	4	4	3	3	2	2
Iredell fine sandy loam, 2 to 6 percent slopes	1	1	1	2	2	2	1	1
Louisburg loamy sand, 6 to 10 percent slopes	3	4	3	4	3	3	2	2
Madison sandy loam, 2 to 6 percent slopes	1	1	1	1	1	1	1	1
Madison sandy loam, 6 to 10 percent slopes	2	2	2	2	2	2	2	2
Madison sandy loam, 10 to 15 percent slopes	4	4	4	4	3	3	2	2
Madison sandy clay loam, 2 to 6 percent slopes, eroded	2	2	2	2	2	2	2	2
Madison sandy clay loam, 6 to 10 percent slopes, eroded	4	4	4	4	3	3	2	2
Mecklenburg sandy loam, 2 to 6 percent slopes	2	2	2	2	2	2	1	1
Mecklenburg sandy loam, 6 to 10 percent slopes	2	3	3	3	3	3	2	2
Vance sandy loam, 2 to 6 percent slopes	2	2	2	2	2	2	1	1
Vance sandy loam, 6 to 10 percent slopes	2	3	3	3	3	3	2	2
Wehadkee-Chewacla complex	4	3	4	4	4	4	3	3

Openland wildlife are quail, dove, cottontail rabbit, fox, meadowlark, field sparrow, and other birds and mammals that normally live on cropland, pasture, meadow, lawn, and in other openland areas where grasses, herbs, and shrubby plants grow. Factors that affect the suitability rating of a soil for openland wildlife are suitability of the soil for grain and seed crops, grasses and legumes, and wild herbaceous upland plants. In general, the greater the slope or erosion, the less suitable a soil is for openland wildlife.

Woodland wildlife are squirrel, woodcock, thrush, vireo, deer, raccoon, wild turkey, and other birds and mammals that normally live in areas wooded with shrubs, hardwood trees, and coniferous trees. The ratings assume that the better a soil is suited to hardwood trees, hardwood woody plants, and wild herbaceous plants, the better it is suited to woodland wildlife species. Slope has little to do with the suitability of the soil for this kind of wildlife. For example, a soil that produces vigorous growth in pines may be rated low in suitability for woodland wildlife.

Wetland wildlife are ducks, geese, rail, heron, shore birds, mink, and other birds and mammals that normally live in wet areas, marshes, and swamps. Suitability of a soil for shallow water development and for growth of wetland food and cover plants are the main factors used in judging the suitability of the soil for wetland wildlife.

Woodland [5]

Seventy percent of Laurens and Union Counties is woodland. Approximately 85 percent of this acreage is privately owned and 15 percent is publicly owned.

Classified by forest type, about 50 percent of the woodland is loblolly-shortleaf pine; 15 percent is oak-pine; 30 percent is oak-hickory; and 5 percent is elm-ash-cottonwood.

In 1967, the net growth of sawtimber and growing stock exceeded the amount removed (*3*).

[5] By GEORGE E. SMITH, JR., woodland conservationist, Soil Conservation Service.

TABLE 3.—*Estimated average yields per acre of*

[Figures in columns A indicate yields obtained under common management; those in columns B are yields to be expected under highest

Soil	Cotton		Corn		Soybeans	
	A	B	A	B	A	B
	Lb. of lint	*Lb. of lint*	*Bu.*	*Bu.*	*Bu.*	*Bu.*
Appling loamy sand, 2 to 6 percent slopes	450	700	60	75	20	35
Appling loamy sand, 6 to 10 percent slopes	350	450	50	70	15	25
Buncombe sand						
Cartecay-Toccoa complex			50	72		
Cataula sandy loam, 2 to 6 percent slopes, eroded	300	450	20	40	10	22
Cataula sandy loam, 6 to 10 percent slopes, eroded			18	35	10	22
Cataula sandy clay loam, 2 to 6 percent slopes, eroded			15	30	10	22
Cataula sandy clay loam, 6 to 10 percent slopes, eroded						
Cecil sandy loam, 2 to 6 percent slopes	500	700	60	80	25	40
Cecil sandy loam, 6 to 10 percent slopes, eroded	350	450	35	65	18	28
Cecil sandy loam, 10 to 15 percent slopes						
Cecil sandy clay loam, 2 to 6 percent slopes, eroded	250	450	30	55	20	30
Cecil sandy clay loam, 6 to 10 percent slopes, eroded						
Chewacla loam			40	70		
Chewacla and Worsham soils						
Colfax loamy sand, 1 to 4 percent slopes	200	325	30	55	12	23
Durham loamy sand, 2 to 6 percent slopes	450	700	60	75	20	35
Durham sandy loam, 2 to 6 percent slopes	450	700	60	75	20	35
Durham sandy loam, 6 to 10 percent slopes	350	450	50	70	15	25
Enon sandy loam, 2 to 6 percent slopes	300	425	25	60	15	28
Enon sandy loam, 6 to 10 percent slopes	200	425	17	45	10	22
Enon sandy loam, 10 to 15 percent slopes			15	30	10	22
Enon sandy loam, 15 to 25 percent slopes						
Enoree soils						
Hiwassee sandy loam, 2 to 6 percent slopes	500	700	60	80	25	40
Hiwassee sandy loam, 6 to 10 percent slopes, eroded	350	450	35	65	18	28
Hiwassee sandy loam, 10 to 15 percent slopes, eroded						
Hiwassee sandy clay loam, 2 to 6 percent slopes, eroded	250	450	30	55	20	30
Hiwassee sandy clay loam, 6 to 10 percent slopes, eroded						
Hiwassee sandy clay loam, 10 to 15 percent slopes, eroded						
Iredell fine sandy loam, 2 to 6 percent slopes	350	600	50	80	20	35
Iredell stony loam, 2 to 6 percent slopes						
Louisburg loamy sand, 6 to 10 percent slopes	200	350			15	23
Madison sandy loam, 2 to 6 percent slopes	500	700	60	80	25	40
Madison sandy loam, 6 to 10 percent slopes	350	450	35	65	18	28
Madison sandy loam, 10 to 15 percent slopes						
Madison sandy clay loam, 2 to 6 percent slopes, eroded	250	450	30	55	20	28
Madison sandy clay loam, 6 to 10 percent slopes, eroded						
Madison sandy clay loam, 10 to 15 percent slopes, eroded						
Mecklenburg sandy loam, 2 to 6 percent slopes	300	425	25	60	15	28
Mecklenburg sandy loam, 6 to 10 percent slopes	200	425	17	45	10	22
Pacolet sandy clay loam, 10 to 15 percent slopes, eroded						
Vance sandy loam, 2 to 6 percent slopes	300	425	25	60	15	28
Vance sandy loam, 6 to 10 percent slopes	200	425	17	45	10	22
Wehadkee-Chewacla complex						
Wilkes sandy loam, 6 to 15 percent slopes						

[1] Cow-acre-days is a term used to express the carrying capacity of pasture. It is the number of animal units carried per acre multiplied days of grazing for two cows has a carrying capacity of 60 cow-acre-days.

principal crops under two levels of management

feasible management. Dash indicates crop is not commonly grown or is not suited to the soil specified. Only arable soils are listed]

Grain sorghum		Oats		Wheat		Fescue and white clover for winter pasture		Bermudagrass for summer pasture	
A	B	A	B	A	B	A	B	A	B
Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]	*Cow-acre-days* [1]	*Cow-acre-days* [1]
45	65	50	75	25	40	120	165	135	175
30	55	35	65	22	37	100	130	100	150
---	---	---	---	---	---	---	---	75	110
35	55	---	---	---	---	140	190	150	200
20	35	20	40	15	25	120	160	120	165
20	35	20	35	15	20	100	160	100	160
15	25	20	33	10	22	100	150	100	155
---	---	---	---	---	---	---	---	90	110
45	70	50	75	25	50	135	185	135	185
20	55	45	60	20	35	110	160	110	160
---	---	30	45	15	28	80	150	80	150
30	50	35	60	18	30	110	150	110	150
---	---	20	35	15	22	100	145	100	145
25	50	---	---	---	---	140	190	140	190
---	---	---	---	---	---	90	110	100	125
35	52	35	55	15	35	115	155	115	165
45	65	50	75	25	40	120	165	135	175
45	65	50	75	25	40	120	165	135	175
30	55	35	65	22	37	100	130	100	140
25	50	22	55	18	35	100	185	100	180
18	30	18	38	15	25	90	165	90	165
15	30	15	30	10	22	80	145	80	155
---	---	---	---	---	---	---	---	60	120
---	---	---	---	---	---	---	---	35	100
45	70	50	75	25	50	135	185	135	185
20	55	45	60	20	35	110	160	110	160
---	---	30	45	15	28	80	150	80	150
30	50	35	60	18	30	110	150	110	150
---	---	20	35	15	22	100	145	100	145
---	---	---	---	---	---	70	100	70	100
28	50	35	65	18	28	115	190	115	190
---	---	---	---	---	---	50	125	50	125
---	---	25	40	10	25	90	145	90	145
45	70	50	75	25	50	135	185	135	185
20	55	45	60	20	35	110	160	110	160
---	---	30	45	15	28	80	150	80	150
30	50	35	60	18	30	110	150	110	150
---	---	20	35	15	22	100	145	100	145
---	---	---	---	---	---	50	90	50	90
25	50	22	55	18	35	100	185	100	180
18	30	18	38	15	25	90	165	90	165
---	---	---	---	---	---	50	110	50	110
25	50	22	55	18	35	100	185	100	180
18	30	18	38	15	25	90	165	90	165
---	---	---	---	---	---	50	110	60	120
---	---	---	---	---	---	90	125	75	110

by the number of days the pasture is grazed during a single grazing season without injury to the sod. An acre of pasture that provides 30

TABLE 4.—*Suitability of soils for wildlife*

Soil	Openland wildlife	Woodland wildlife	Wetland wildlife
Appling loamy sand, 2 to 6 percent slopes	Suited	Well suited	Unsuited.
Appling loamy sand, 6 to 10 percent slopes	Suited	Suited	Unsuited.
Buncombe sand	Unsuited	Unsuited	Unsuited.
Cartecay-Toccoa complex	Unsuited	Suited	Suited.
Cataula sandy loam, 2 to 6 percent slopes, eroded	Suited	Well suited	Unsuited.
Cataula sandy loam, 6 to 10 percent slopes, eroded	Poorly suited	Suited	Unsuited.
Cataula sandy clay loam, 2 to 6 percent slopes, eroded	Poorly suited	Suited	Unsuited.
Cataula sandy clay loam, 6 to 10 percent slopes, eroded	Poorly suited	Suited	Unsuited.
Cecil sandy loam, 2 to 6 percent slopes	Suited	Well suited	Unsuited.
Cecil sandy loam, 6 to 10 percent slopes, eroded	Suited	Suited	Unsuited.
Cecil sandy loam, 10 to 15 percent slopes	Poorly suited	Suited	Unsuited.
Cecil sandy clay loam, 2 to 6 percent slopes, eroded	Suited	Suited	Unsuited.
Cecil sandy clay loam, 6 to 10 percent slopes, eroded	Poorly suited	Suited	Unsuited.
Chewacla loam	Unsuited	Well suited	Suited.
Chewacla and Worsham soils	Unsuited	Well suited	Suited.
Colfax loamy sand, 1 to 4 percent slopes	Unsuited	Suited	Unsuited.
Durham loamy sand, 2 to 6 percent slopes	Suited	Well suited	Unsuited.
Durham sandy loam, 2 to 6 percent slopes	Suited	Well suited	Unsuited.
Durham sandy loam, 6 to 10 percent slopes	Poorly suited	Suited	Unsuited.
Enon sandy loam, 2 to 6 percent slopes	Suited	Well suited	Unsuited.
Enon sandy loam, 6 to 10 percent slopes	Poorly suited	Suited	Unsuited.
Enon sandy loam, 10 to 15 percent slopes	Poorly suited	Suited	Unsuited.
Enon sandy loam, 15 to 25 percent slopes	Unsuited	Poorly suited	Unsuited.
Enoree soils	Unsuited	Well suited	Suited.
Gullied land-Pacolet soils complex	Unsuited	Unsuited	Unsuited.
Hiwassee sandy loam, 2 to 6 percent slopes	Suited	Well suited	Unsuited.
Hiwassee sandy loam, 6 to 10 percent slopes, eroded	Suited	Suited	Unsuited.
Hiwassee sandy loam, 10 to 15 percent slopes, eroded	Poorly suited	Suited	Unsuited.
Hiwassee sandy clay loam, 2 to 6 percent slopes, eroded	Suited	Suited	Unsuited.
Hiwassee sandy clay loam, 6 to 10 percent slopes, eroded	Poorly suited	Suited	Unsuited.
Hiwassee sandy clay loam, 10 to 15 percent slopes, eroded	Unsuited	Suited	Unsuited.
Iredell fine sandy loam, 2 to 6 percent slopes	Suited	Suited	Unsuited.
Iredell stony loam, 2 to 6 percent slopes	Unsuited	Poorly suited	Unsuited.
Louisburg loamy sand, 6 to 10 percent slopes	Unsuited	Poorly suited	Unsuited.
Louisburg loamy sand, 10 to 40 percent slopes	Unsuited	Unsuited	Unsuited.
Madison sandy loam, 2 to 6 percent slopes	Suited	Well suited	Unsuited.
Madison sandy loam, 6 to 10 percent slopes	Suited	Suited	Unsuited.
Madison sandy loam, 10 to 15 percent slopes	Poorly suited	Suited	Unsuited.
Madison sandy clay loam, 2 to 6 percent slopes, eroded	Suited	Suited	Unsuited.
Madison sandy clay loam, 6 to 10 percent slopes, eroded	Poorly suited	Suited	Unsuited.
Madison sandy clay loam, 10 to 15 percent slopes, eroded	Unsuited	Suited	Unsuited.
Madison and Pacolet soils, 15 to 40 percent slopes	Unsuited	Suited	Unsuited.
Mecklenburg sandy loam, 2 to 6 percent slopes	Suited	Well suited	Unsuited.
Mecklenburg sandy loam, 6 to 10 percent slopes	Poorly suited	Suited	Unsuited.
Pacolet sandy clay loam, 10 to 15 percent slopes, eroded	Unsuited	Suited	Unsuited.
Vance sandy loam, 2 to 6 percent slopes	Suited	Well suited	Unsuited.
Vance sandy loam, 6 to 10 percent slopes	Poorly suited	Suited	Unsuited.
Wehadkee-Chewacla complex	Unsuited	Well suited	Suited.
Wilkes sandy loam, 6 to 15 percent slopes	Unsuited	Poorly suited	Unsuited.
Wilkes soils, 15 to 40 percent slopes	Unsuited	Unsuited	Unsuited.

Table 5 includes some evaluations for individual soils. The soil series listed in column one are those defined according to the current soil classification system. Erosion, slope, and texture phase within a soil series are not shown, except where differences in productivity, species suitability, or management problems exist.

Column two lists some commercially important tree species that are suited to the soils listed in column one. These are the species that woodland managers generally favor in intermediate or improvement cuttings, after considering the form and vigor of individual trees. Priority among species will be influenced by local marketability and the owner's objectives, as well as the quality of wood products from a given species.

Column three indicates the average site index for the most important species. The standard deviation is shown as a plus or minus (±) for each species where five or more plots were taken on the soils listed in column one. Site index is the average height of dominant trees at age 30 for cottonwood, age 35 for sycamore, and age 50 for all other species.

Column four evaluates the potential erosion hazard of the soil in woodland use after cutting, or where the soil is exposed along roads, trails, firebreaks, or logyards. *Slight* indicates that erosion is not important. *Moderate* indicates that some attention must be given to prevent unnecessary erosion. *Severe* indicates that intensive treatment, special equipment, or special methods of operation should be planned to minimize soil erosion. The potential erosion hazard is based on slope, soil depth, erodibility, and soil-loss tolerance.

TABLE 5.—*Wood crops and factors in management*

Soil	Potential productivity		Management problems			Species suitable for planting [3]	Woodland group
	Tree species [1]	Average site index [2] and standard deviation	Erosion hazard	Equipment restriction	Seedling mortality		
Appling: ApB, ApC.	Black oak Eastern white pine *Loblolly pine* Longleaf pine Shortleaf pine Scarlet oak Southern red oak Virginia pine White oak Yellow-poplar	70 80 81±7 71 65±6 68 76 74±7 71 90	Slight	Slight	Slight	Eastern redcedar, eastern white pine, loblolly pine, slash pine, yellow-poplar.	3o7.
Buncombe: Bu.	*Eastern cottonwood* Sycamore Black willow Sweetgum	100 90 ---------- 90	Slight	Moderate	Moderate	Eastern cottonwood, loblolly pine, slash pine, sycamore.	2s8.
Cartecay: Ca. For Toccoa part of Ca, see Toccoa series.	*Sweetgum* *Yellow-poplar* Loblolly pine	(90) (95) ----------	Slight	Moderate	Slight to moderate.	Eastern cottonwood, loblolly pine, slash pine, sweetgum, sycamore, cherrybark oak, yellow-poplar.	2w8.
Cataula:							
CeB2, CeC2. [4]	*Loblolly pine* Shortleaf pine	65 and below 50 and below	Moderate to severe.	Moderate to severe.	Moderate to severe.	Loblolly pine, slash pine, Virginia pine.	5c3e.
CdB2, CdC2.	*Loblolly pine* Shortleaf pine Southern red oak Sweetgum White oak Yellow-poplar	80 66±15 84±7 85 81±5 88±8	Slight	Slight	Slight	Loblolly pine, Virginia pine, yellow-poplar.	3o7.
Cecil:							
CmB2, CmC2.	*Loblolly pine* Shortleaf pine Virginia pine	72±6 66±6 65	Moderate	Moderate	Moderate	Loblolly pine, slash pine, Virginia pine.	4c2e.
ClB, ClC2, ClD.	Eastern white pine *Loblolly pine* Shortleaf pine Virginia pine Black oak Northern red oak Post oak Scarlet oak Southern red oak Sweetgum White oak Yellow-poplar	80 80±8 67±7 73±4 66 82±6 65±9 80±3 81±10 78±6 76±7 86±8	Slight	Slight	Slight	Eastern white pine, loblolly pine, slash pine, yellow-poplar.	3o7.

See footnotes at end of table.

TABLE 5.—*Wood crops and factors in management*—Continued

Soil	Potential productivity		Management problems			Species suitable for planting [3]	Woodland group
	Tree species [1]	Average site index [2] and standard deviation	Erosion hazard	Equipment restriction	Seedling mortality		
Chewacla: Cn, Cw. For Worsham part of Cw, see Worsham series.	American elm	90	Slight	Moderate	Moderate	Eastern cottonwood, loblolly pine, slash pine, sycamore, sweetgum, yellow-poplar, cherrybark oak, eastern white pine.	1w8.
	Eastern cottonwood.	100					
	Green ash	97					
	Loblolly pine	96±6					
	Shortleaf pine	66					
	Virginia pine	66					
	Red maple	70					
	River birch	70					
	Post pak	69					
	Scarlet oak	90					
	Southern red oak	90					
	Sugarberry	80					
	Swamp blackgum	80					
	Sweetgum	97±13					
	Sycamore	90					
	Water oak	86±11					
	White ash	80					
	White oak	73±8					
	Willow oak	85					
	Yellow-poplar	104±8					
Colfax: CxB.	*Loblolly pine*	80	Slight	Moderate	Slight	Loblolly pine, slash pine, Virginia pine, sweetgum.	3w8.
	Red maple	65					
	Shortleaf pine	70					
	Sweetgum	81					
	Yellow-poplar	80					
	Virginia pine	----------					
Durham: DuB, DvB, DvC.	*Loblolly pine*	79±11	Slight	Slight	Slight	Loblolly pine, slash pine, yellow-poplar.	307.
	Post oak	70					
	Shortleaf pine	72					
	Southern red oak	80					
	Sweetgum	80					
	White oak	70					
	Yellow-poplar	80					
Enon: EnB, EnC, EnD, EnE.[5]	*Loblolly pine*	73±7	Slight	Slight	Slight	Eastern redcedar, loblolly pine, slash pine.	401.
	Shortleaf pine	63±7					
	Virginia pine	63					
	Post oak	55					
	Red maple	70					
	Southern red oak	84					
	Sweetgum	78					
	White oak	69±8					
	Yellow-poplar	88					
Enoree soils: Eo.	Eastern cottonwood.	(100)	Slight	Severe	Severe	Eastern cottonwood, sweetgum, sycamore.	2w6.
	Sycamore	(100)					
	Sweetgum	(90)					
Gullied land-Pacolet complex: Gp. Variable. Requires onsite determination. For Pacolet part of Gp, see Pacolet series.							

See footnotes at end of table.

TABLE 5.—*Wood crops and factors in management*—Continued

Soil	Potential productivity		Management problems			Species suitable for planting [3]	Woodland group
	Tree species [1]	Average site index [2] and standard deviation	Erosion hazard	Equipment restriction	Seedling mortality		
Hiwassee: HyB2, HyC2, HyD2.	*Loblolly pine* Shortleaf pine	(66) 61	Moderate	Moderate	Moderate	Eastern redcedar, loblolly pine, slash pine, Virginia pine.	4c2e.
HwB, HwC2, HwD2.	Loblolly pine Red oak *Shortleaf pine* White oak Yellow-poplar	75±6 (70) 70±7 (70) (85)	Slight	Slight	Slight	Loblolly pine, slash pine, yellow-poplar.	3o7.
Iredell: IdB, IrB.[6]	*Loblolly pine* Longleaf pine Post oak Shortleaf pine White oak	67±5 55 44 58±2 47	Slight	Moderate	Moderate	Eastern redcedar, loblolly pine.	4c2.
Louisburg: LoC, LoF.[7]	*Loblolly pine* Shortleaf pine Southern red oak Virginia pine White oak Yellow-poplar	77±5 69±10 72 71±3 68 84	Slight	Slight	Slight	Loblolly pine, slash pine, Virginia pine, yellow-poplar.	3o7.
Madison and Pacolet soils: MhF. For Pacolet part of MhF, see Pacolet series.	Loblolly pine Longleaf pine *Shortleaf pine* Southern red oak Yellow-poplar	73±8 63±5 66 81 96	Moderate	Moderate	Slight	Loblolly pine, longleaf pine, slash pine, yellow-poplar.	3r8.
Madison: MeB2, MeC2, MeD2.	*Loblolly pine* Longleaf pine Shortleaf pine Virginia pine	72±6 (60) 66 ----------	Moderate	Moderate	Moderate	Eastern redcedar, loblolly pine, slash pine, Virginia pine.	4c2e.
MdB, MdC, MdD.	Loblolly pine Longleaf plne *Shortleaf pine* Southern red oak Yellow-poplar	73±8 63±5 66 81 96	Slight	Slight	Slight	Loblolly pine, longleaf pine, slash pine, yellow-poplar.	3o7.
Mecklenburg: MkB, MkC.	*Loblolly pine* Shortleaf pine Southern red oak Sweetgum White oak Yellow-poplar	75 67±7 75 82 71±5 89	Slight	Slight	Slight	Eastern redcedar, loblolly pine, slash pine, Virginia pine.	4o1.
Pacolet: PaD2.	*Loblolly pine* Shortleaf pine Southern red oak Virginia pine White oak	(72) (70) 60 68 67	Moderate	Moderate	Moderate	Eastern redcedar, loblolly pine, Virginia pine.	4c2e.
Toccoa: Mapped only with Cartecay soils.	Loblolly pine *Yellow-poplar* Sweetgum Red oak Green ash	90 107 100 ---------- ----------	Slight	Slight	Slight	Loblolly pine, yellow-poplar, sycamore, cherrybark oak.	1o7.

See footnotes at end of table.

TABLE 5.—*Wood crops and factors in management*—Continued

Soil	Potential productivity		Management problems			Species suitable for planting [3]	Woodland group
	Tree species [1]	Average site index [2] and standard deviation	Erosion hazard	Equipment restriction	Seedling mortality		
Vance: VaB, VaC.	*Loblolly pine* Northern red oak Shortleaf pine White oak	76±5 ---------- ---------- ----------	Slight	Slight	Slight	Loblolly pine, Virginia pine, slash pine, yellow-poplar.	3o7.
*Wehadkee-Chewacla complex: Wc. For Chewacla part of Wc, see Chewacla series.	Black willow Eastern cottonwood. Green ash *Loblolly pine* Red maple Sycamore Sweetgum Virginia pine Water oak White ash Willow ash Yellow-poplar	76 86 96 102 90 ---------- 93±6 84 86 88 90 98±8	Slight	Moderate to severe.	Moderate to severe.	Cherrybark oak, eastern cottonwood, green ash, loblolly pine, sweetgum, sycamore, yellow-poplar, slash pine.	1w9.
Wilkes: WkD, WlF.[8]	*Loblolly pine* Post oak Shortleaf pine Southern red oak Sweetgum	75±7 79 63 76 82	Slight	Slight	Slight	Eastern redcedar, loblolly pine, Virginia pine.	4o1.
Worsham: Mapped only with Chewacla soils.	Loblolly pine Shortleaf pine Virginia pine Post oak Red maple Southern red oak Sweetgum White oak Yellow-poplar	88 66 66 69 92 91 86±6 73±8 95±10	Slight	Moderate	Slight to moderate.	Loblolly pine, slash pine, sweetgum, sycamore, yellow-poplar.	2w8.

[1] Italicized names are indicator species, the most important forest type for each kind of soil.
[2] Site indexes in parentheses are estimated. Site indexes are for age 50, except for cottonwood and sycamore. Site index for cottonwood is at age 30 and for sycamore at age 35.
[3] Slash pine is planted only in the lower Piedmont area because it is susceptible to damage from ice and snow and white pine is planted only in the upper Piedmont.
[4] Die out and little-leaf disease are hazards on CeB2 and CeC2.
[5] Same data for EnE, but erosion hazard and equipment restrictions are moderate and woodland group is 4r2.
[6] Same data for IrB, but woodland group is 4x2.
[7] Same data for LoF, but erosion hazard and equipment restrictions are moderate and woodland group is 3r8.
[8] Same data for WlF, but erosion hazard and equipment restrictions are moderate and woodland group is 4r2.

Column five evaluates equipment restriction. The ratings reflect limitations in the use of equipment for managing or harvesting a tree crop. *Slight* indicates equipment use is seldom limited in kind or time of year. *Moderate* indicates a need for modified equipment or seasonal restrictions due to slope, stones, obstructions, wetness, flooding, or overflow. *Severe* indicates a need for specialized equipment.

Column six indicates the degree of expected seedling mortality depends on the first two growing seasons after planting or seeding. Normal rainfall, adequate site preparation, good planting stock, proper planting methods, and appropriate protection and cultivation are assumed. *Slight* indicates that unsatisfactory survival on less than 25 percent of the area is likely. *Moderate* indicates that unsatisfactory survival is likely on 25 to 50 percent of the area planted. *Severe* indicates that unsatisfactory survival is likely on more than 50 percent of the area.

Column seven lists several tree species suitable for planting on the soils named in column one. The list may include some species that do not normally occur in native stands on the designated soil or in this geographic area, as well as some of the important species listed in column two.

The last column shows the woodland group. A woodland group is made up of soils that are capable of producing similar kinds of wood crops, need similar management to produce these crops, and have about the same potential productivity.

Woodland groups

The soils of Laurens and Union Counties have been placed in 15 woodland groups. The groups are described in the paragraphs that follow.

WOODLAND GROUP 1o7

This group consists of soils that formed in alluvium. These soils have very high potential productivity and no serious management problems. The soils are suited to broadleaf and needleleaf trees.

WOODLAND GROUP 1w8

This group consists of seasonally wet soils that formed in alluvium. These soils have very high potential productivity, moderate equipment restrictions, and moderate seedling mortality. Under adequate water management the soils are suited to broadleaf and needleleaf trees.

WOODLAND GROUP 1w9

This group consists of excessively wet loamy soils that formed in alluvium. These soils have very high potential productivity, moderate to severe equipment restrictions, and moderate to severe seedling mortality. Under adequate water management the soils are suited to broadleaf and needleleaf trees.

WOODLAND GROUP 2w6

This group consists of excessively wet loamy soils that formed in alluvium. These soils have very high potential productivity, severe equipment restrictions, and severe seedling mortality. They are suited to broadleaf trees.

WOODLAND GROUP 2w8

This group consists of seasonally wet soils that have high productivity, moderate equipment restrictions, and slight to moderate seedling mortality. These soils are suited to broadleaf and needleleaf trees.

WOODLAND GROUP 2s8

This group consists of excessively drained sandy soils on flood plains. These soils have high productivity, moderate equipment restrictions, and moderate seedling mortality. They are suited to broadleaf and needleleaf trees.

WOODLAND GROUP 3o7

This group consists of upland soils that have moderately high productivity and no serious management problems. These soils are suited to broadleaf and needleleaf trees.

WOODLAND GROUP 3w8

This group consists of seasonally wet soils that are moderately deep over a fragipan. These soils have moderate productivity and moderate equipment restrictions. They are suited to broadleaf and needleleaf trees.

WOODLAND GROUP 3r8

This group consists of shallow to moderately deep upland soils that have moderate productivity, strongly sloping to steep slopes, moderate equipment restrictions, and moderate erosion hazard. These soils are suited to broadleaf and needleleaf trees.

WOODLAND GROUP 4o1

This group consists of shallow, moderately deep, or deep soils on uplands. These soils have moderate productivity and no serious management problems. They are best suited to needleleaf trees.

WOODLAND GROUP 4c2

This group consists of moderately deep soils that have a plastic clay subsoil, moderate productivity, moderate equipment restrictions, and moderate seedling mortality. These soils are best suited to needleleaf trees.

WOODLAND GROUP 4c2e

This group consists of moderately deep to deep, eroded upland soils that have moderate productivity, moderate erosion hazard, moderate equipment restrictions, and moderate seedling mortality. These soils are best suited to needleleaf trees.

WOODLAND GROUP 4r2

This group consists of shallow to moderately deep, moderately steep to steep soils that have moderate productivity, moderate erosion hazard, and moderate equipment restrictions. These soils are best suited to needleleaf trees.

WOODLAND GROUP 4x2

This group consists of moderately deep, stony soils that have a plastic subsoil, moderate productivity, moderate equipment limitations, and moderate seedling mortality. These soils are best suited to needleleaf trees.

WOODLAND GROUP 5c3e

This group consists of eroded soils that are moderately deep over a fragipan. These soils have low productivity and moderate to severe erosion hazard, moderate seedling mortality, and moderate equipment restrictions. They are best suited to needleleaf trees.

Potential yields

Yields for loblolly pine plantations (*2*) and for several important hardwoods (*6*) are shown in figure 7.

Use of the Soils in Engineering[6]

Permeability, shear strength, compaction characteristics, grain size, plasticity, depth to water table, depth to bedrock, topography, and consolidation potential or settlement are among the soil properties that interest engineers because they affect construction. These properties affect the suitability of soils for use in construction of roads, pipelines, foundations, sewage disposal systems, drainage systems, terraces, and farm ponds.

Information in this survey can be used to—

1. Make soil and land-use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the engineering properties of the soil to aid in planning agricultural drainage systems, farm ponds, irrigation systems, and diversion terraces.

[6] By RICHARD G. CHRISTOPHER III, area engineer, Soil Conservation Service.

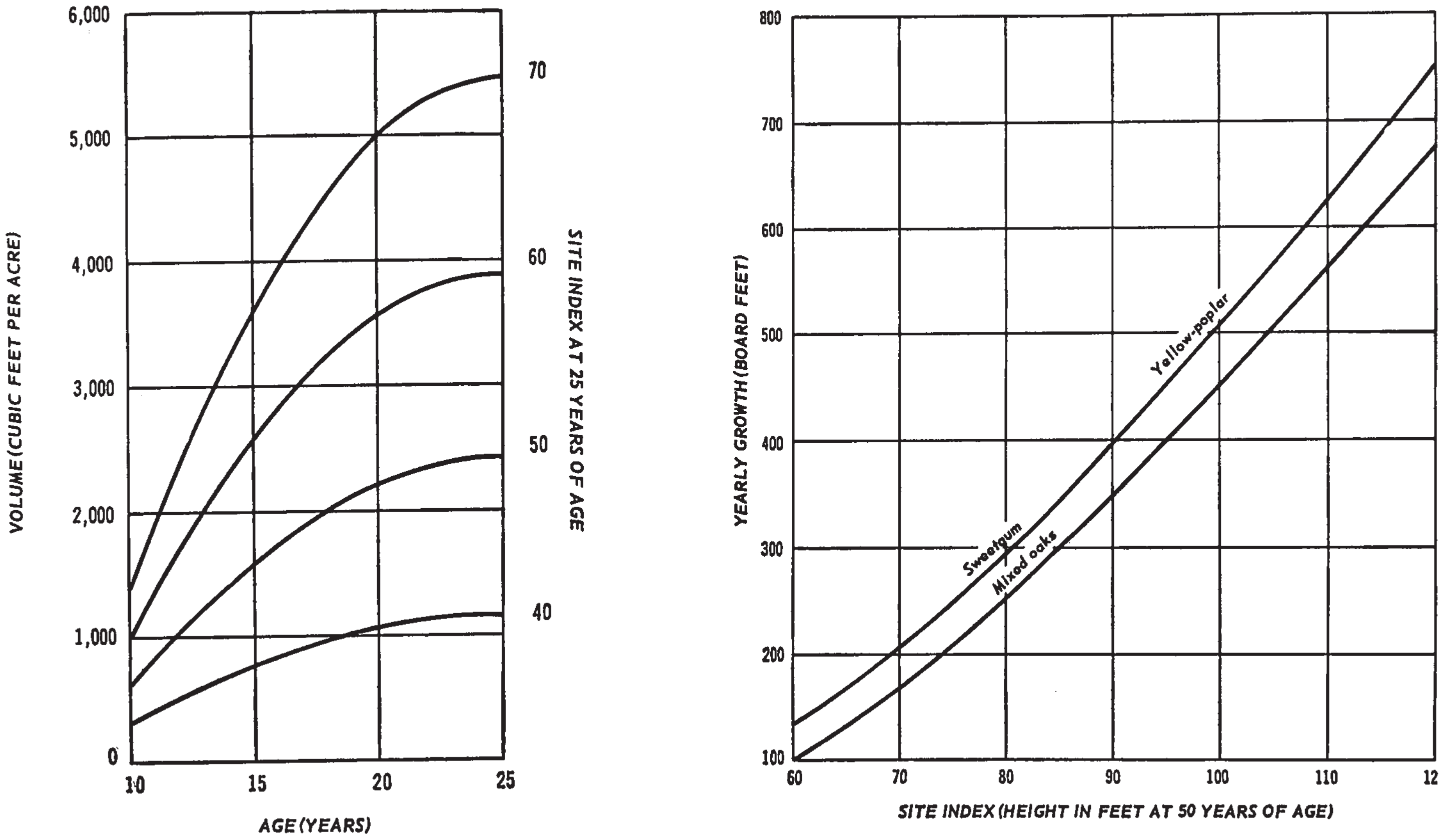

***Figure 7.*—Left: Merchantable volume (inside bark) to 3-inch top in cubic feet per acre for loblolly pine plantations. Stocking: 700 trees per acre. Right: Average yearly growth per acre in board feet for well-stocked, even-aged stands of southern hardwoods to age 60. (Scribner log rule)**

3. Make preliminary evaluations of soil and ground conditions that will aid in selecting highway, airport, and pipeline locations, and in planning detailed investigations of selected sites.
4. Determine the suitability of soils for cross-country movements of vehicles and construction equipment.
5. Correlate performance of engineering structures with soil mapping units to develop information that will be useful in designing and maintaining engineering structures.
6. Supplement information obtained from other published maps and reports and aerial photographs to make soil maps and reports that can be used readily by engineers.
7. Develop other preliminary estimates for construction purposes pertinent to the particular area.

The information in the soil survey is somewhat generalized and should be used only in planning more detailed surveys to determine the condition of the soil, in place, at the site of the proposed engineering construction. Because soil samples were taken at a relatively shallow depth, the data may not be adequate for estimating the characteristics of soil materials in deep cuts. Small areas of other soils impractical to show on maps are included in some mapped areas. Specific values for bearing capacity should not be assigned to estimated values expressed in words, whether these values are in tables or in the text.

To make the best use of the soil map and the soil survey report, the engineer should know the physical properties of the soil material and the condition of the soil in place. After testing the soil materials and observing the behavior of each soil when used in engineering structures and foundations, the engineer can develop recommendations for each soil unit designated on the map.

Some of the terms used by soil scientists and farmers may not be familiar to engineers. Others, though familiar, have special meanings in soil science and farming. Most of the terms used in this section and other special terms used in the report are defined in the Glossary at the back of the report. Engineers can find additional information in the sections "Descriptions of the Soils," and "Formation and Classification of the Soils."

Most highway engineers classify soil materials according to a system approved by the American Association of State Highway Officials (AASHO) (*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 clay soils having low strength when wet. Within each group, the relative engineering value of the soil materials is indicated by a group index number. These numbers range from 0 for the best materials to 20 for the poorest. The group index number is shown in parentheses following the group symbol.

The most widely adopted system used by engineers for classifying soils is the Unified Soil Classification System (*11*). 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. Test data on samples of the principal soil types of 12 series are given in table 6. Soils and their physical and chemical properties are given in table 7. Engineering classifications (AASHO and Unified) of the soils are given in tables 6 and 7. The engineering properties of the soils for specific engineering uses are evaluated in table 8.

Engineering test data

Modal samples of 12 extensive soil series in Laurens and Union Counties were tested according to standard procedures. These tests were made to help evaluate the soils for engineering purposes. The laboratory test data are given in table 6. Because samples for these tests were obtained only to a depth of approximately 6 feet, the data may not be adequate for estimating the characteristics of soil materials in deeper cuts.

The engineering soil classifications in table 6 are based on data obtained by mechanical analyses and by tests to determine the liquid limit and plastic limit. Mechanical analyses were made by the combined sieve and hydrometer methods.

The tests for plastic limit and liquid limit measure the effects of water on the consistence of the soil material. As the moisture content of a dry clayey soil increases, it changes from a solid to a semisolid or plastic state. As the moisture content increases further, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from a semisolid to a plastic state (*5*). 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 plastic limit and the liquid limit. It indicates the range of moisture content within which a soil material is in a plastic condition.

A dual classfication, such as ML-CL, is used under the Unified Classification System to indicate a borderline soil that possesses characteristics of two groups.

Moisture-density (compaction) data are also given in this table. Dry density is the maximum test density of a dry soil material under a specified effort and is expressed in pounds of soil material per cubic feet of volume. Optimum moisture content is that percentage of moisture that exists at highest dry density of a soil under a specified effort.

Estimated properties

Estimated physical and chemical properties of the soils are given in table 7. The estimates are by layers that have properties significant to engineering; hence, the depths shown may not be the same as the depths in the section "Descriptions of the Soils." The texture of each layer is listed according to the textural classification of the United States Department of Agriculture (*9*). Also listed for the layers are the estimated percentages of material that will pass a No. 4 sieve, a No. 10 sieve, a No. 40 sieve, and a No. 200 sieve.

Permeability is estimated for each layer on the basis of soil structure without compaction. Permeability is the rate at which water moves through the soil material. It depends largely on the texture and structure of the soil (*8*).

Available water capacity is approximately the amount of capillary water in the soil when the downward flow by gravity has practically stopped. In table 7, it is the water held in the range between field capacity and the wilting point and is expressed in inches of water per inch of soil.

Reaction is shown in numerical terms of pH. A pH value of less than 6.6 indicates that the soil is acid; values from pH 6.6 to pH 7.3 indicate that the soil is neutral; and values of more than 7.3 indicate that the soil is alkaline. Extreme acid or alkaline reactions can have an important effect on structures or on soil stabilization treatments.

The shrink-swell potential indicates how much a soil changes in volume when its moisture content changes. In general, soils with a high clay content, such as CH and A–7, as shown in table 7, have a high shrink-swell potential, and those that contain clean sand and gravel have a low shrink-swell potential.

Dispersion of the soils was not rated.

Engineering interpretations

This section discusses characteristics of soils that affect highway and conservation engineering. More detailed ratings are given in table 8.

Suitability of the soil as a source of topsoil, road fill, and as a location for highways was considered in relation to highway engineering.

The main factors considered in rating the soil as a source of topsoil were the ability of the soil to grow vegetation, the thickness of the surface layer, and the presence of rock or coarse fragments.

Road fill is soil material used in embankments for roads. Ratings were based on the capacity of the soils used as embankment to support the subbase, a base course, or a surface course. Shear strength, shrink-swell behavior, compaction, workability, moisture content, depth to water table, and depth to bedrock were factors considered.

The soils were not rated as a source of sand or gravel. Sand is obtained locally from streams, but is generally poorly graded. Gravel from local sources is crushed rock.

The soil properties that affect highway location are slope, traffic-supporting capacity, depth to the water table, erodibility, depth to rock, and flooding. These factors were considered for the entire soil profile in an undisturbed state.

The conservation uses of the soil considered include the construction of ponds, terraces and diversions, grassed waterways, and drainage systems. The suitability of the soil for irrigation was also considered.

TABLE 6.—*Engineering*

[Tests performed by the Soil Testing Laboratory,

Soil and location	Parent material	South Carolina report number	Depth
			Inches
Appling loamy sand: 2 miles south of Fountain Inn, 500 feet east of State Highway 14, 15 feet north of field road, Laurens County. Modal.	Granite, gneiss, schist.	G–30442 G–30443 G–30444	0–7 20–44 55–72
Cartecay sandy loam: 2 miles north of Friendship Church, 150 yards north of County Road 67, Laurens County. Modal.	Thick, loamy alluvial sediments.	G–96925 G–96926 G–96927	0–7 7–18 18–32
Cataula sandy loam: 1 mile southeast of Reedy Fork Church, 30 feet southwest of County Road 48, Laurens County. Modal.	Granite, gneiss, schist.	G–30412 G–30413 G–30414	0–4 4–16 40–68
Cecil sandy loam: 1 mile southeast of Barksdale, 20 feet south of County Road 113, Laurens County. Modal.	Granite, gneiss, schist.	G–30455 G–30454 G–30456	0–5 21–39 58–79
Chewacla loam: 1 mile west of Wattsville, 150 feet south of County Road 24, Laurens County. Modal.	Loamy sediments.	G–96901 G–96902 G–96903	2–11 18–33 33–48
Enon sandy loam: 1 mile northwest of Floyds Landing, 30 feet south of County Road 87 Laurens County. Modal.	Gneiss, schist with intrusions of diorite, gabbro, and hornblende.	G–30421 G–30423 G–30422	0–6 14–29 38–55
Iredell fine sandy loam: 1.5 miles northeast of Carlisle, 75 feet north of County Road 113, Union County. Modal.	Gabbro, diorite, hornblende, gneiss.	G–96922 G–96923 G–96924	0–5 5–27 27–42
Madison sandy loam: 1.5 miles northeast of Princeton, ¼ mile northwest of Prospect Church, Laurens County. Modal.	Quartz mica, gneiss, schist, quartz diorite, pegmatite.	G–96913 G–96914 G–96915	0–6 6–22 22–37
Mecklenburg sandy loam: 0.8 mile south of State Highway 215, 15 feet west of County Road 52, Union County. Modal.	Hornblende gneiss, hornblende schist, gabbro, diorite.	G–96910 G–96911 G–96912	0–7 21–39 39–62
Toccoa sandy loam: 3 miles west of Lanford, 150 yards west of County Road 97, Laurens County. Modal.	Thick loamy alluvium.	G–96898 G–96899 G–96900	2–11 11–31 31–51
Vance sandy loam: 2 miles northwest of Joanna, 30 feet north of U.S. Highway 76, Laurens County. Modal.	Granite, gneiss.	G–30435 G–30433 G–30434	0–9 19–35 45–76
Wilkes sandy loam: 3 miles west of Cold Point, 50 feet north of County Road 6, Laurens County. Modal.	Diorite, hornblende gneiss, hornblende schist.	G–96904 G–96905 G–96906	0–6 9–15 15–38

[1] Mechanical analysis according to AASHO Designation: T 88–57(*1*). Results by this procedure may differ from results of the Soil Conservation Service (SCS). In the AASHO procedure, fine material is analyzed by the hydrometer method, and various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, fine material is analyzed by the pipette method, and material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data used in this table are not suitable for naming textural classes for soils.

[2] Based on AASHO Designation: T 99–57, Method A (*1*).

test data

South Carolina State Highway Department]

Mechanical analysis [1]						Liquid limit	Plasticity index	Classification		Moisture-density data [2]	
Percentage passing sieve—					Percentage smaller than 0.005 mm.[3]			AASHO [4]	Unified [5]	Maximum dry density	Optimum moisture content
¾ inch	No. 4	No. 10	No. 40	No. 200							
						Percent				*Lb./cu. ft.*	*Percent*
97	94	80	49	19	9	----------	(6) NP	A-1-b(0)	SM	126	10
----------	100	97	79	72	65	70	29	A-7-5(18)	MH	88	29
100	98	80	58	43	26	45	5	A-5(2)	SM	103	11
----------	100	96	56	19	14	18	2	A-2-4(0)	SM	115	14
100	98	97	56	11	9	----------	(6)	A-2-4(0)	SP, SM	108	7
100	97	93	69	20	13	----------	(6)	A-2-4(0)	SM	119	12
----------	100	90	58	20	6	----------	(6)	A-2-4(0)	SM	115	8
----------	----------	100	78	55	39	48	11	A-7-5(5)	ML	(7)	(7)
----------	----------	100	78	55	39	42	8	A-5(4)	ML	105	18
----------	100	95	70	24	11	----------	(6)	A-2-4(0)	SM	122	14
----------	----------	100	89	78	68	69	25	A-7-5(18)	MH	86	33
----------	----------	100	80	56	33	48	8	A-5(5)	ML	96	23
----------	----------	100	98	85	65	56	12	A-7-5(12)	MH	86	30
----------	----------	100	98	86	55	52	9	A-5(10)	MH	88	28
----------	----------	100	97	75	44	48	11	A-7-5(10)	ML	90	25
100	98	90	66	22	8	----------	(6)	A-2-4(0)	SM	116	11
----------	----------	100	95	88	81	67	29	A-7-5(20)	MH	80	34
----------	----------	100	83	32	21	----------	(6)	A-2-4(0)	SM	99	21
----------	100	97	66	29	19	24	5	A-2-4(0)	SM, SC	120	13
----------	100	87	80	69	64	63	31	A-7-5(18)	MH, CH	82	26
100	98	95	70	12	6	----------	(6)	A-2-4(0)	SP, SM	117	13
99	97	88	45	24	13	20	4	A-1-b	SM, SC	122	11
----------	----------	100	94	75	65	57	21	A-7-5(16)	MH	94	24
----------	100	99	87	62	46	52	15	A-7-5(9)	MH	95	23
99	97	91	85	48	32	25	7	A-4(3)	SM, SC	110	15
----------	----------	100	99	87	72	55	13	A-7-5(12)	MH	90	30
----------	----------	100	87	43	19	----------	(6)	A-4(2)	SM	96	25
----------	----------	100	96	30	11	36	7	A-2-4(0)	SM	105	18
100	99	94	60	19	11	----------	(6)	A-2-4(0)	SM	117	11
100	98	93	53	15	8	----------	(6)	A-2-4(0)	SM	118	12
99	98	88	54	22	10	----------	(6)	A-2-4(0)	SM	116	14
----------	----------	100	80	69	60	64	25	A-7-5(16)	MH	93	26
----------	----------	100	71	48	33	49	9	A-5(3)	SM	102	20
98	97	93	83	46	29	38	9	A-4(2)	SM	99	21
----------	----------	100	95	67	53	46	16	A-7-5(10)	ML	95	22
96	93	89	79	22	10	----------	(6)	A-2-4(0)	SM	118	13

[3] Test data not available on 0.05 mm., 0.02 mm., and 0.002 mm.
[4] Based on AASHO Designation M 145–49(*1*).
[5] Based on Unified Soil Classification System (*11*).
[6] Nonplastic.
[7] Insufficient amount for moisture and density tests.

TABLE 7.—*Estimated soil properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in referring to other series that appear in the first

Soil series and map symbol	Depth to seasonal high water table	Depth to bedrock	Depth from surface	Classification		
				USDA texture	Unified	AASHO
	Feet	*Feet*	*Inches*			
Appling: ApB, ApC	6	>5	0–7	Loamy sand	SM	A–1–b, A–2–4
			7–11	Sandy clay loam	CL	A–7–5
			11–44	Clay	CL, MH	A–7–5
			44–55	Sandy clay loam	CL	A–7–5
			55–72	Loam	SM	A–5
Buncombe: Bu	5	>10	0–6	Sand	SP–SM	A–2–4, A–3
			6–72	Sand	SP, SP–SM	A–3, A–1–b
*Cartecay: Ca. For Toccoa part of Ca, see Toccoa series.	0–2	>5	0–8	Sandy loam	SM	A–2–4
			8–14	Loamy sand	SM, SM–SP	A–2–4
			14–30	Sandy loam	SP–SM, SM	A–2–4
			30–47	Loamy sand	SP–SM, SM	A–2–4
			47–55	Fine sandy loam	SM	A–2–4, A–4
Cataula: CdB2, CdC2	6	>5	0–6	Sandy loam	SM	A–2–4
			6–24	Sandy clay loam, clay loam.	ML, MH	A–7–5
			24–37	Sandy clay	ML, SC	A–4, A–5
			37–50	Sandy clay loam	SM, ML	A–5
CeB2, CeC2. Except for the surface layer, estimates are the same as those shown for CdB2 and CdC2.	6	>5	0–4	Sandy clay loam	ML	A–5
Cecil: ClB, ClC2, ClD	6	>5	0–5	Sandy loam	SM	A–2–4
			5–39	Clay	MH	A–7–5
			39–58	Clay loam	ML	A–7
			58–79	Clay loam	ML	A–5
CmB2, CmC2. Except for the surface layer, estimates are the same as those shown for ClB, ClC2, and ClD.	----------	----------	0–4	Sandy clay loam	ML	A–7
*Chewacla: Cn, Cw. For Worsham part of Cw, see Worsham series.	0–2	>4	0–6	Loam	ML, MH	A–7
			6–24	Silt loam, silty clay loam.	MH	A–7–5
			24–48	Loam	ML, MH	A–5, A–7
			48–61	Sandy loam	SM	A–2–4
Colfax: CxB	1. 5–3	4–6	0–11	Loamy sand	SM	A–2–4
			11–22	Sandy loam, sandy clay loam.	SM, SC	A–2, A–4
			22–44	Sandy clay loam	SM, MH	A–7
			44–50	Sandy loam	SM	A–2–4

See footnote at end of table.

significant to engineering

such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for column of this table. The symbol > means more than]

Percent passing sieve—				Permeability [1]	Available water capacity	Reaction	Shrink-swell potential
No. 4	No. 10	No. 40	No. 200				
				In./hr.	*In./in. of soil*	*pH*	
92–96	75–85	45–55	15–25	2. 0–6. 3	0. 07–0. 11	5. 6–6. 5	Low.
100	95–100	75–85	55–65	0. 63–2. 0	0. 12–0. 16	5. 6–6. 5	Low.
100	95–100	75–85	70–80	0. 63–2. 0	0. 12–0. 15	4. 5–5. 5	Moderate.
100	95–100	75–85	51–60	0. 63–2. 0	0. 12–0. 20	4. 5–5. 5	Low.
95–100	75–85	55–65	40–50	2. 0–6. 3	0. 12–0. 16	4. 5–5. 5	Low.
95–98	90–96	55–65	5–12	6. 3–20. 0	0. 03–0. 07	5. 1–6. 5	Low.
95–98	90–96	30–65	2–5	6. 3–20. 0	0. 03–0. 07	5. 1–6. 5	Low.
98–100	92–100	51–60	18–30	2. 0–6. 3	0. 10–0. 13	5. 1–6. 5	Low.
95–100	90–100	51–60	11–25	2. 0–6. 3	0. 10–0. 13	5. 1–6. 5	Low.
95–100	90–95	51–75	11–30	2. 0–6. 3	0. 10–0. 13	5. 1–6. 5	Low.
95–100	90–95	51–75	11–25	2. 0–6. 3	0. 06–0. 09	5. 1–6. 5	Low.
95–100	90–95	65–75	20–45	2. 0–6. 3	0. 06–0. 10	4. 5–6. 0	Low.
95–100	90–95	55–65	20–30	0. 63–2. 0	0. 08–0. 12	5. 1–6. 5	Low.
100	100	65–85	51–65	0. 20–0. 63	0. 13–0. 18	4. 5–6. 0	Low.
98–100	95–100	70–85	45–60	0. 06–0. 20	0. 08–0. 10	4. 5–6. 0	Low.
98–100	95–100	75–85	40–55	0. 20–0. 63	0. 13–0. 18	4. 5–6. 0	Low.
100	95–100	75–85	51–55	0. 20–0. 63	0. 08–0. 15	5. 1–6. 5	Low.
100	95–100	65–75	20–30	0. 63–2. 0	0. 10–0. 15	4. 5–6. 5	Low.
-----------	100	85–95	70–80	0. 63–2. 0	0. 10–0. 15	4. 5–6. 0	Moderate.
-----------	100	85–95	55–65	0. 63–2. 0	0. 10–0. 16	4. 5–6. 0	Low.
-----------	100	75–85	51–60	0. 63–2. 0	0. 10–0. 15	4. 5–6. 0	Low.
100	95–100	70–80	51–65	0. 63–2. 0	0. 10–0. 15	4. 5–6. 5	Low.
-----------	100	95–100	75–85	0. 63–2. 0	0. 15–0. 18	5. 1–6. 5	Low.
-----------	100	95–100	80–90	0. 63–2. 0	0. 15–0. 18	5. 1–6. 5	Low.
-----------	100	95–100	70–88	0. 63–2. 0	0. 15–0. 18	4. 5–6. 0	Low.
98–100	95–100	85–95	30–35	0. 63–2. 0	0. 12–0. 16	4. 5–6. 0	Low.
98–100	98–100	55–65	15–30	0. 63–2. 0	0. 07–0. 10	4. 5–6. 0	Low.
98–100	95–100	55–75	30–50	0. 63–2. 0	0. 12–0. 16	4. 5–6. 0	
95–100	95–100	55–65	45–55	0. 06–0. 2	0. 08–0. 10	4. 5–6. 0	Low.
95–100	95–100	55–65	25–35	0. 63–2. 0	0. 10–0. 15	4. 5–6. 0	Low.

TABLE 7.—*Estimated soil properties*

Soil series and map symbol	Depth to seasonal high water table	Depth to bedrock	Depth from surface	Classification		
				USDA texture	Unified	AASHO
	Feet	*Feet*	*Inches*			
Durham:						
DuB			0–14	Loamy sand	SM	A-2-4
			14–50	Sandy clay loam	SC, SM, MH	A-5, A-7
			50–60	Sandy loam	SM	A-2-4
DvB, DvC. Except for the surface layer, estimates are the same as those shown for DuB.	6	>5	0–6	Sandy loam	SM	A-6
Enon: EnB, EnC, EnD, EnE	6	>3	0–5	Sandy loam	SM	A-2-4
			5–29	Clay loam, clay	MH	A-7-5
			29–38	Clay loam	ML, MH	A-7-5
			38–48	Sandy loam	SM	A-2-4
Enoree: Eo	0–1	>5	0–7	Silt loam	ML	A-4, A-6
			7–15	Sandy clay loam	SM, ML	A-4, A-6
			15–27	Sandy loam	SM	A-2-4
			27–50	Loamy sand	SM	A-2-4
*Gullied land: Gp. No valid estimates can be made. For Pacolet part of Gp, see Pacolet series.						
Hiwassee:						
HwB, HwC2, HwD2	6	>5	0–6	Sandy loam	SM	A-2-4
			6–19	Clay	MH	A-7
			19–53	Clay loam	ML	A-7, A-5
			53–63	Fine sandy loam	ML	A-5
HyB2, HyC2, HyD2. Except for the surface layer, estimates are the same as those shown for HwB, HwC2, and HwD2.			0–4	Sandy clay loam	SM, ML	A-4
Iredell: IdB, IrB	1–2	3–6	0–6	Fine sandy loam	SM, SC	A-2-4
			6–25	Clay, clay loam	MH, CH	A-7-5
			25–42	Sandy loam	SP-SM, SM	A-2-4
Louisburg: LoC, LoF	6	2–4	0–7	Loamy sand	SM	A-2-4
			7–16	Sandy clay loam	SM	A-5
			16–26	Loamy sand	SM	A-2-4

See footnote at end of table.

significant to engineering—Continued

Percent passing sieve—				Permeability [1]	Available water capacity	Reaction	Shrink-swell potential
No. 4	No. 10	No. 40	No. 200				
				In./hr.	*In./in. of soil*	*pH*	
95–100	92–98	60–70	15–25	0. 63–2. 0	0. 07–0. 10	4. 5–6. 0	Low.
100	95–100	65–75	45–55	0. 63–2. 0	0. 10–0. 16	4. 5–5. 5	Low.
100	95–100	65–75	20–30	0. 63–2. 0	0. 10–0. 15	4. 5–5. 5	Low.
99–100	90–98	60–70	36–45	0. 63–2. 0	0. 10–0. 12	4. 5–6. 0	Low.
98–100	90–95	60–70	20–30	0. 63–2. 0	0. 07–0. 11	5. 6–7. 3	Low.
95–100	95–100	90–100	80–90	0. 06–0. 2	0. 10–0. 15	5. 6–7. 3	High.
95–100	95–100	90–100	51–60	0. 06–0. 2	0. 10–0. 16	6. 1–7. 8	Low.
90–100	90–100	80–90	25–35	0. 63–2. 0	0. 07–0. 10	6. 1–7. 8	Low.
95–100	85–95	70–80	51–60	0. 63–2. 0	0. 13–0. 18	4. 5–6. 5	Low.
95–100	85–95	70–80	36–55	0. 63–2. 0	0. 13–0. 15	4. 5–6. 5	Low.
95–100	85–95	70–80	20–35	2. 0–6. 3	0. 10–0. 13	4. 5–6. 5	Low.
95–100	85–95	70–80	20–30	2. 0–6. 3	0. 05–0. 08	4. 5–6. 5	Low.
98–100	95–100	65–75	20–30	0. 63–2. 0	0. 10–0. 12	5. 6–6. 5	Low.
98–100	95–98	85–95	70–85	0. 63–2. 0	0. 10–0. 14	5. 6–6. 5	Moderate.
98–100	90–98	85–95	70–80	0. 63–2. 0	0. 10–0. 17	5. 6–6. 5	Low.
98–100	95–98	75–85	51–65	0. 63–2. 0	0. 10–0. 14	5. 6–6. 5	Low.
98–100	95–100	85–95	45–55	0. 63–2. 0	0. 10–0. 12	5. 6–6. 5	Low.
95–100	95–100	60–70	25–35	0. 2–0. 63	0. 08–0. 12	5. 6–6. 5	Low.
95–100	85–95	75–85	65–75	0. 06–0. 2	0. 15–0. 22	6. 1–7. 3	High.
95–100	90–98	65–75	11–25	0. 63–2. 0	0. 08–0. 11	6. 1–7. 3	Low.
95–100	90–95	75–90	20–30	6. 3–20. 0	0. 03–0. 06	5. 1–6. 0	Low.
95–100	90–95	75–85	40–50	2. 0–6. 3	0. 08–0. 10	5. 1–6. 0	Low.
95–100	90–95	75–90	20–30	2. 0–6. 3	0. 03–0. 07	5. 1–6. 0	Low.

TABLE 7.—*Estimated soil properties*

Soil series and map symbol	Depth to seasonal high water table	Depth to bedrock	Depth from surface	Classification		
				USDA texture	Unified	AASHO
	Feet	*Feet*	*Inches*			
*Madison:						
MdB, MdC, MdD, MhF	6	3–6	0–6	Sandy loam	SM, SC	A–2–4, A–1–b
For Pacolet part of MhF, see Pacolet series.			6–31	Clay loam, clay	MH	A–7–5
			31–39	Clay loam	MH, ML	A–7–5, A–5
			39–54	Sandy clay loam	SM, SC	A–5
MeB2, MeC2, MeD2	6	3–6	0–4	Sandy clay loam	SM, SC	A–5
Except for the surface layer, estimates are the same as those for MdB, MdC, MdD, and MhF.						
Mecklenburg: MkB, MkC	6	>4	0–6	Sandy loam	SM, SC	A–4
			6–29	Clay	MH	A–7–5
			29–37	Clay loam	MH, ML	A–7–5
			37–46	Loam	SM	A–4
Pacolet: PaD2	6	>5	0–5	Sandy loam	SM, ML	A–7–5
			5–27	Clay loam	ML, MH	A–7–5
			27–53	Sandy clay loam	SM, ML	A–7–5
Toccoa	2–4	>5	0–8	Sandy loam	SM	A–2–4
Mapped only with Cartecay soils.			8–43	Sandy loam	SM	A–2–4, A–4
			43–52	Loamy sand, sandy loam.	SM	A–2–4
Vance: VaB, VaC	6	>4	0–6	Sandy loam	SM	A–2–4
			6–31	Clay	MH	A–7–5
			31–40	Clay loam	ML	A–7–5
			40–55	Sandy clay loam	SM, ML	A–5
*Wehadkee: Wc	0–1	>5	0–18	Loam	ML	A–6
For Chewacla part of Wc, see Chewacla series.			18–41	Sandy clay loam	SM, ML	A–6
			41–56	Sandy loam	SM	A–2–4
Wilkes: WkD, WlF	6	2–4	0–7	Sandy loam	SM	A–4
			7–12	Sandy clay loam, clay loam.	ML, CL, SM, SC.	A–6, A–7–5
			12–24	Sandy loam	SM	A–2–4
Worsham	1–2	>5	0–6	Sandy loam	SM	A–2–4
Mapped only with Chewacla soils.			6–41	Sandy clay loam, sandy clay.	SC	A–7
			41–48	Sandy loam	SC, SM	A–7, A–5

[1] Not to be confused with the coefficient of permeability "K."

significant to engineering—Continued

Percent passing sieve—				Permeability [1]	Available water capacity	Reaction	Shrink-swell potential
No. 4	No. 10	No. 40	No. 200				
				In./hr.	*In./in. of soil*	*pH*	
80–100	80–100	40–50	23–35	0. 63–2. 0	0. 08–0. 12	4. 5–6. 0	Low.
80–100	80–100	80–95	70–80	0. 63–2. 0	0. 10–0. 16	4. 5–6. 0	Low.
80–100	80–100	80–95	60–80	0. 63–2. 0	0. 10–0. 15	4. 5–6. 0	Low.
80–100	80–90	75–85	36–45	0. 63–2. 0	0. 10–0. 17	4. 5–6. 0	Low.
95–100	85–95	65–75	36–45	0. 63–2. 0	0. 10–0. 16	4. 5–6. 0	Low.
95–100	90–95	80–90	36–50	0. 63–2. 0	0. 08–0. 12	5. 1–6. 5	Low.
98–100	98–100	95–100	85–95	0. 06–0. 2	0. 11–0. 15	5. 1–6. 5	Moderate.
98–100	98–100	95–100	85–90	0. 2–0. 63	0. 11–0. 17	5. 1–6. 5	Low.
95–100	90–100	80–90	36–50	0. 63–2. 0	0. 08–0. 12	5. 1–6. 5	Low.
100	98–100	65–70	45–55	0. 63–2. 0	0. 10–0. 16	4. 5–5. 5	Low.
----------	100	80–90	75–90	0. 63–2. 0	0. 10–0. 16	4. 5–5. 5	Low.
----------	100	75–85	45–60	0. 63–2. 0	0. 10–0. 16	4. 5–5. 5	Low.
98–100	95–100	90–98	15–35	2. 0–6. 3	0. 08–0. 12	4. 5–6. 0	Low.
98–100	93–98	55–70	15–40	2. 0–6. 3	0. 08–0. 12	4. 5–6. 0	Low.
98–100	92–98	51–65	15–25	2. 0–6. 3	0. 08–0. 12	4. 5–6. 0	Low.
95–100	85–95	51–65	20–30	0. 63–2. 0	0. 08–0. 12	4. 5–6. 0	Low.
----------	100	75–85	65–75	0. 06–0. 2	0. 10–0. 15	4. 5–6. 0	Moderate.
----------	100	75–85	60–70	0. 2–0. 63	0. 10–0. 16	4. 5–6. 0	Low.
----------	100	65–80	45–55	0. 63–2. 0	0. 10–0. 16	4. 5–6. 0	Low.
100	98–100	75–90	55–70	0. 63–2. 0	0. 15–0. 20	5. 1–6. 5	Low.
100	98–100	75–90	45–55	0. 63–2. 0	0. 15–0. 20	5. 1–6. 5	Low.
98–100	90–98	70–85	25–35	0. 63–2. 0	0. 08–0. 10	5. 1–6. 5	Low.
95–100	90–95	80–90	40–50	0. 63–2. 0	0. 07–0. 10	5. 6–6. 5	Low.
90–100	90–100	90–100	45–70	0. 2–0. 63	0. 03–0. 10	6. 1–7. 3	Low.
90–98	85–95	75–85	20–30	0. 63–2. 0	0. 03–0. 10	6. 1–7. 3	Low.
95–100	90–98	75–90	25–30	0. 2–0. 63	0. 08–0. 12	4. 5–6. 0	Low.
95–100	90–98	75–90	40–50	0. 06–0. 2	0. 10–0. 16	4. 5–6. 0	Low.
90–98	85–95	70–85	36–40	0. 06–0. 2	0. 10–0. 16	4. 5–5. 5	Low.

TABLE 8.—*Engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in for referring to other series that

Soil series and map symbols	Suitability as a source of—		Soil features affecting—
	Topsoil	Road fill	Highway location
Appling: ApB, ApC	Poor: less than 8 inches of suitable material.	Fair: fair traffic-supporting capacity.	Fair traffic-supporting capacity; slopes.
Buncombe: Bu	Poor: surface layer too sandy.	Good	Flood hazard
*Cartecay: Ca For Toccoa part of Ca, see Toccoa series.	Fair: less than 16 inches of suitable material.	Fair: fair traffic-supporting capacity.	Flood hazard; high water table.
Cataula: CdB2, CdC2, CeB2, CeC2	Poor: less than 8 inches of suitable material.	Poor: poor shear strength and traffic-supporting capacity.	Poor traffic-supporting capacity: slopes.
Cecil: ClB, ClC2, ClD, CmB2, CmC2	Poor: less than 8 inches of suitable material.	Fair: Fair traffic-supporting capacity; moderate shrink-swell potential.	Fair traffic-supporting capacity; slopes; moderate shrink-swell potential.
*Chewacla: Cn, Cw For Worsham part of Cw, see Worsham series.	Poor: less than 8 inches of suitable material.	Fair: Fair traffic-supporting capacity; high water table.	Fair traffic-supporting capacity; flood hazard; high water table.
Colfax: CxB	Poor: surface layer too sandy.	Poor: high water table; poor traffic-supporting capacity.	Poor traffic-supporting capacity.
Durham: DuB, DvB, DvC	Fair to poor: texture of surface layer.	Fair to poor: fair to poor traffic-supporting capacity.	Fair to poor: traffic-supporting capacity; slopes.
Enon: EnB, EnC, EnD, EnE	Poor: less than 8 inches of suitable material.	Poor: high shrink-swell potential; poor shear strength.	Poor traffic-supporting capacity; slopes; high shrink-swell potential.
Enoree: Eo	Fair: texture of surface layer.	Poor: wetness	Flood hazard; high water table.
*Gullied land: Gp. No interpretations. Material too variable. For Pacolet part of Gp, see Pacolet series.			
Hiwassee: HwB, HwC2, HwD2, HyB2, HyC2, HyD2.	Poor: less than 8 inches of suitable material.	Fair: fair traffic-supporting capacity; moderate shrink-swell potential.	Fair traffic-supporting capacity; slopes; moderate shrink-swell potential.

interpretations of soils

such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions appear in the first column of this table]

Soil features affecting—Continued					
Ponds		Terraces and diversions	Grass waterways	Agricultural drainage	Sprinkler irrigation
Reservoir	Embankment				
Moderate permeability; slopes.	Moderate permeability; moderate shrink-swell potential.	Irregular slopes	Irregular slopes	Well drained	Medium available water capacity; moderate infiltration; slopes.
Rapid permeability.	Rapid permeability	Nearly level soil	Low fertility	Flood hazard	Low to very low available water capacity; rapid infiltration.
Moderately rapid permeability.	Moderately rapid permeability; high moisture content.	Nearly level soil	Low fertility	Flood hazard; high water table.	Medium available water capacity; moderate infiltration.
Slow permeability; slopes.	Poor stability; poor compaction characteristics.	Irregular slopes	Irregular slopes	Well drained	Medium available water capacity; slow infiltration; slopes.
Moderate permeability; slopes.	Moderate shrink-swell potential.	Irregular slopes	Irregular slopes	Well drained	Medium available water capacity; moderate infiltration; slopes.
Moderate permeability.	High moisture content; poor shear strength; poor compaction.	Nearly level soil	Nearly level soil	Flood hazard; high water table; moderate permeability.	High available water capacity; slow infiltration.
Slow permeability; fragipan at a depth of 22 inches; slopes.	High moisture content; poor compaction.	Irregular slopes	Low fertility	Slow permeability; fragipan at a depth of 22 inches.	Medium available water capacity; rapid infiltration; slopes.
Moderate permeability; slopes.	Moderate permeability; moderate strength and stability.	Irregular slopes	Irregular slopes; low fertility.	Well drained	Medium available water capacity; rapid infiltration; slopes.
Slow permeability; slopes.	High shrink-swell potential; poor shear strength.	Iregular and gentle to moderately steep slopes.	Irregular and gentle to moderately steep slopes; low fertility.	Slow permeability; well drained.	Medium available water capacity; moderate infiltration; slopes.
Moderate to moderately rapid permeability.	High moisture content; moderate to moderately rapid permeability.	Nearly level soils	Low fertility	Flood hazard; high water table.	Medium available water capacity; moderate infiltration.
Moderate permeability; slopes.	Poor shear strength; moderate permeability; moderate shrink-swell potential.	Irregular slopes	Irregular slopes; severe inherent erodibility.	Well drained	Medium available water capacity; moderate infiltration; slopes.

TABLE 8.—*Engineering*

Soil series and map symbols	Suitability as a source of—		Soil features affecting—
	Topsoil	Road fill	Highway location
Iredell: IdB, IrB	Poor: less than 8 inches of suitable material.	Poor: poor shear strength; high shrink-swell potential.	Poor traffic-supporting capacity; high shrink-swell potential.
Louisburg: LoC, LoF	Poor: surface layer too sandy.	Fair: bedrock at a depth of 2 to 4 feet.	Shallow to rock; slopes
*Madison: MdB, MdC, MdD, MeB2, MeC2, MeD2, MhF. For Pacolet part of unit MhF, see Pacolet series.	Poor: less than 8 inches of suitable material.	Poor: poor shear strength; micaceous rock fragments; moderate shrink-swell potential.	Poor traffic-supporting capacity; slopes; moderate shrink-swell potential; rock fragments.
Mecklenburg: MkB, MkC	Poor: less than 8 inches of suitable material.	Poor: poor shear strength; moderate shrink-swell potential.	Poor traffic-supporting capacity; slopes.
Pacolet: PaD2	Poor: less than 8 inches of suitable material.	Poor: poor shear strength; moderate shrink-swell potential.	Poor traffic-supporting capacity; slopes; moderate shrink-swell potential.
Toccoa: Mapped only with Cartecay soils.	Good	Good	Flood hazard
Vance: VaB, VaC	Poor: less than 8 inches of suitable material.	Poor: poor shear strength; moderate shrink-swell potential.	Poor traffic-supporting capacity; slopes; moderate shrink-swell potential.
*Wehadkee: Wc. For Chewacla part of Wc, see Chewacla series.	Poor: wetness	Poor: poor shear strength; wetness.	High water table; flood hazard.
Wilkes: WkD, WlF	Fair: texture of surface layer.	Fair: 2 to 4 feet of suitable material.	Slopes; shallow to bedrock.
Worsham: Mapped only with Chewacla soils.	Poor: wetness	Poor: poor workability; wetness.	Fair traffic-supporting capacity; high water table.

interpretations of soils—Continued

Soil features affecting—Continued					
Ponds		Terraces and diversions	Grass waterways	Agricultural drainage	Sprinkler irrigation
Reservoir	Embankment				
Slow permeability; slopes.	High shrink-swell potential; poor shear strength.	Irregular slopes; clayey subsoils.	Irregular slopes; clayey subsoils.	Slow permeability	Slow infiltration; high available water capacity; slopes.
Slopes; moderately rapid permeability.	Limited borrow material; moderately rapid permeability.	Irregular slopes; shallow soil.	Irregular slopes; shallow soil; low fertility.	Well drained to excessively drained.	Slopes; low available water capacity; shallow soil.
Slopes; moderate permeability.	Poor shear strength; micaceous rock fragments; moderate shrink-swell potential.	Irregular and steep slopes.	Irregular and steep slopes.	Well drained	Medium available water capacity; moderate infiltration; slopes.
Slopes; slow permeability.	Poor shear strength; moderate shrink-swell potential.	Irregular slopes	Irregular slopes; low fertility.	Slow permeability; well drained.	Medium available water capacity; slow infiltration; slopes.
Slopes; moderate permeability.	Poor shear strength; moderate shrink-swell potential.	Irregular and steep slopes.	Slopes; low fertility	Well drained	Medium available water capacity; moderate infiltration; slopes.
Moderately rapid permeability.	Moderately rapid permeability.	Nearly level soil	Low fertility	Flood hazard	Low to medium available water capacity; moderate infiltration.
Slopes; slow permeability.	Poor shear strength; moderate shrink-swell potential.	Irregular slopes	Irregular slopes; low fertility.	Slow permeability; well drained.	Medium available water capacity; slow in filtration; slopes.
Moderate permeability.	High moisture content; poor shear strength; poor compaction.	Nearly level soil	Nearly level soil	Flood hazard; high water table.	High available water capacity; moderate infiltration.
Moderately slow permeability; slopes.	Limited borrow material; shallow to rock; moderately slow permeability.	Irregular slopes; shallow to rock.	Irregular slopes; shallow to rock.	Well drained	Low to very low available water capacity; moderate infiltration.
Slow permeability	High moisture content; poor compaction.	Nearly level soil; poorly drained.	Nearly level soil; poorly drained.	High water table; slow permeability.	Medium available water capacity; moderate infiltration.

Many sites in the county are suitable for ponds. Many ponds have been built, and they are for fishing and for watering livestock. Needs in constructing a pond are: (1) selecting a site where a maximum amount of water can be impounded at a minimum cost; (2) preventing excessive seepage under or through the dam or along the abutments; (3) providing adequate fill material to build a stable embankment; (4) providing spillways adequate to carry off storm water; and (5) stabilizing embankments and emergency spillways by establishing suitable vegetation (fig. 8).

Most cropland in Laurens and Union Counties needs a complete water-disposal system to control erosion. The system should consist of one or all of the following: (1) diversions, (2) terraces, and (3) grassed waterways. Diversions channel water from higher land to sites where it can be disposed of safely. Terraces reduce erosion damage by intercepting surface runoff and conducting it to a stable outlet in cropland that has a 2 to 10 percent slope. It is not feasible to build terraces where the slope is less than 2 percent or more than 10 percent. The spacing between terraces depends on percentage of slope. The gradient of the terrace depends on erodibility of the soil. Terraces on fine-textured, less erodible soils can have steeper grades than terraces on light, erodible soils. Various grades are used on irregular slopes to improve terrace alinement and spacing, since crooked and unevenly spaced terraces make cultivation difficult. Land smoothing is also used on terraces to permit better row drainage and terrace alinement. Waterways are constructed in natural draws to serve as outlets for diversions and terraces. The deepening and widening of shallow depressions may be required to provide adequate depth and capacity for drainage from rows and terraces. Natural draws and depressions should be seeded or sodded to adapted vegetation.

Most soils on flood plains along rivers and creeks have a high water table, or are subject to flooding, or both. For favorable production, most of these soils need some type of surface or subsurface drainage. Depending on land use, outlets, or soil permeability, either an open ditch or tile drain (or a combination) is needed to provide adequate drainage.

Very little irrigation is done in the county. Most of it is done with sprinklers. Because the rate of infiltration is low and the soils are sloping, water should be applied at a rate of one-half inch of water per hour or less.

Use of the soils in community development

Table 9 rates the limitations to use of soils as sites for dwellings and light industry, septic tank filter fields, sewage lagoons, local roads and streets, camp areas, pic-

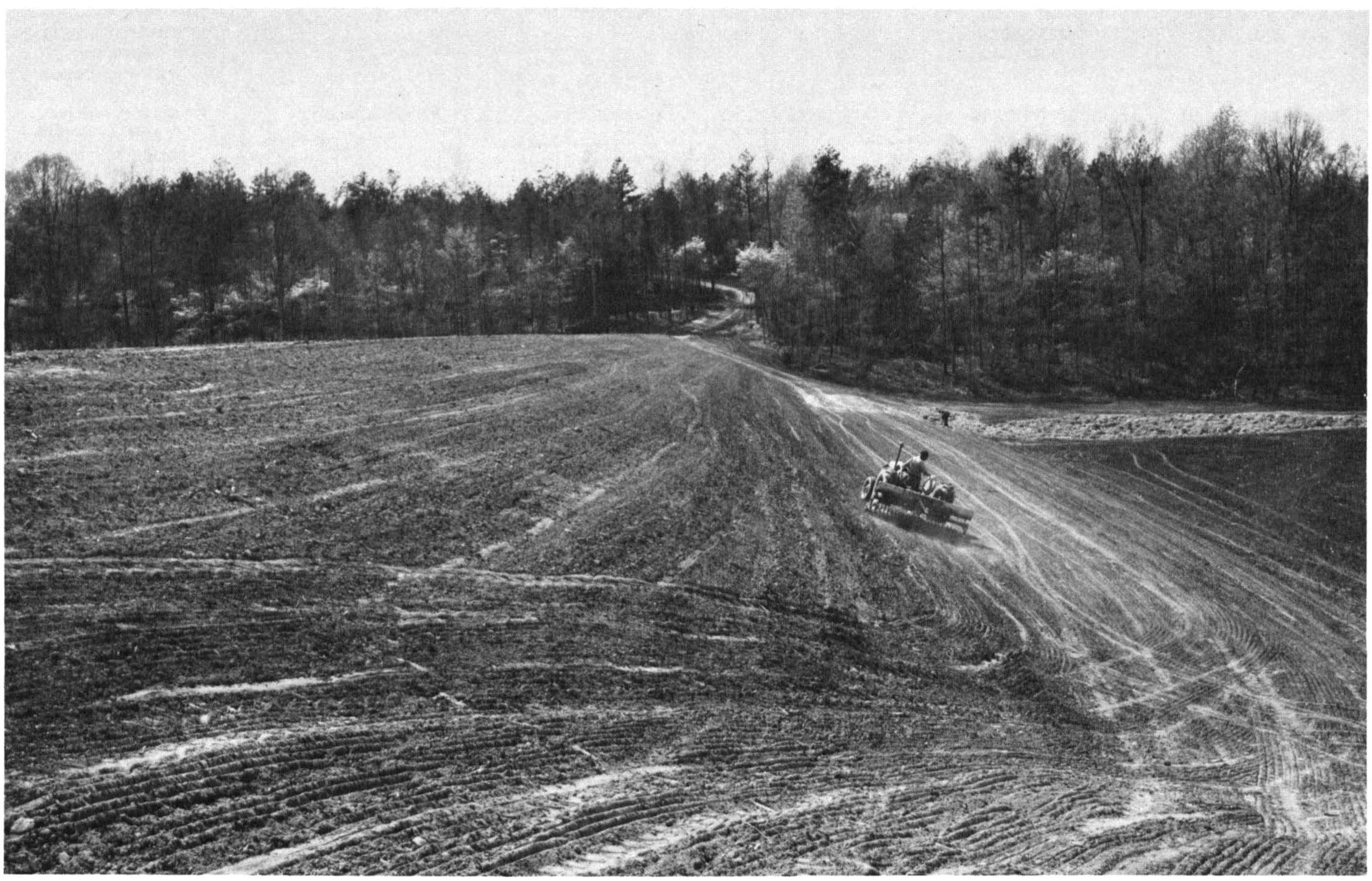

***Figure 8.*—Seedbed preparation on dam embankment covered with material from surface layer of Cecil sandy loam, 6 to 10 percent slopes. The dam was constructed of material dominantly from the subsoil of Cecil soils.**

nic areas, playgrounds, and paths and trails. The ratings are slight, moderate, and severe. The main soil properties that determine the rating are given for all ratings except slight. *Slight* means that the soils have few or no limitations, or that the limitations can be easily overcome. *Moderate* indicates that limitations should be recognized, but that they can be overcome by practical means. A rating of *severe* indicates that suitability of the soils is questionable because the limitations are difficult to overcome.

The following paragraphs list the soil properties considered when the soils were rated for specified uses.

Sites for dwellings and light industries.—These are sites for buildings of three stories or less. Public or community facilities for sewage disposal are assumed to be available. The factors considered in rating the soils are bearing strength, slope, depth to the water table, hazard of flooding, and depth to rock. Engineers and others should not apply specific values to the estimates given for bearing capacity of soils.

Local roads and streets.—These are streets in residential areas and roads that can be built at low cost. Construction requirements are only small cuts, fills, and little preparation of subgrade. Factors in rating the limitations are slope, depth to bedrock, depth to the water table, hazard of flooding, wetness, and traffic-supporting capacity.

Septic tank filter fields and sewage lagoons.—The principal reasons for assigning moderate to severe limitations to sewage lagoons and septic tank filter fields are given. The soil features influencing these uses are permeability, percolation rate, location of the water table, susceptibility to flooding, depth to bedrock, and slope.

Recreational sites.—The chief factors that limit the use of soils for recreational sites are slope, trafficability, permeability, texture of soil, depth to the water table, flooding, drainage, and depth to bedrock. Limitations are rated for camp areas, picnic areas, playgrounds, and paths and trails.

Formation and Classification of the Soils

This section has two parts. The first tells how the soils of Laurens and Union Counties formed. It discusses the principal factors controlling soil formation and the morphology of soils.

The second part tells how the soils are classified and discusses the Comprehensive Soil Classification System. The second part contains a table showing classification of the soil series into families, subgroups, and orders of the Comprehensive System.

Factors of Soil Formation

The soils of Laurens and Union Counties were produced out of parent material through time by the action of living organisms, climate, and relief. Each of these forces interacted with the others and slowly, but constantly, soil was formed. This process is continuing today. In some soils, one or two soil-forming factors are dominant and determine most characteristics of the soil. In other soils, each of the factors contributes about equally to the nature of the soil. Horizons, or layers, are formed in soils by the addition, removal, transfer, or transformation of materials.

The five primary soil-forming factors are discussed in the following paragraphs.

Parent material

Parent material is the unconsolidated mass from which a soil develops. In Laurens and Union Counties, about 91 percent of the soils formed in residual parent material, and about 9 percent in alluvium deposited along flood plains of the streams.

Residual parent material is partly weathered minerals that accumulated by weathering of the underlying bedrock. For the most part, the bedrock of Laurens and Union Counties is granite, gneiss, schist, and gabbro diorite (*4*), cut by dikes, or intrusions, of minor rock. Soils formed in residuum from this bedrock have morphological, chemical, and textural characteristics related to the bedrock.

Granite rocks contain quartz, which is hard and weathers slowly. Soils derived from granite have a sandy surface layer. Appling, Colfax, Durham, and Louisburg soils are the dominant soils formed in this material. Gneiss rocks are neither so hard nor so dense as granite and weather more readily. Hornblende gneiss contains less quartz than granitic rocks. Soils derived from gneiss have a sandy loam to loam surface layer. Schist rocks are micaceous, relatively soft, and deeply weathered. Soils derived from schist have a sandy loam to fine sandy loam surface layer. Pacolet, Cataula, Cecil, Hiwassee, and Madison soils are the dominant soils formed in gneiss and schist. The steep or moderately steep soils derived from granite, gneiss, or schist are weakly developed and shallow. Soils derived from granite, gneiss, or schist are medium to strongly acid. Gabbro-diorite weathers at a moderate rate, while intrusions weather slowly. Soils derived from gabbro-diorite generally have a fine sandy loam to loam surface layer over a plastic clay. Iredell and Mecklenburg soils are the dominant soils formed in this material. These soils are less acid than soils formed in material weathered from granite, gneiss, and schist.

In Laurens and Union Counties alluvium consists of a mixture of gravel, sand, silt, and clay. Much of this alluvium is from nearby uplands, but some is from the Piedmont Plateau and the mountains farther north. Soils that formed in alluvium are on bottom lands. These soils are weakly developed and in places still receive deposits during floods. Cartecay, Chewacla, Enoree, Toccoa, and Wehadkee soils are the dominant soils formed in alluvium.

Relief

Relief is the lay of the land. It is determined by underlying bedrock formations, the geologic history of the region, the climate, and the effects of dissection by rivers and streams. Relief influences soil formation through its effect on drainage, erosion, temperature, and plant cover. This influence is modified by the other factors of soil formation.

TABLE 9.—*Limitations of soils*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in referring to other series that appear

Soil series and map symbols	Sites for dwellings	Sites for light industry	Local roads and streets	Septic tank filter fields
Appling: ApB, ApC	Moderate: fair bearing strength.	Moderate: fair bearing strength; 2 to 8 percent slopes. Severe: 8 to 10 percent slopes.	Moderate: fair traffic-supporting capacity.	Moderate: moderate permeability.
Buncombe: Bu	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
*Cartecay: Ca. For Toccoa part of Ca, see Toccoa series.	Severe: subject to flooding; high water table.	Severe: subject to flooding; high water table.	Severe: subject to flooding; high water table.	Severe: subject to flooding; high water table.
Cataula: CdB2, CdC2, CeB2, CeC2.	Moderate: fair bearing strength.	Severe: high corrosion potential.	Severe: poor traffic-supporting capacity.	Severe: slow permeability.
Cecil: ClB, ClC2, ClD, CmB2, CmC2.	Moderate: fair bearing strength; moderate shrink-swell potential.	Moderate: fair bearing strength; moderate shrink-swell potential; 2 to 8 percent slopes. Severe: 8 to 15 percent slopes.	Moderate: fair traffic-supporting capacity.	Moderate: moderate permeability.
*Chewacla: Cn, Cw. For Worsham part of Cw, see Worsham series.	Severe: subject to flooding; high water table.	Severe: subject to flooding; high water table.	Severe: subject to flooding; high water table.	Severe: subject to flooding; high water table.
Colfax: CxB	Severe: somewhat poorly drained; subject to ponding.	Severe: somewhat poorly drained; subject to ponding.	Moderate: somewhat poorly drained.	Severe: slow permeability.
Durham: DuB, DvB, DvC.	Moderate: fair bearing strength.	Moderate: fair bearing strength; 2 to 8 percent slopes. Severe: 8 to 10 percent slopes.	Moderate to severe: fair to poor traffic-supporting capacity.	Slight: 2 to 8 percent slopes. Moderate: 8 to 10 percent slopes.
Enon: EnB, EnC, EnD, EnE.	Severe: low bearing strength; high shrink-swell potential.	Severe: low bearing strength; high shrink-swell potential.	Severe: poor traffic-supporting capacity; high shrink-swell potential.	Severe: slow permeability.
Enoree: Eo	Severe: subject to flooding; high water table.	Severe: subject to flooding; high water table.	Severe: subject to flooding; high water table.	Severe: subject to flooding; high water table.
Hiwassee: HwB, HyB2, HwC2, HyC2, HyD2, HwD2.	Moderate: fair bearing strength.	Moderate: fair bearing strength; 2 to 8 percent slopes. Severe: 8 to 15 percent slopes.	Moderate: fair traffic-supporting capacity.	Moderate: moderate permeability.

in community development

such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for in the first column of this table]

Sewage lagoons	Camp areas	Picnic areas	Playgrounds	Paths and trails
Moderate: moderate permeability; 2 to 7 percent slopes. Severe: 7 to 10 percent slopes.	Slight: 2 to 8 percent slopes. Moderate: 8 to 10 percent slopes.	Slight: 2 to 8 percent slopes. Moderate: 8 to 10 percent slopes.	Moderate: 2 to 6 percent slopes. Severe: 6 to 10 percent slopes.	Slight.
Severe: rapid permeability.	Severe: subject to flooding; sand surface and subsurface layers more than 20 inches thick.	Moderate: subject to flooding; sand surface and subsurface layers more than 20 inches thick.	Severe: subject to flooding; sand surface and subsurface layers more than 20 inches thick.	Moderate: subject to flooding; sand surface and subsurface layers more than 20 inches thick.
Severe: moderately rapid permeability.	Severe: subject to flooding; high water table.	Moderate: subject to flooding; high water table.	Severe: subject to flooding; high water table.	Moderate: subject to flooding; high water table.
Moderate: 2 to 7 percent slopes. Severe: 7 to 10 percent slopes.	Moderate: slow permeability.	Slight: sandy loam surface layer, 2 to 8 percent slopes. Moderate: sandy clay loam and sandy loam surface layer, 8 to 10 percent slopes.	Moderate: 2 to 6 percent slopes. Severe: 6 to 10 percent slopes.	Slight: sandy loam surface layer. Moderate: sandy clay loam surface layer.
Moderate: moderate permeability; 2 to 7 percent slopes. Severe: 7 to 15 percent slopes.	Slight: sandy loam surface face layer, 2 to 8 percent slopes. Moderate: sandy clay loam surface layer, 2 to 15 percent slopes; and sandy loam surface layer, 8 to 15 percent slopes.	Slight: sandy loam surface face layer, 2 to 8 percent slopes. Moderate: sandy clay loam surface layer, 2 to 15 percent slopes; and sandy loam surface layer, 8 to 15 percent slopes.	Moderate: 2 to 6 percent slopes. Severe: 6 to 15 percent slopes.	Slight: sandy loam surface layer. Moderate: sandy clay loam surface layer.
Moderate if protected from flooding; moderate permeability.	Severe: subject to flooding; high water table.	Severe: subject to flooding; high water table.	Severe: subject to flooding; high water table.	Moderate: subject to flooding; high water table.
Moderate: slopes-----	Moderate: slow permeability; somewhat poorly drained.	Moderate: somewhat poorly drained.	Moderate: slow permeability; somewhat poorly drained.	Moderate: somewhat poorly drained.
Moderate: moderate permeability; 2 to 7 percent slopes. Severe: 7 to 10 percent slopes.	Slight: 2 to 8 percent slopes. Moderate: 8 to 10 percent slopes.	Slight: 2 to 8 percent slopes. Moderate: 8 to 10 percent slopes.	Moderate: 2 to 6 percent slopes. Severe: 6 to 10 percent slopes.	Slight.
Moderate: 2 to 7 percent slopes. Severe: 7 to 25 percent slopes.	Moderate: slow permeability; 2 to 15 percent slopes. Severe: 15 to 25 percent slopes.	Slight: 2 to 8 percent slopes. Moderate: 8 to 15 percent slopes. Severe: 15 to 25 percent slopes.	Moderate: slow permeability; 2 to 6 percent slopes. Severe: 6 to 25 percent slopes.	Slight: 2 to 15 percent slopes. Moderate: 15 to 25 percent slopes.
Severe: moderate to moderately rapid permeability.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.
Moderate: moderate permeability; 2 to 7 percent slopes. Severe: 7 to 15 percent slopes.	Slight: sandy loam, loam surface layer; 2 to 8 percent slopes. Moderate: sandy clay loam surface layer, 2 to 15 percent slopes; and sandy loam or loam surface layer, 8 to 15 percent slopes.	Slight: sandy loam, loam surface layer; 2 to 8 percent slopes. Moderate: sandy clay loam surface layer, 2 to 15 percent slopes; and sandy loam or loam surface layer, 8 to 15 percent slopes.	Moderate: 2 to 6 percent slopes. Severe: 6 to 15 percent slopes.	Slight: sandy loam, loam surface layer. Moderate: sandy clay loam surface layer.

TABLE 9.—*Limitations of soils*

Soil series and map symbols	Sites for dwellings	Sites for light industry	Local roads and streets	Septic tank filter fields
Iredell: IdB, IrB	Severe: low bearing strength; high shrink-swell potential.	Severe: high corrosion potential; low bearing strength; high shrink-swell potential.	Severe: poor traffic-supporting capacity; high shrink-swell potential.	Severe: slow permeability.
Louisburg: LoC, LoF	Moderate: bedrock within 2 to 4 feet of surface; 6 to 15 percent slopes. Severe: 15 to 40 percent slopes.	Moderate: bedrock within 2 to 4 feet of surface; 6 to 8 percent slopes. Severe: 8 to 40 percent slopes.	Moderate: bedrock within 2 to 4 feet of surface; 6 to 8 percent slopes. Severe: 8 to 40 percent slopes.	Severe: bedrock within 2 to 4 feet of surface.
*Madison: MdB, MeB2, MdC, MeC2, MdD, MeD2, MhF. For Pacolet part of MhF, see Pacolet series.	Moderate: fair bearing strength; 2 to 15 percent slopes. Severe: 15 to 40 percent slopes.	Moderate: fair bearing strength; 2 to 8 percent slopes. Severe: 8 to 40 percent slopes.	Severe: poor traffic-supporting capacity.	Moderate: moderate permeability; bedrock commonly within 3 to 6 feet of surface; 2 to 15 percent slopes. Severe: 15 to 40 percent slopes.
Mecklenburg: MkB, MkC.	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.	Severe: poor traffic-supporting capacity.	Severe: slow permeability.
Pacolet: PaD2	Moderate: fair bearing strength; 10 to 15 percent slopes. Severe: 15 to 40 percent slopes.	Severe: 10 to 40 percent slopes.	Severe: poor traffic-supporting capacity.	Moderate: 10 to 15 percent slopes. Severe: 15 to 40 percent slopes.
Toccoa: Mapped only with Cartecay soils.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Vance: VaB, VaC	Moderate: fair bearing strength.	Moderate: fair bearing strength; 2 to 8 percent slopes. Severe: 8 to 10 percent slopes.	Severe: poor traffic-supporting capacity.	Severe: slow permeability.
*Wehadkee: Wc. For Chewacla part of Wc, see Chewacla series.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.
Wilkes: WkD, WlF	Severe: bedrock within 2 to 4 feet of surface; 6 to 40 percent slopes.	Moderate: 6 to 8 percent slopes. Severe: 8 to 40 percent slopes.	Severe: bedrock within 2 to 4 feet of surface.	Severe: bedrock within 2 to 4 feet of surface.
Worsham: Mapped only with Chewacla soils.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: slow permeability; high water table; subject to flooding.

in community development—Continued

Sewage lagoons	Camp areas	Picnic areas	Playgrounds	Paths and trails
Moderate: 2 to 6 percent slopes. Severe: bedrock within 40 inches of surface.	Moderate: high water table.	Moderate: high water table.	Moderate: high water table.	Moderate: high water table.
Severe: bedrock within 2 to 4 feet of surface; moderately rapid permeability.	Moderate: rockiness on surface; 6 to 15 percent percent slopes. Severe: 15 to 40 percent slopes.	Moderate: rockiness on surface; 6 to 15 percent percent slopes. Severe: 15 to 40 percent slopes.	Severe: 6 to 40 percent slopes.	Moderate: rockiness on surface; 6 to 25 percent slopes. Severe: 25 to 40 percent slopes.
Moderate: moderate permeability; 2 to 7 percent slopes. Severe: 7 to 40 percent slopes.	Slight: sandy loam surface layer; 2 to 8 percent slopes. Moderate: sandy clay loam surface layer, 2 to 15 percent slopes; and sandy loam surface layer, 2 to 15 percent slopes. Severe: 15 to 40 percent slopes.	Slight: sandy loam surface layer; 2 to 8 percent slopes. Moderate: sandy clay loam surface layer, 2 to 15 percent slopes; and sandy loam surface layer, 8 to 15 percent slopes. Severe: 15 to 40 percent slopes.	Moderate: 2 to 6 percent slopes. Severe: 6 to 40 percent slopes.	Slight: sandy loam surface layer; 2 to 15 percent slopes. Moderate: sandy clay loam surface layer, 2 to 25 percent slopes; and sandy loam surface layer, 15 to 25 percent slopes. Severe: 25 to 40 percent slopes.
Moderate: 2 to 7 percent slopes. Severe: 7 to 10 percent slopes.	Moderate: slow permeability.	Slight: 2 to 8 percent slopes. Moderate: 8 to 10 percent slopes.	Moderate: 2 to 6 percent slopes. Severe: 6 to 10 percent slopes.	Slight.
Severe: 10 to 40 percent slopes.	Moderate: 10 to 15 percent slopes. Severe: 15 to 40 percent slopes.	Moderate: 10 to 15 percent slopes. Severe: 15 to 40 percent slopes.	Severe: 10 to 40 percent slopes.	Slight: 10 to 15 percent slopes. Moderate: 15 to 25 percent slopes. Severe: 25 to 40 percent slopes.
Severe: moderately rapid permeability.	Severe: subject to flooding.	Moderate: subject to flooding.	Severe: subject to flooding.	Moderate: subject to flooding.
Moderate: 2 to 7 percent slopes. Severe: 7 to 10 percent slopes.	Moderate: slow permeability.	Slight: 2 to 8 percent slopes. Moderate: 8 to 10 percent slopes.	Moderate: slow permeability; 2 to 6 percent slopes. Severe: 6 to 10 percent slopes.	Slight.
Severe: subject to flooding. Moderate if protected from flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.
Severe: bedrock within 2 to 4 feet of surface.	Moderate: moderately slow permeability; 6 to 15 percent slopes. Severe: 15 to 40 percent slopes.	Slight: 6 to 8 percent slopes. Moderate: 8 to 15 percent slopes. Severe: 15 to 40 percent slopes.	Severe: 6 to 40 percent slopes.	Slight: 6 to 15 percent slopes. Moderate: 15 to 25 percent slopes. Severe: 25 to 40 percent slopes.
Slight if protected from flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.

Slopes in Laurens and Union Counties range from 0 to 40 percent. Most soils on uplands that have slopes of less than 15 percent have a thick, well-developed profile. Cecil and Durham soils are examples. Where slopes range from 15 to 40 percent, geologic erosion, creep, or slide removes soil material. As a result, moderately deep or shallow soils, such as Louisburg or Wilkes soils, formed.

Time

The length of time required for soil development depends largely on the intensity of other soil-forming factors. Less time is required for a soil to develop from coarse-textured than from fine-textured parent material, other things being equal. On smoother parts of the uplands, soil materials have been in place a long time, and soils have developed horizons that are widely differentiated. On stronger slopes, geologic erosion has removed soil material and the depth to bedrock is shallow; therefore, less development has taken place. On flood plains soil materials are added at such a rate that soil-forming processes do not greatly alter them. These soils have been in place only a short time.

Climate

The climate of Laurens and Union Counties is temperate and uniform in both counties. Winters are mild and summers warm. The climate has contributed to basic similarities in most soils of the area.

Climate affects the physical, chemical, and biological relationships in the soil through the influence of precipitation and temperature. Water dissolves minerals, supports chemical and biological activity, and transports mineral and organic residues through the soil.

The amount of water that percolates through the soil is dependent upon rainfall, humidity, frost-free period, and the infiltration rate, physiographic position, slope, and permeability of the soil. Large amounts of rainwater promote leaching of soluble bases and the translocation of less soluble and colloidal material downward through the soil.

Temperature influences the kinds and growth of living organisms and the speed of physical and chemical reaction in the soils.

In Laurens and Union Counties, most of the soils are highly leached, acid, low in fertility, and have well-developed horizons. The effect of climate has not overcome the young age of the soils formed in alluvium, nor has it overcome relief on some of the steeper soils.

Living organisms

The numbers and kinds of plants and animals that live in and on the soil are determined mainly by climate, but are influenced by parent material, relief, and age of the soil.

Bacteria, fungi, and other micro-organisms are indispensable in soil formation. They hasten the weathering of rock and the decomposing of organic matter. They assimilate and transform chemicals of the soil. Most fungi, bacteria, and other micro-organisms in the soils of Laurens and Union Counties are in the upper few inches of the soil. The activity of earthworms and other small invertebrates is chiefly in the A horizon and the upper part of the B horizon, where these organisms slowly but continuously mix the soil material. Larger plants alter the soil microclimate, furnish organic matter, and transfer chemical elements from the subsoil to the surface soil. They cause a mixing of materials as large trees are uprooted.

Morphology of Soils

If a vertical cut is dug into a soil, several layers or horizons are exposed. The differentiation of horizons is the result of many soil-forming processes. These include the accumulation of organic matter, the leaching of soluble salts, the reduction and translocation of iron, the formation of soil structure, physical weathering such as freezing and thawing, and chemical weathering of primary minerals or rocks.

Some of these processes are continual in all soils, but the number of active processes and the degree of their activity vary from one soil to another.

Most soils contain three major horizons called A, B, and C (*9*). These major horizons may be further subdivided by the use of subscripts and letters to indicate changes within one horizon. An example would be the B2t horizon that represents a layer within the B horizon that has translocated clay illuviated from the A horizon.

The A horizon is the surface layer. The layer with the largest accumulation of organic matter is called an A1 horizon. If the soils are cleared and plowed, the surface layer becomes an Ap horizon. Iredell soils are an example of soils that have a distinctive, dark-colored A1 or Ap horizon. The A horizon is also the layer of maximum leaching or eluviation of clay and iron. When considerable leaching has taken place, an A2 horizon forms just below the surface layer. It is normally the lightest colored horizon in the soil. It is found in soils such as Colfax and Durham.

The B horizon lies under the A horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation of clay, iron, aluminum, or other compounds, leached from the A horizon. Appling, Cecil, and Hiwassee soils have a prominent B horizon.

The C horizon is below the A and B horizons. Some soils, such as Buncombe and Cartecay soils, have not formed a B horizon, and the C horizon lies immediately under the A horizon. The C horizon consists of materials that are little altered by the soil-forming processes, but may be modified by weathering.

Some soils, such as Cataula and Colfax soils, have a fragipan that generally occurs below the B horizon, 20 to 36 inches below the surface. This horizon is very low in organic-matter content. It is seemingly cemented and is hard or very hard when dry and brittle when moist. The fragipan is generally mottled, is slowly or very slowly permeable to water, and generally has few or many bleached fracture planes that form polygons.

Soils in Laurens and Union Counties that are well drained have yellowish-brown or reddish subsoils. These colors are the result of a thin coating of iron oxide on the sand, silt, and clay particles. A soil is considered well drained if it is free of gray (chroma 2 or less) mottles to a depth of at least 30 inches. Among the soils in

Laurens and Union Counties that are well drained are Cecil, Hiwassee, and Vance soils.

Soils that are moderately well drained and wet for short periods are generally free of gray (chroma 2 or less) mottles to a depth of about 15 to 20 inches. Soils that are somewhat poorly drained have gray mottles near the A horizon. Cartecay and Iredell soils are moderately well to somewhat poorly drained.

The reduction and transfer of iron is associated with the wetter soils that are more poorly drained. This process is called gleying. Soils that are poorly drained, such as Wehadkee and Worsham soils, have subsoils and underlying materials that are grayish, indicating the reduction and transfer of iron.

Classification of the Soils

The purpose of soil classification is to help us remember the significant characteristics of soils, assemble our knowledge about the soils, see their relationships to one another and to the whole environment, and develop principles relating to their behavior and their response to manipulation. First through classification and then through the use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The current system of soil classification (*7*, *10*) was adopted by the Cooperative Soil Survey in 1965. It is a comprehensive system, designed to accommodate all soils. In this system classes of soils are defined in terms of observable or measurable properties. The properties chosen are primarily those that result in the grouping of soils of similar genesis, or mode of origin. Genesis does not, however, appear in the definitions of the classes.

The current system of classification has six categories. Beginning with the most inclusive, the categories are the order, the suborder, the great group, the subgroup, the family, and the series. Table 10 shows the classification of the soils of Laurens and Union Counties according to this system. Brief descriptions of the six categories follow.

Order.—Ten soil orders are recognized: Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate orders are those that tend to give broad climatic groupings of soils. Two exceptions to this generalization are the Entisols and the Histosols, both of which occur in many different climates. Four of the ten orders are represented in Laurens and Union Counties: Alfisols, Inceptisols, Ultisols, and Entisols.

Suborder.—Each order is divided into suborders, mainly on the basis of soil characteristics that result in grouping soils according to genetic similarity. The climatic range is narrower than that of the order. The properties used are mainly those that reflect either the presence or absence of waterlogging or differences in climate or vegetation.

Great group.—Each suborder is divided into great groups on the basis of similarity in the kind and sequence of the major horizons and in major soil properties. The horizons considered are those in which clay, iron, or humus have accumulated and those in which pans that interfere with the growth of roots and the movement of water have formed. The properties are soil temperature, chemical composition (mainly content of calcium, magnesium, sodium, and potassium), and the like.

Subgroup.—Each great group is divided into subgroups, one that represents the central (typic) concept of the group, and others, called intergrades, that have one or more properties of another great group, suborder, or order.

TABLE 10.—*Soil series classified according to the current system of classification*

Series	Family	Subgroup	Order
Appling	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Buncombe	Mixed, thermic	Typic Udipsamments	Entisols.
Cartecay	Coarse-loamy, mixed, nonacid, thermic	Aquic Udifluvents	Entisols.
Cataula	Clayey, kaolinitic, thermic	Typic Fragiudults	Ultisols.
Cecil	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Chewacla	Fine-loamy, mixed, thermic	Fluvaquentic Dystrochrepts	Inceptisols.
Colfax [1]	Fine-loamy, mixed, thermic	Aquic Fragiudults	Ultisols.
Durham	Fine-loamy, siliceous, thermic	Typic Hapludults	Ultisols.
Enon [2]	Fine, mixed, thermic	Ultic Hapludalfs	Alfisols.
Enoree	Coarse-loamy, mixed, nonacid, thermic	Aeric Fluvaquents	Entisols.
Hiwassee	Clayey, kaolinitic, thermic	Typic Rhodudults	Ultisols.
Iredell	Fine, montmorillonitic, thermic	Typic Hapludalfs	Alfisols.
Louisburg	Coarse-loamy, mixed, thermic	Ruptic-Ultic Dystrochrepts	Inceptisols.
Madison	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Mecklenburg [3]	Fine, mixed, thermic	Ultic Hapludalfs	Alfisols.
Pacolet	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Toccoa	Coarse-loamy, mixed, nonacid, thermic	Typic Udifluvents	Entisols.
Vance	Clayey, mixed, thermic	Typic Hapludults	Ultisols.
Wehadkee	Fine-loamy, mixed, nonacid, thermic	Typic Fluvaquents	Entisols.
Wilkes	Loamy, mixed, thermic, shallow	Typic Hapludalfs	Alfisols.
Worsham	Clayey, mixed, thermic	Typic Ochraquults	Ultisols.

[1] These soils are taxadjuncts to the Colfax series. Gray mottles begin at a slightly greater depth and the fragipan is at a slightly lesser depth than is defined as the range for the series.

[2] These soils are taxadjuncts to the Enon series. Base saturation is greater than is defined as the range for the series.

[3] Some of these soils are taxadjuncts to the Mecklenburg series. Base saturation is higher than is defined as the range for the series.

Family.—Families are established within each subgroup, primarily on the basis of properties important to the growth of plants or properties significant in engineering. Texture, mineral content, reaction, soil temperature, permeability, thickness of horizons, and consistence are among the properties considered.

Series.—A series is a group of soils that have horizons similar in all important characteristics, except for texture of the surface layer, and similar in arrangement in the profile. (See the section "How This Survey Was Made.")

Additional Facts About Laurens and Union Counties

The climate, physiography, drainage, and geology of Laurens and Union Counties are described in the paragraphs that follow.

Physiography, Drainage, and Geology

Laurens and Union Counties lie between the Saluda River on the west and the Broad River on the east, in northwestern South Carolina. The Enoree River forms a common boundary between the two counties. The general slope is eastward, which is the general direction of the main drainageways. The land ranges from nearly level to steep, but most areas are gently sloping to moderately steep.

The highest point in these counties, about 870 feet, is on Big Knob, west of Barksdale in Laurens County (*4*). The elevation in the central part of these counties ranges from about 500 to 700 feet. There is a series of hills in the northern part of Union County which rises about 50 to 150 feet above the surrounding area. Big and Little Knobs, in the northwestern part of Laurens County, rise about 100 to 200 feet above the surrounding area. The lowest elevation, about 350 feet, is at the intersection of the Tyger and Broad Rivers in the southeastern part of Union County.

The rivers and smaller streams in these counties form a dendritic pattern of drainage. The major streams that drain these counties are Saluda, Little, Bush, Enoree, Tyger, and Broad Rivers. The chief tributaries are Campbell, Rabon, Indian, Duncan, Warrior, Beaver Dam, and Durbin Creeks in Laurens County and Frenchmans, Padgets, Dutchmans, Fairforest, Mitchells, Rocky, and Browns Creeks in Union County.

Laurens and Union Counties are in the Piedmont area of the State. Geologically, this area is a dissected peneplain containing a few remnants of an ancient mountain range. The materials underlying the soils of Laurens and Union Counties are primarily granite, gneiss, schist, gabbro, diorite, and alluvium. Dikes of material derived from minor rocks intrude into these major underlying rocks.

The granites are Paleozoic rock. Granite rock of Laurens and Union Counties is fine grained, coarse grained, and undivided. Soils of the Appling, Colfax, Durham, and Louisburg series commonly formed in material weathered from granite formations.

The gneisses are Pre-cambrian rock. These gneisses are granitoid and hornblende gneiss. Soils of the Cecil, Cataula, Hiwassee, Madison, and Pacolet series commonly formed in material weathered from gneiss formations.

The schists are Precambrian rock. Biotite, hornblende, and sericite schists are the most common in Laurens and Union Counties. Soils of the Cataula, Cecil, Hiwassee, and Madison series commonly formed in material weathered from schist formations.

The gabbro diorites are Paleozoic rock. They generally are intermediate between true gabbro and true diorite. Soils of the Iredell and Mecklenburg series commonly formed in material weathered from gabbro and diorite formations.

Alluvium on the flood plains is of Recent age. The recent alluvium consists of a mixture of gravel, sand, loam, silt, and clay. Much of this alluvium weathered from rocks in nearby uplands. Soils of the Chewacla, Wehadkee, Toccoa, Cartecay, and Enoree series commonly formed in alluvium.

Climate[7]

The climate of Laurens and Union Counties is temperate: winters are mild and summers rather warm. Weather in the fall, winter, and spring is controlled largely by the west to east motion of fronts, cyclones, and air masses. Air mass exchanges are infrequent in summer, and maritime tropical air persists in the area for extended periods. Although rainfall is ample, this is one of the relatively dry areas of the State, with 44 to 48 inches falling annually. The annual distribution of precipitation reaches a maximum in March and July of about 5 inches, a minimum of about 3 inches in May, and another minimum of about 2½ inches in October. Temperature and precipitation data are given in table 11.

The nearest wind and humidity records are at Greenville and Spartanburg. These records show the prevailing winds to be from the northeast in autumn and winter and from the southwest in spring and summer, with average windspeeds about 8 miles per hour. The highest windspeed ever measured in the area was 70 miles per hour at Greenville. The average values of relative humidity at 1:00 p.m. are 53 percent in winter, 49 percent in spring, 51 percent in summer, and 52 percent in autumn. Corresponding values for 7:00 a.m. are 75 percent, 76 percent, 82 percent, and 81 percent, respectively. The sun is visible about 66 percent of the daylight hours, ranging from 58 percent in February to 74 percent in August. One-tenth inch or more of rain falls on about 75 days per year. Annual rainfall has varied from over 68 inches in 1964 to less than 33 inches in 1950.

Summers are warm and long. An average of 68 days have a temperature of 90°F. or higher. The temperature reaches 100° on an average of 3 days per year. Summer is the wettest season. About 29 percent of the annual rainfall falls in summer. Showers and thunderstorms are common. They occur during the frequent presence of warm, moist, and relatively unstable maritime tropical air. Precipitation from a tropical storm is also possible.

[7] By H. LANDERS, State climatologist, Department of Commerce, Environmental Science Service Administration, National Weather Service, Clemson, South Carolina.

TABLE 11.—*Temperature and precipitation*

[All data from Laurens and Santuc]

Month	Temperature				Precipitation				
	Average daily maximum	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—	Average total	One year in 10 will have— Less than—	One year in 10 will have— More than—	Days with snow cover of 1 inch or more	Average depth of snow on days with snow cover
	° F.	° F.	° F.	° F.	Inches	Inches	Inches	Number	Inches
January	56	33	71	16	4. 3	2. 3	7. 2	1	1. 6
February	59	35	73	21	4. 5	1. 6	7. 0	(1)	. 7
March	66	39	80	24	5. 2	2. 4	9. 1	1	. 8
April	76	49	87	33	4. 1	. 9	7. 0	0	0
May	83	58	93	45	3. 3	. 8	5. 4	0	0
June	90	66	98	55	4. 0	1. 7	6. 6	0	0
July	91	69	100	61	4. 8	1. 9	8. 7	0	0
August	90	68	99	60	4. 2	1. 6	9. 6	0	0
September	85	62	95	49	3. 6	. 6	7. 8	0	0
October	71	50	84	33	2. 5	. 4	6. 5	0	0
November	64	40	77	24	3. 0	. 9	7. 2	0	0
December	55	32	70	18	3. 8	2. 0	6. 4	(1)	. 3
Year	73	50	[2] 100	[3] 10	47. 2	35. 5	57. 5	2	3. 4

[1] Less than half a day.
[2] Average annual highest temperature.
[3] Average annual lowest temperature.

Autumn is a warm and pleasant season in which "Indian Summer" type of weather prevails. It is the driest season. The rainfall received is only 20 percent of the annual amount. The average date of the first freezing temperature is October 31st, and in 1 year out of 10 it is as early as October 19th. Tropical storms or hurricanes sometimes strike the State in this season.

Winters are mild, with temperatures as low as 32° on half of the days. Snowfall occurs nearly every winter, but significant amounts come only about once every 3 years, and even these snows seldom remain more than a day or two. Temperatures drop to 20° or less on 10 days and to 15° or less on 4 days. Winter rainfall is about one-fourth of the annual total and is associated with fronts and traveling cyclones.

Spring is a period of change. March is a month of heavy rainfall. A dry period occurs late in April and continues through June. Winter-type steady rains are likely early in spring with scattered thunderstorm activity beginning late in spring as winter gives way to summer. Tornadoes and violent thunderstorms occur more often in spring than in other seasons. The average date of the last freezing temperature in spring is April 14. Table 12 gives the probable dates for the first freezing temperatures in fall and the last in spring.

Severe weather can occur in the form of tornado activity and as tropical storms and hurricanes. The tornado season is mainly from March through August, and April is the peak month. The hurricane and tropical storm season is in the summer and early autumn. There have been only nine tornadoes in Laurens and Union Counties in the last 55 years. No full-fledged hurricane has visited these counties in 50 years; however, the less violent tropical storms affect the area about once every 7 years. They bring heavy rain and minor wind damage.

TABLE 12.—*Probabilities of last freezing temperatures in spring and first in fall*

[All data from Laurens and Santuc]

Probability	Dates for given probability and temperature— 24° F. or lower	28° F. or lower	32° F. or lower
Spring:			
1 year in 10 later than	Mar. 28	Apr. 5	Apr. 18
2 years in 10 later than	Mar. 21	Apr. 2	Apr. 15
5 years in 10 later than	Mar. 9	Mar. 21	Apr. 4
Fall:			
1 year in 10 earlier than	Nov. 2	Oct. 24	Oct. 19
2 years in 10 earlier than	Nov. 7	Oct. 30	Oct. 24
5 years in 10 earlier than	Nov. 22	Nov. 7	Oct. 31

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Glossary

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

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

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

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

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

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

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

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

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

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

Cemented.—Hard and brittle; little affected by moistening.

Gleyed soil. A soil in which waterlogging and lack of oxygen have caused the material in one or more horizons to be neutral gray in color. The term "gleyed" is applied to soil horizons with yellow and gray mottling caused by intermittent waterlogging.

Gravelly soil material. From 15 to 50 percent of material by volume consists of rounded or angular rock fragments that are not prominently flattened and are up to 3 inches in diameter.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

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

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Leaching. The removal of soluble materials from soils or other material by percolating water.

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

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few*, *common*, and *many;* size—*fine*, *medium*, and *coarse;* and contrast—*faint*, *distinct*, and *prominent*. The size measurements are these: *fine*, less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium*, ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse*, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Natural soil drainage. Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low 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 horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. 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 largely from the air and water, are plant nutrients.

Parent material. Disintegrated and partly weathered rock from which soil has formed.

Percolation. The downward movement of water through the soil.

Permeability. The quality that enables the soil to transmit water or air. Terms used to describe permeability are as follows:

very slow, slow, moderately slow, moderate, moderately rapid, rapid, and *very rapid.*

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

Productivity (of soil). The present capability of a soil for producing a specified plant or sequence of plants under a specified system of management. It is measured in terms of output, or harvest, in relation to input of production for the specific kind of soil under a specified system of management.

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

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock. Only the upper part of this, modified by organisms and other soil-building forces, is regarded by soil scientists as soil. Most American engineers speak of the whole regolith, even to great depths, as "soil."

Relief. The elevations or inequalities of a land surface, considered collectively.

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Shrink-swell potential (engineering). Amount that a soil will expand when wet or contract when dry. Indicates kinds of clay in soil.

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

Site index. A numerical means of expressing the quality of a forest site that is based on the height of the dominant stand at an arbitrarily chosen age; for example, the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years.

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

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

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

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

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their usefulness or behavior.

Terrace. An ambankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

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

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

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

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GUIDE TO MAPPING UNITS

For complete information about a mapping unit, read both the description of the mapping unit and that of the soil series to which it belongs. Woodland groups are described on page 39. Other information is given in tables as follows:

Acreage and extent, table 1, page 8.
Estimated yields, table 3, page 32.
Engineering uses of soils, tables 6, 7, and 8, pages 42 to 53.
Soil limitations for community facilities, table 9, page 56.

Map symbol	Mapping unit	Page	Capability unit Symbol	Woodland group Number
ApB	Appling loamy sand, 2 to 6 percent slopes	9	IIe-2	3o7
ApC	Appling loamy sand, 6 to 10 percent slopes	9	IIIe-2	3o7
Bu	Buncombe sand	10	IIIs-2	2s8
Ca	Cartecay-Toccoa complex	10	IIIw-2	-----
	Cartecay soil	--	------	2w8
	Toccoa soil	--	------	1o7
CdB2	Cataula sandy loam, 2 to 6 percent slopes, eroded	11	IIIe-3	3o7
CdC2	Cataula sandy loam, 6 to 10 percent slopes, eroded	11	IVe-2	3o7
CeB2	Cataula sandy clay loam, 2 to 6 percent slopes, eroded	11	IVe-2	5c3e
CeC2	Cataula sandy clay loam, 6 to 10 percent slopes, eroded	11	VIe-3	5c3e
ClB	Cecil sandy loam, 2 to 6 percent slopes	12	IIe-1	3o7
ClC2	Cecil sandy loam, 6 to 10 percent slopes, eroded	12	IIIe-1	3o7
ClD	Cecil sandy loam, 10 to 15 percent slopes	12	IVe-1	3o7
CmB2	Cecil sandy clay loam, 2 to 6 percent slopes, eroded	13	IIIe-1	4c2e
CmC2	Cecil sandy clay loam, 6 to 10 percent slopes, eroded	13	IVe-1	4c2e
Cn	Chewacla loam	14	IIIw-2	1w8
Cw	Chewacla and Worsham soils	14	Vw-1	-----
	Chewacla soil	--	------	1w8
	Worsham soil	--	------	2w8
CxB	Colfax loamy sand, 1 to 4 percent slopes	16	IIIw-3	3w8
DuB	Durham loamy sand, 2 to 6 percent slopes	16	IIe-2	3o7
DvB	Durham sandy loam, 2 to 6 percent slopes	16	IIe-2	3o7
DvC	Durham sandy loam, 6 to 10 percent slopes	16	IIIe-2	3o7
EnB	Enon sandy loam, 2 to 6 percent slopes	17	IIe-3	4o1
EnC	Enon sandy loam, 6 to 10 percent slopes	17	IIIe-3	4o1
EnD	Enon sandy loam, 10 to 15 percent slopes	17	IVe-2	4o1
EnE	Enon sandy loam, 15 to 25 percent slopes	18	VIe-3	4r2
Eo	Enoree soils	18	Vw-2	2w6
Gp	Gullied land-Pacolet soils complex	18	------	-----
HwB	Hiwassee sandy loam, 2 to 6 percent slopes	20	IIe-1	3o7
HwC2	Hiwassee sandy loam, 6 to 10 percent slopes, eroded	20	IIIe-1	3o7
HwD2	Hiwassee sandy loam, 10 to 15 percent slopes, eroded	20	IVe-1	3o7
HyB2	Hiwassee sandy clay loam, 2 to 6 percent slopes, eroded	20	IIIe-1	4c2e
HyC2	Hiwassee sandy clay loam, 6 to 10 percent slopes, eroded	20	IVe-1	4c2e
HyD2	Hiwassee sandy clay loam, 10 to 15 percent slopes, eroded	20	VIe-1	4c2e
IdB	Iredell fine sandy loam, 2 to 6 percent slopes	21	IIe-4	4c2
IrB	Iredell stony loam, 2 to 6 percent slopes	21	VIs-1	4x2
LoC	Louisburg loamy sand, 6 to 10 percent slopes	21	IVe-3	3o7
LoF	Louisburg loamy sand, 10 to 40 percent slopes	22	VIIe-2	3r8
MdB	Madison sandy loam, 2 to 6 percent slopes	22	IIe-1	3o7
MdC	Madison sandy loam, 6 to 10 percent slopes	22	IIIe-1	3o7
MdD	Madison sandy loam, 10 to 15 percent slopes	22	IVe-1	3o7
MeB2	Madison sandy clay loam, 2 to 6 percent slopes, eroded	23	IIIe-1	4c2e
MeC2	Madison sandy clay loam, 6 to 10 percent slopes, eroded	23	IVe-1	4c2e
MeD2	Madison sandy clay loam, 10 to 15 percent slopes, eroded	23	VIe-1	4c2e
MhF	Madison and Pacolet soils, 15 to 40 percent slopes	23	VIIe-1	3r8
MkB	Mecklenburg sandy loam, 2 to 6 percent slopes	24	IIe-3	4o1
MkC	Mecklenburg sandy loam, 6 to 10 percent slopes	24	IIIe-3	4o1
PaD2	Pacolet sandy clay loam, 10 to 15 percent slopes, eroded	25	VIe-1	4c2e
VaB	Vance sandy loam, 2 to 6 percent slopes	26	IIe-3	3o7
VaC	Vance sandy loam, 6 to 10 percent slopes	26	IIIe-3	3o7
Wc	Wehadkee-Chewacla complex	27	IVw-1	-----
	Wehadkee soil	--	------	1w9
	Chewacla soil	--	------	1w8
WkD	Wilkes sandy loam, 6 to 15 percent slopes	27	VIe-2	4o1
WlF	Wilkes soils, 15 to 40 percent slopes	27	VIIe-2	4r2

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