United States
Department of
Agriculture

Natural
Resources
Conservation
Service and
Forest Service

In cooperation with
University of Georgia,
College of Agriculture and
Environmental Sciences
and Agricultural
Experiment Stations

Soil Survey of Fannin and Union Counties, Georgia

How To Use This Soil Survey

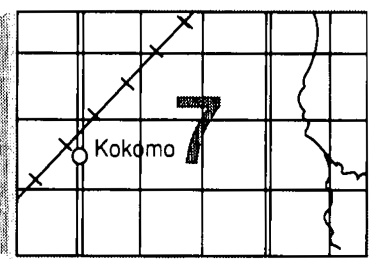
General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

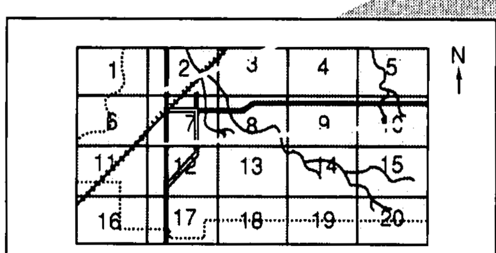
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.



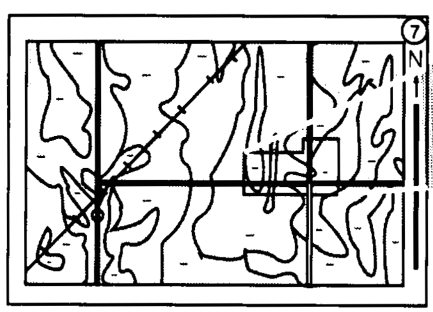
MAP SHEET

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



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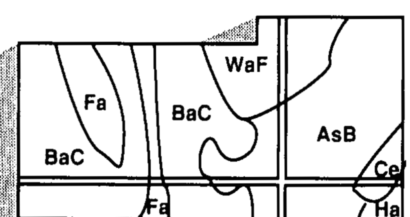

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1990. Soil names and descriptions were approved in 1991. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1991. This soil survey was made cooperatively by the Natural Resources Conservation Service, the Forest Service, and the University of Georgia, College of Agriculture and Environmental Sciences and Agricultural Experiment Stations. It is part of the technical assistance furnished to the Blue Ridge Mountain Soil and Water Conservation District.

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

All programs and services of the Natural Resources Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Autumn in the Georgia mountains. The gently sloping to strongly sloping Bradson and Thurmont soils in the foreground are well suited to pasture and woodland. The moderately steep and steep Cowee and Evard soils in the background are well suited to woodland.

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Issued January 1996

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Foreword

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

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

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

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

Earl Cosby
State Conservationist
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Soil Survey of Fannin and Union Counties, Georgia

By Douglas E. Cabe, Natural Resources Conservation Service

Fieldwork by Richard A. Anderson and Louie W. Frost, Natural Resources Conservation Service; Alan Ardoin, Bruce Stoneman, and Marvin E. Weeks, Forest Service (Forest Service lands surveyed by Forest Service personnel); and Johnny Woodruff, soil consultant

United States Department of Agriculture, Natural Resources Conservation Service and Forest Service,
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FANNIN AND UNION COUNTIES are in the extreme north-central part of Georgia (fig. 1). The survey area is bordered by Towns County on the east, Murray County on the west, and Dawson, Gilmer, Lumpkin, and White Counties on the south. North Carolina and Tennessee form the northern boundary of the survey area.

Fannin County consists of about 390 square miles, or 249,800 acres. The population in 1990 was about 16,000. Blue Ridge, the county seat, is in the central part of the county, approximately 75 miles north of Atlanta and 10 miles south of the Georgia-Tennessee State line.

Union County consists of about 330 square miles, or 211,200 acres. The population in 1990 was about 12,000. Blairsville, the county seat, is in the central part of the county, approximately 20 miles east of Blue Ridge.

This survey updates earlier surveys of both counties. A soil survey of Fannin County was published in 1926 *(5)*, and a soil survey of Union County was published in 1950 *(7)*. The current survey updates the earlier surveys and provides more detailed information.

Approximately 30,000 acres of the Chattahoochee National Forest in Fannin County is not included in this soil survey. The unmapped section is part of the Cohutta Wilderness Area and was not surveyed in order to preserve its wilderness state. The area is outlined and identified on soil survey sheets. This area also is excluded from the general soil map of Fannin County.

General Nature of the Survey Area

This section provides general information about the survey area. It describes settlement and early history; climate; physiography, relief, and drainage; geology; natural resources; farming; and industries, utilities, and transportation facilities.

Settlement and Early History

The territory from which Fannin and Union Counties were created was previously inhabited by the Cherokee Indians. A treaty signed in 1832 allowed the United States Government to take possession of the land from the Cherokees in 1838. The newly acquired property was distributed to settlers through a land lottery.

Fannin County was created by an act of the Legislature in 1854 from land in Gilmer and Union Counties. The county was named for Colonel James Walker Fannin of North Carolina. Colonel Fannin fought during the Texas Revolution and died with his entire regiment in the massacre of prisoners at Goliad, Texas.

The original county seat, Morganton, was named in honor of General Daniel Morgan, a Revolutionary War

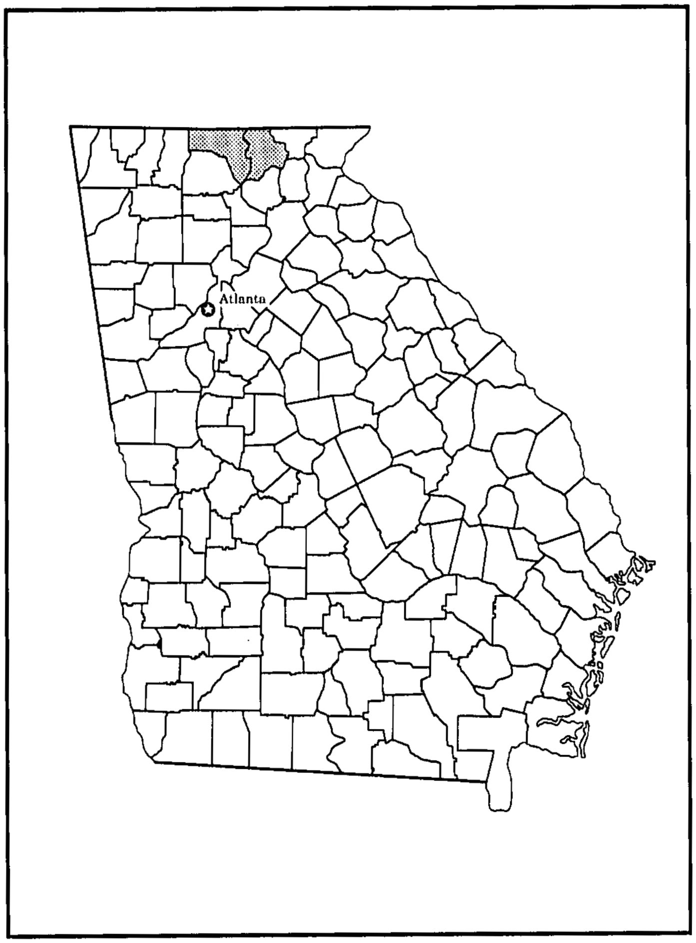

Figure 1.—Location of the survey area in Georgia.

hero. General Morgan was originally from Virginia but later represented Georgia in Congress. Blue Ridge became the county seat in 1895. It was named after the Blue Ridge Mountains.

Union County was created in 1832, when a huge tract of land, referred to then as Cherokee County, was divided into Bartow, Cherokee, Cobb, Floyd, Forsyth, Gilmer, Lumpkin, Murray, Paulding, and Union Counties. Union County was once about 1,000 square miles, but land was given to Fannin, Gilmer, and Towns Counties during the 1850's.

Union County got its name from the Union Party, a political group led by George M. Troup, governor of Georgia from 1823 to 1827. Governor Troup was dissatisfied with the progress made by the United States Government in obtaining land from the Indians. He threatened to declare war on the Federal Government if it interfered with his policy of opening up land to white settlers. Troup's greatest support came from north Georgia, where gold had been discovered and settlers were anxious to stake a claim. After the land was signed over to the government by the Cherokees, the Union Party disintegrated.

Blairsville was named for Francis Preston Blair, Sr., an editor and politician. Mr. Blair served as a member of President Andrew Jackson's "Kitchen Cabinet." He established The Washington Globe newspaper to promote Jackson's reelection. The famous "Blair House" in Washington, D.C., is the former home of Francis Blair.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Blue Ridge, Georgia, in the period 1957 to 1977. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 40 degrees F and the average daily minimum temperature is 29 degrees. The lowest temperature on record, which occurred at Blue Ridge on January 9, 1990, is -10 degrees. In summer, the average temperature is 73 degrees and the average daily maximum temperature is 85 degrees. The highest recorded temperature, which occurred on June 22, 1964, is 98 degrees.

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

The total annual precipitation is about 62 inches. Of this, about 31 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 27 inches. The heaviest 1-day rainfall during the period of record was 8.27 inches on October 4, 1964. Thunderstorms occur on about 50 days each year.

The average seasonal snowfall is 3 inches. The greatest snow depth at any one time during the period of record was 8 inches. On an average of only 1 day per year, at least 1 inch of snow is on the ground.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 65 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the northwest. Average windspeed is highest, 11 miles per hour, in spring.

Physiography, Relief, and Drainage

Fannin and Union Counties are in the Blue Ridge Major Land Resource Area. The survey area is characterized by steep, mountainous ridges along its eastern, southern, and western boundaries. Less prominent mountainous ridges occur throughout the survey area. The intermountainous areas consist of rolling foothills and narrow valleys. Slopes range from 0 to 90 percent but are mainly 10 to 45 percent.

Brasstown Bald Mountain, the highest elevation in Georgia (4,784 feet), is in the eastern part of Union County. Other prominent points in the survey area include Blood Mountain (4,458 feet), Coosa Bald Mountain (4,271 feet), Cowpen Mountain (4,149 feet), and Springer Mountain (3,782 feet). The lowest elevation in the survey area, 1,460 feet, occurs where the Toccoa River leaves Fannin County and enters Tennessee.

The Nottely and Toccoa Rivers and their many tributaries provide the main source of drainage for the survey area. The Toccoa River drains most of Fannin County and the southwestern part of Union County. Additional drainage is provided in Fannin County by the Conasauga and Jacks Rivers. The Nottely River drains the remaining areas of Union County, except for a small section in the southeast, which is drained by the Chattahoochee River. Most drainage in the survey area flows north into the Tennessee River.

Geology

Fannin and Union Counties both exhibit typical Blue Ridge Mountain terrain. They are in the Blue Ridge physiographic province. Union County and southern Fannin County encompass the Blue Ridge Mountain District, defined by rugged mountains and ridges that range from 3,500 to 4,700 feet in elevation in the north and east and from 3,000 to 3,500 feet along the southern border of the two counties. Differing rates of stream erosion have produced valleys that are 1,500 to 2,000 feet below adjacent summits. Western Fannin County is within the Cohutta Mountain District, where rugged mountains reach elevations of 2,500 to 4,000 feet and deeply entrenched valleys are 1,000 to 1,500 feet below the mountain crest. Between the Cohuttas and the Blue Ridge, in Fannin County, erosion of the Great Smoky group has produced the McCaysville Basin, a gently rolling basin enclosed by mountains that rise 2,000 to 2,500 feet. Relief varies by only 200 to 300 feet throughout the survey area, except near the Jasper Ridges, which bisect the district. Relief ranges from 300 to 500 feet in this area.

Principal rock types in Fannin and Union Counties are members of the Great Smoky Group of pre-Cambrian age. Rocks in this group are essentially a mass of coarse grained to fine grained feldspathic, metasandstone, metagraywacke, or biotite gneiss in graded beds interbedded with dark slate or mica schist. Where bedding is thin, metagraywacke has the appearance of flagstone. The other major rock types are metaconglomerate and quartzite.

These rocks and others in this area are typical metamorphic rocks derived from the alteration of existing sediments during the pre-Cambrian. Preexisting bedding features are still present within these rocks as evidence of their former sedimentary environment.

Rocks within the Great Smoky Group grade laterally from a biotite gneiss, metagraywacke phase to a mica schist phase in the direction of the Murphy syncline.

In Fannin County, the Great Smoky Group makes up the eastern and western limbs of the Murphy syncline, an extensive development that extends from eastern Bartow County toward the northeast in a fairly narrow exposure through Tate in Pickens County, Ellijay in Gilmer County, and Blue Ridge in Fannin County. It terminates in North Carolina north of Murphy. In Fannin County, the Murphy syncline bisects the county with an outcrop area approximately 3 or 4 miles wide. Typically, rock types within the Murphy belt consist of garnet schist, gray slates or phyllites, and scattered conglomerates along the axis of the syncline. These rocks overlie quartzite, slate, calcareous schist, Murphy Marble (a fine grained or medium grained, blue and white marble), and additional black slates or phyllites, all in sequence, forming the limbs of the syncline. The outermost black slates of the Murphy belt are in contact with other members of the Great Smoky Group. Discontinuous faulting occurs along the formation contacts within the Murphy belt. The Junaluska-Tsali-Cataska general soil map unit is associated with the Murphy syncline.

The attitude of the bedding and the discontinuous nature of the quartzites in this zone produced the steep, sharp, resistant ridges collectively known as the Jasper Ridges.

East of the Murphy syncline, rocks of the Great Smoky Group extend into and cover western Union County. These rocks are essentially the same as those west of the syncline, differing only in the gradation of mineral grains and a distinctly coarser crystallization of the mica beds. Mica schist is the principal rock type in this area. Garnet and kyanite are common accessory minerals. Strongly banded, coarse grained biotite gneiss is interlayered within the mica schist.

Garnet mica schist underlies the Brasstown Bald area of northeastern Union County. Associated rock types within the schist are biotite schist, quartzite, and biotite gneiss. This area is significant in that the mica schist overlies the Lake Chatuge sill, a zone of ultramafic rocks that crop out along the lower flanks of the more elevated schist and continue through Lake Chatuge in Towns County and into North Carolina. Olivine gabbro, chlorite serpentine, and amphibolite are the principal rocks and mineral assemblages making up the sill.

In eastern Union County, the mica schist gives way to the more dominant biotite gneiss, which is coarse grained and has strong banding of segregated minerals. Small garnets are common within this gneiss. The rock is generally alternating beds of gneiss and schist with interbeds of quartzite.

The metagraywacke/biotite gneiss members of the Great Smoky Group, in eastern Union County and western Fannin County, provide the underlying bedrock for the Evard-Cowee-Saunook, Cowee-Evard-Saunook, Porters-Chestnut-Saunook, and Chestnut-Porters-Saunook general soil map units. Somewhat massive biotite gneiss, which is high in quartz, is steeply inclined, and has resistant interbedded quartzite, has provided moderately steep or steep slopes with relatively shallow, yellowish brown to reddish brown saprolite underlying reddish brown soils.

Quartzites within the schist member of the Great Smoky Group probably provide the somewhat steep ridges that are surrounded by the more gentle to moderate slopes typical of the Clifton-Evard-Cowee and Evard-Clifton-Cowee general soil map units. The high iron content of this biotite/muscovite schist provides the strong red color of these soils, which occupy most of the area where mica schist is the dominant parent material.

Natural Resources

Mines and minerals.—Several important minerals occur in Fannin and Union Counties. Copper, gold, and marble were mined previously in the survey area but exist in qualities or quantities too low to be mined economically today. The copper mines were located in northwestern Fannin County near McCaysville. Gold mining was concentrated in the Coosa area of Union County. It is believed that gold was mined in Union County before the famous gold rush of Dahlonega, Georgia, in the late 1820's.

Flagstone rock is mined in the metasedimentary belt of Fannin County. This represents the largest and most important concentration of mines in the survey area today. Flagstone rock is used as masonry material in the construction industry. Both counties also have areas that are mined to produce gravel-sized rock.

Soils.—Soils in Fannin and Union Counties are derived mainly from metamorphic rocks, but some areas are influenced by metasedimentary and igneous rocks. Dominant rock types that have weathered to form soils are granite, gneiss, schist, phyllite, slate, and metasandstone.

Upland soils that formed in igneous and metamorphic rocks include Chestnut, Clifton, Cowee, Evard, Hayesville, and Porters soils. These soils are deep or moderately deep and are well drained. Upland soils that formed in metasedimentary rocks include Cataska, Junaluska, and Tsali soils. These soils are shallow or moderately deep and are well drained. Land use on upland soils is limited primarily to woodland because of the steep topography.

Bradson, Saunook, and Thurmont soils are on colluvial fans, on benches, in coves, and on foot slopes. Thurmont soils also occur on stream terraces. Land use on these soils is mainly pasture and woodland but includes some row cropping.

Soils on stream terraces and flood plains are the primary agricultural soils in the survey area. Arkaqua, Colvard, French, Suches, Toxaway, and Transylvania soils are on flood plains. Soils on flood plains are well drained to very poorly drained. Chatuge and Dillard soils are on stream terraces. Chatuge soils are poorly drained, and Dillard soils are moderately well drained. Pasture, row crops, and truck crops are the major land uses on these soils.

Water.—Fannin and Union Counties possess an abundant supply of good-quality water. Both counties utilize above- and below-ground water sources. Each county has as its primary water source a large water impoundment constructed under the Tennessee Valley Authority. In addition to water supply, these lakes provide electricity, flood control, and recreational opportunities.

Lake Blue Ridge, in Fannin County, provides water for the towns of Blue Ridge, McCaysville, and Morganton. The lake covers approximately 3,200 acres and is fed by the Toccoa River. In Union County, Lake Nottely supplies water for the greater Blairsville area and covers 4,180 acres. Lake Nottely is fed by the Nottely River and its many tributaries.

Two types of wells provide water in areas of both counties not served by a water system. Bored 30-inch wells range in depth from 50 to 70 feet, and drilled 6-inch wells range from 100 to 400 feet. Both types of wells provide a good source of water. Streams supply most of the water for livestock, but a few farm ponds also are used.

Woodland.—The Chattahoochee National Forest accounts for approximately 204,000 acres in the survey area. About 106,000 acres is in Fannin County, and about 98,000 acres is in Union County. The majority of the nonfederal land in the survey area also is restricted to woodland because of the steep, rugged terrain of the area.

National Forest land is primarily managed for recreational purposes by the Forest Service. Management includes game and wildlife areas. A trout hatchery is operated by the Forest Service on Rock Creek in the Blue Ridge Wildlife Management Area in Fannin County. Several wilderness areas also are in both counties. The largest is the Cohutta Wilderness Area in Fannin County. This wilderness area consists of approximately 30,000 acres.

Recreational activities include backpacking, camping, fishing, hunting, and nature observation. The Appalachian Trail, which runs the length of the Appalachian Mountains from Maine to Georgia, crosses the survey area and terminates at Springer Mountain in Fannin County.

The Forest Service also manages Federal land for timber production. Several sawmills are located in the survey area for the production of lumber and log homes. Land ownership by timber companies accounts for only about 3,500 acres in both counties.

In addition to esthetics, recreation, and timber production, woodlands in Fannin and Union Counties help to protect the important watersheds of the area. These watersheds provide water to Alabama, Georgia, North Carolina, and Tennessee. The Conasauga, Jacks, Nottely, and Toccoa Rivers originate in the survey area.

Farming

Livestock, row crops, and truck crops are the primary agricultural enterprises in Fannin and Union Counties. Cropland and pastureland account for approximately 40,000 acres. About 5,000 acres is used for crops.

Row crops and truck crops are grown mainly on flood plains and on gently sloping or sloping stream terraces and toe slopes. Corn is the major crop. Pasture is mainly in sloping to strongly sloping areas. Pastures are planted mostly to cool-season grasses and legumes.

The poultry industry has grown recently in the survey area. New poultry houses occupy areas previously used for pasture or woodland. Most pasture and corn crops grown in the area support local cattle, hog, and poultry operations.

Fannin and Union Counties are members of the Blue Ridge Mountain Soil and Water Conservation District. The District was established in 1951 to promote wise land use and minimize soil erosion. The Georgia Mountain Branch Experiment Station in Union County was established to provide agronomic and horticultural research for the area.

Industries, Utilities, and Transportation Facilities

Important industries in Fannin and Union Counties include apparel, food, housing, leather, lumber, mining, poultry, and tourism. The poultry industry has expanded greatly in recent years because of the establishment of a large poultry company in Union County. An increase in population has benefited the housing industry as well as the overall economy of the area. Esthetics and mild summer temperatures make the area attractive for retirement and weekend homes.

Public utilities in Fannin and Union Counties include electricity, natural gas, sewage treatment, telephone, and water. Sewage treatment plants are located in Blairsville, Blue Ridge, and McCaysville. The part of the survey area not served by these systems depends on septic tanks for sewage disposal.

The survey area contains an adequate network of Federal, State, and local highways. Most county roads are paved, except in remote areas and on National Forest land. Fannin County is served by one railroad system.

How This Survey Was Made

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

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

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

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

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

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

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

Some soil names and boundaries on the soil maps in this survey do not match those on the maps in the surveys of adjacent counties. Differences are the result of variations in soil patterns and recent improvements in soil classification, particularly soil series concepts.

Map Unit Composition

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

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

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

General Soil Map Units

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

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

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

The soils in the survey area differ in suitability for major land uses. In this section, each map unit description includes information regarding the visual elements of landform, water, vegetation or land use, and structures. The units are classified as having a low or moderate degree of visual diversity. This is a value rating of landscape elements and their pattern within a frame of reference developed for a local geographic area. Visual diversity can be used in conservation planning and in establishing a desirable continuity of landscape elements. The extent of the units and their components are identified and described. The main concerns of management and the soil properties that limit use are indicated. Suitability or the degree of limitation is given for the common uses.

The Cohutta Wilderness Area makes up about 12 percent of Fannin County. This area is not included in the descriptions of the general soil map units or on the general soil map of Fannin County.

Descriptions of General Soil Map Units in Fannin County

1. Thurmont-Arkaqua-Suches

Very deep, nearly level to moderately steep, well drained to somewhat poorly drained soils that are loamy throughout; on stream terraces, toe slopes, and flood plains

The landscape is characterized by nearly level to moderately steep soils on stream terraces, toe slopes, and flood plains in moderately broad mountain valleys. Thurmont soils are on stream terraces and toe slopes, and Arkaqua and Suches soils are on flood plains. Arkaqua soils are frequently flooded, and Suches soils are occasionally flooded. Slopes range from 0 to 25 percent. Drainage is not well defined. Most natural watercourses are perennial. Open water areas are few. Roads, utility lines, houses, fences, and farm structures are common. The degree of visual diversity is moderate.

This map unit makes up about 3 percent of Fannin County. It is about 50 percent Thurmont soils, 20 percent Arkaqua soils, 15 percent Suches soils, and 15 percent soils of minor extent.

Thurmont soils are well drained. Typically, the surface layer is brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 42 inches. The upper part is reddish yellow sandy clay loam, and the lower part is predominantly reddish yellow gravelly sandy clay loam. The substratum extends to a depth of 60 inches or more. It is mottled brownish yellow and reddish yellow sandy loam.

Arkaqua soils are somewhat poorly drained. Typically, the surface layer is dark brown loam about 9 inches thick. The subsoil extends to a depth of 46 inches. The upper part is yellowish brown clay loam that has pale brown mottles, the next part is brown fine sandy loam that has yellowish brown and grayish brown mottles, and the lower part is gray sandy clay loam that has yellowish brown mottles. The substratum extends to a depth of 72 inches or more. It is stratified gray, light gray, and dark gray loamy sand, sandy loam, and sandy clay loam.

Suches soils are well drained and moderately well drained. Typically, the surface layer is dark grayish brown loam about 10 inches thick. It has yellowish brown mottles. The subsoil extends to a depth of 44 inches. The upper part is light yellowish brown sandy clay loam, the next part is brownish yellow sandy clay loam that has pale brown mottles, and the lower part is light yellowish brown sandy clay loam that has yellowish brown mottles. The substratum extends to a depth of 60 inches or more. It is mottled light gray, light yellowish brown, and dark yellowish brown loamy sand.

Of minor extent in this map unit are Bradson, Chatuge, and Dillard soils on terraces and toe slopes and Colvard, French, Toxaway, and Transylvania soils on flood plains.

Soils in this map unit are used mainly for crops and pasture, but some soils support mixed stands of hardwoods and pines. Wetness and flooding are the main management concerns affecting most uses on the flood plains and lower terraces. The slope and erosion control are management concerns in areas used for row crops on the more strongly sloping terraces.

2. Evard-Clifton-Cowee

Very deep and moderately deep, strongly sloping to steep, well drained soils that have a loamy surface layer and a loamy or clayey subsoil; on ridges and side slopes of intermountain uplands

The landscape is characterized by strongly sloping to steep soils on broad ridge crests and side slopes in basins between the higher mountain areas. Slopes range from 6 to 45 percent. Excess surface water drains into a system of intermittent and perennial streams. Open water areas are few. Roads, utility lines, houses, fences, and farm structures are common. The degree of visual diversity is moderate.

This map unit makes up about 39 percent of Fannin County. It is about 35 percent Evard soils, 25 percent Clifton soils, 20 percent Cowee soils, and 20 percent soils of minor extent.

Evard soils are very deep. Typically, the surface layer is brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 40 inches. The upper part is predominantly red clay loam, the next part is red sandy clay loam, and the lower part is red sandy loam. The substratum extends to a depth of 60 inches or more. The upper part is yellowish red sandy loam that has strong brown mottles, and the lower part is strong brown sandy loam that has yellowish red mottles.

Clifton soils are very deep. Typically, the surface layer is reddish brown fine sandy loam about 4 inches thick. The subsoil extends to a depth of 36 inches. The upper part is yellowish red clay loam, the next part is predominantly red clay, and the lower part is red loam. The substratum to a depth of 60 inches or more is red loam.

Cowee soils are moderately deep. Typically, the surface layer is dark brown fine sandy loam about 7 inches thick. The subsoil extends to a depth of 26 inches. It is yellowish red sandy clay loam. Multicolored, weathered gneiss bedrock is at a depth of about 26 inches.

Of minor extent in this map unit are Bradson, Thurmont, and Hayesville soils. Bradson and Thurmont soils are in the lower colluvial areas and on high stream terraces. Hayesville soils are on side slopes of intermountain uplands. Narrow delineations of any of the soils on flood plains or low stream terraces may be adjacent to drainageways in this map unit.

Soils in this map unit are mainly wooded. Many of the less sloping areas are used for pasture, and some are used for row crops. The slope and the hazard of erosion are the primary management concerns.

3. Junaluska-Tsali-Cataska

Moderately deep and shallow, strongly sloping to very steep, well drained and excessively drained soils that are loamy throughout or are loamy and have a high content of rock fragments throughout; on ridges and side slopes at the lower elevations of intermountain uplands

The landscape is characterized by strongly sloping to very steep soils on narrow ridges and side slopes. Most of this map unit is in a single delineation that extends across Fannin County from southwest to northeast. It extends from the Gilmer County line southwest of Blue Ridge, through Blue Ridge and Mineral Bluff, and along Georgia Highway 60 to North Carolina. A smaller area of this map unit is in northwestern Fannin County. Slopes range from 6 to 90 percent. Excess water drains into a system of intermittent and perennial streams. Open water areas are few. Roads, utility lines, houses, fences, farm structures, and urban development are common. The degree of visual diversity is moderate.

This map unit makes up about 8 percent of Fannin County. It is about 47 percent Junaluska soils, 30 percent Tsali soils, 7 percent Cataska soils, and 16 percent soils of minor extent.

Junaluska soils are moderately deep and are well drained. Typically, the surface layer is dark reddish brown channery loam about 2 inches thick. The subsoil extends to a depth of 28 inches. The upper part is yellowish red clay loam, and the lower part is yellowish red channery clay loam. Multicolored, weathered and fractured, interbedded phyllite and metasandstone bedrock is at a depth of about 28 inches. The bedrock can be ripped.

Tsali soils are shallow and well drained. Typically, the surface layer is brown channery loam about 2 inches thick. The subsoil extends to a depth of 16 inches. It is yellowish red channery clay loam. Multicolored, weathered and fractured, thinly bedded phyllite and metasandstone bedrock is at a depth of about 16 inches. The bedrock can be ripped.

Cataska soils are shallow and excessively drained. Typically, the surface layer is very dark grayish brown channery silt loam about 4 inches thick. The subsoil extends to a depth of 16 inches. The upper part is yellowish brown channery silt loam, and the lower part is yellowish brown very channery silt loam. Gray, fractured, thinly bedded phyllite and metasandstone bedrock is at a depth of about 16 inches. The bedrock can be ripped.

Of minor extent in this map unit are Arkaqua, Bradson, Colvard, Dillard, French, Suches, and Thurmont soils on flood plains and in colluvial areas.

Soils in this map unit are mainly wooded. A few areas are used for pasture or urban development, and a minor acreage is used for row crops. The depth to bedrock, droughtiness, the slope, and a severe hazard of erosion are the major management concerns.

4. Cowee-Evard-Saunook

Moderately deep and very deep, moderately steep to very steep, well drained soils that are loamy throughout; on ridges of intermountain basins and on side slopes of the lower mountains

The landscape is characterized by moderately steep to very steep soils on the more sloping ridges at the higher elevations within intermountain basins and on the lower side slopes of high mountain areas. Elevation is generally less than 2,500 feet. Slopes range from 10 to 90 percent. Excess water drains into a system of intermittent and perennial streams. Open water areas are few. Roads, utility lines, houses, fences, and farm structures are few. The degree of visual diversity is low.

This map unit makes up about 29 percent of Fannin County. It is about 42 percent Cowee soils, 30 percent Evard soils, 11 percent Saunook soils, and 17 percent soils of minor extent.

Cowee soils are moderately deep. Typically, the surface layer is dark brown fine sandy loam about 7 inches thick. The subsoil extends to a depth of 26 inches. It is yellowish red sandy clay loam. Multicolored, weathered gneiss bedrock is at a depth of about 26 inches.

Evard soils are very deep. Typically, the surface layer is brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 40 inches. The upper part is predominantly red clay loam, the next part is red sandy clay loam, and the lower part is red sandy loam. The substratum extends to a depth of 60 inches or more. The upper part is yellowish red sandy loam that has strong brown mottles, and the lower part is strong brown sandy loam that has yellowish red mottles.

Saunook soils are very deep. Typically, the surface layer is very dark brown loam about 9 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is dark yellowish brown loam, the next part is dark yellowish brown clay loam, and the lower part is dark yellowish brown sandy clay loam.

Of minor extent in this map unit are Bradson, Clifton, and Hayesville soils at the lower elevations and Chestnut and Porters soils at the higher elevations. Narrow delineations of any of the soils on flood plains may be adjacent to drainageways in this map unit.

Soils in this map unit are mainly wooded and support mixed hardwoods and pines. The slope, stoniness, and the hazard of erosion are the major management concerns.

5. Chestnut-Porters-Saunook

Moderately deep to very deep, moderately steep to very steep, well drained soils that are loamy throughout; on ridges and side slopes of the higher mountains

The landscape is characterized by moderately steep to very steep soils in mountain areas at the higher elevations. Elevation is generally more than 2,500 feet. Slopes range from 10 to 90 percent. Excess water drains into a system of intermittent and perennial streams. Open water areas are few. Roads, utility lines, houses, fences, and farm structures are few. The degree of visual diversity is low.

This map unit makes up about 9 percent of Fannin County. It is about 40 percent Chestnut soils, 28 percent Porters soils, 16 percent Saunook soils, and 16 percent soils of minor extent.

Chestnut soils are moderately deep. Typically, the surface layer is brown loam about 6 inches thick. The subsoil extends to a depth of 21 inches. It is dark yellowish brown gravelly loam. The substratum extends to a depth of 33 inches. It is yellowish brown gravelly sandy loam. Soft bedrock is at a depth of about 33 inches.

Porters soils are deep. Typically, the surface layer is very dark grayish brown loam about 9 inches thick. The subsoil extends to a depth of 45 inches. The upper part is dark yellowish brown loam, and the lower part is yellowish brown sandy loam that has grayish brown mottles. The substratum extends to a depth of 52 inches. It is mottled yellowish brown and grayish brown saprolite that crushes to sandy loam. Hard gneiss bedrock is at a depth of about 52 inches. The soils have cobbles throughout.

Saunook soils are very deep. Typically, the surface layer is very dark brown loam about 9 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is dark yellowish brown loam, the next part is dark yellowish brown clay loam, and the lower part is dark yellowish brown sandy clay loam.

Of minor extent in this map unit are Bradson, Cowee, and Evard soils. Bradson soils are on toe slopes and in coves. Cowee and Evard soils are generally at the lower elevations and in the less sloping areas. Areas of rock outcrop generally occur on very narrow ridge crests or on very steep slopes.

Soils in this map unit are mainly wooded. The slope, stoniness, the depth to bedrock, climate, and the hazard of erosion are the major management concerns.

Descriptions of General Soil Map Units in Union County

1. Thurmont-Arkaqua-Suches

Very deep, nearly level to moderately steep, well drained to somewhat poorly drained soils that are loamy throughout; on stream terraces, toe slopes, and flood plains

The landscape is characterized by nearly level to moderately steep soils on stream terraces, toe slopes, and flood plains in moderately broad mountain valleys. Thurmont soils are on stream terraces and toe slopes, and Arkaqua and Suches soils are on flood plains. Arkaqua soils are frequently flooded, and Suches soils are occasionally flooded. Slopes range from 0 to 25 percent. Drainage is not well defined. Most natural watercourses are perennial. Open water areas are few. Roads, utility lines, houses, fences, and farm structures are common. The degree of visual diversity is moderate.

This map unit makes up about 5 percent of Union County. It is about 48 percent Thurmont soils, 26 percent Arkaqua soils, 9 percent Suches soils, and 17 percent soils of minor extent.

Thurmont soils are well drained. Typically, the surface layer is brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 42 inches. The upper part is reddish yellow sandy clay loam, and the lower part is predominantly reddish yellow gravelly sandy clay loam. The substratum extends to a depth of 60 inches or more. It is mottled brownish yellow and reddish yellow sandy loam.

Arkaqua soils are somewhat poorly drained. Typically, the surface layer is dark brown loam about 9 inches thick. The subsoil extends to a depth of 46 inches. The upper part is yellowish brown clay loam that has pale brown mottles, the next part is brown fine sandy loam that has yellowish brown and grayish brown mottles, and the lower part is gray sandy clay loam that has yellowish brown mottles. The substratum extends to a depth of 72 inches or more. It is stratified gray, light gray, and dark gray loamy sand, sandy loam, and sandy clay loam.

Suches soils are well drained and moderately well drained. Typically, the surface layer is dark grayish brown loam about 10 inches thick. It has yellowish brown mottles. The subsoil extends to a depth of 44 inches. The upper part is light yellowish brown sandy clay loam, the next part is brownish yellow sandy clay loam that has pale brown mottles, and the lower part is light yellowish brown sandy clay loam that has yellowish brown mottles. The substratum extends to a depth of 60 inches or more. It is mottled light gray, light yellowish brown, and dark yellowish brown loamy sand.

Of minor extent in this map unit are Bradson, Chatuge, and Dillard soils on terraces and toe slopes and Colvard, French, Toxaway, and Transylvania soils on flood plains.

Soils in this map unit are used mainly for crops and pasture, but some soils support mixed stands of hardwoods and pines. Wetness and flooding are the main management concerns affecting most uses on the flood plains and the lower terraces. The slope and erosion control are management concerns in areas used for row crops on the more strongly sloping terraces.

2. Clifton-Evard-Cowee

Very deep and moderately deep, strongly sloping to steep, well drained soils that have a loamy surface layer and a clayey or loamy subsoil; on ridges and side slopes of intermountain uplands

The landscape is characterized by strongly sloping to steep soils on broad ridge crests and side slopes in basins between the higher mountain areas. Slopes range from 6 to 45 percent. Excess surface water drains into a system of intermittent and perennial streams. Open water areas are few. Roads, utility lines, houses, fences, and farm structures are common. The degree of visual diversity is moderate.

This map unit makes up about 37 percent of Union County. It is about 36 percent Clifton soils, 29 percent Evard soils, 12 percent Cowee soils, and 23 percent soils of minor extent.

Clifton soils are very deep. Typically, the surface layer is reddish brown fine sandy loam about 4 inches thick. The subsoil extends to a depth of 36 inches. The upper part is yellowish red clay loam, the next part is predominantly red clay, and the lower part is red loam. The substratum to a depth of 60 inches or more is red loam.

Evard soils are very deep. Typically, the surface layer is brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 40 inches. The upper part is predominantly red clay loam, the next part is red sandy clay loam, and the lower part is red sandy loam. The substratum extends to a depth of 60 inches or more. The upper part is yellowish red sandy loam that has strong brown mottles, and the lower part is strong brown sandy loam that has yellowish red mottles.

Cowee soils are moderately deep. Typically, the surface layer is dark brown fine sandy loam about 7 inches thick. The subsoil extends to a depth of 26 inches. It is yellowish red sandy clay loam. Multicolored, weathered gneiss bedrock is at a depth of about 26 inches.

Of minor extent in this map unit are Bradson, Thurmont, and Hayesville soils. Bradson and Thurmont soils are in the lower colluvial areas and on high stream terraces. Hayesville soils are on side slopes of intermountain uplands. Narrow delineations of any of the soils on flood plains or low stream terraces may be adjacent to drainageways in this map unit.

Soils in this map unit are mainly wooded. Many of the less sloping areas are used for pasture, and some are used for row crops. The slope and the hazard of erosion are the primary management concerns.

3. Junaluska-Tsali-Cataska

Moderately deep and shallow, strongly sloping to very steep, well drained and excessively drained soils that are loamy throughout or are loamy and have a high content of rock fragments throughout; on ridges and side slopes of intermountain uplands at the lower elevations

The landscape is characterized by strongly sloping to very steep soils on narrow ridges and side slopes. This map unit occurs in two delineations, which are in the northwest and northeast corners of Union County. Slopes range from 6 to 90 percent. Excess water drains into a system of intermittent and perennial streams. Open water areas are few. Roads, utility lines, houses, fences, farm structures, and urban development are common. The degree of visual diversity is moderate.

This map unit makes up less than 1 percent of Union County. It is about 40 percent Junaluska soils, 22 percent Tsali soils, 13 percent Cataska soils, and 25 percent soils of minor extent.

Junaluska soils are moderately deep and are well drained. Typically, the surface layer is dark reddish brown channery loam about 2 inches thick. The subsoil extends to a depth of 28 inches. The upper part is yellowish red clay loam, and the lower part is yellowish red channery clay loam. Multicolored, weathered and fractured, interbedded phyllite and metasandstone bedrock is at a depth of about 28 inches. The bedrock can be ripped.

Tsali soils are shallow and well drained. Typically, the surface layer is brown channery loam about 2 inches thick. The subsoil extends to a depth of 16 inches. It is yellowish red channery clay loam. Multicolored, weathered and fractured, thinly bedded phyllite and metasandstone bedrock is at a depth of about 16 inches. The bedrock can be ripped.

Cataska soils are shallow and excessively drained. Typically, the surface layer is very dark grayish brown channery silt loam about 4 inches thick. The subsoil extends to a depth of 16 inches. The upper part is yellowish brown channery silt loam, and the lower part is yellowish brown very channery silt loam. Gray, fractured, thinly bedded phyllite and metasandstone bedrock is at a depth of about 16 inches. The bedrock can be ripped.

Of minor extent in this map unit are Arkaqua, Bradson, Colvard, Dillard, French, Suches, and Thurmont soils on flood plains and in colluvial areas.

Soils in this map unit are mainly wooded. A few areas are used for pasture or urban development, and a minor acreage is used for row crops. The depth to bedrock, droughtiness, the slope, and a severe hazard of erosion are the major management concerns.

4. Evard-Cowee-Saunook

Very deep and moderately deep, moderately steep to very steep, well drained soils that are loamy throughout; on ridges of intermountain basins and on side slopes of the lower mountains

The landscape is characterized by moderately steep to very steep soils on the more sloping ridges at the higher elevations within intermountain basins and on the lower side slopes of high mountain areas. Elevation is generally less than 2,500 feet. Slopes range from 10 to 90 percent. Excess water drains into a system of intermittent and perennial streams. Open water areas are few. Roads, utility lines, houses, fences, and farm structures are few. The degree of visual diversity is low.

This map unit makes up about 32 percent of Union County. It is about 30 percent Evard soils, 25 percent Cowee soils, 18 percent Saunook soils, and 27 percent soils of minor extent.

Evard soils are very deep. Typically, the surface layer is brown fine sandy loam about 6 inches thick.

The subsoil extends to a depth of 40 inches. The upper part is predominantly red clay loam, the next part is red sandy clay loam, and the lower part is red sandy loam. The substratum extends to a depth of 60 inches or more. The upper part is yellowish red sandy loam that has strong brown mottles, and the lower part is strong brown sandy loam that has yellowish red mottles.

Cowee soils are moderately deep. Typically, the surface layer is dark brown fine sandy loam about 7 inches thick. The subsoil extends to a depth of 26 inches. It is yellowish red sandy clay loam. Multicolored, weathered gneiss bedrock is at a depth of about 26 inches.

Saunook soils are very deep. Typically, the surface layer is very dark brown loam about 9 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is dark yellowish brown loam, the next part is dark yellowish brown clay loam, and the lower part is dark yellowish brown sandy clay loam.

Of minor extent in this map unit are Bradson, Clifton, and Hayesville soils at the lower elevations and Chestnut and Porters soils at the higher elevations. Narrow delineations of any of the soils on flood plains may be adjacent to drainageways in this map unit.

Soils in this map unit are mainly wooded and support mixed hardwoods and pines. The slope, stoniness, and the hazard of erosion are the major management concerns.

5. Porters-Chestnut-Saunook

Moderately deep to very deep, moderately steep to very steep, well drained soils that are loamy throughout; on ridges and side slopes of the higher mountains

The landscape is characterized by moderately steep to very steep soils in mountain areas at the higher elevations. Elevation is generally more than 2,500 feet. Slopes range from 10 to 90 percent. Excess water drains into a system of intermittent and perennial streams. Open water areas are few. Roads, utility lines, houses, fences, and farm structures are few. The degree of visual diversity is low.

This map unit makes up about 25 percent of Union County. It is about 44 percent Porters soils, 33 percent Chestnut soils, 8 percent Saunook soils, and 15 percent soils of minor extent.

Porters soils are deep. Typically, the surface layer is very dark grayish brown loam about 9 inches thick. The subsoil extends to a depth of 45 inches. The upper part is dark yellowish brown loam, and the lower part is yellowish brown sandy loam that has grayish brown mottles. The substratum extends to a depth of 52 inches. It is mottled yellowish brown and grayish brown saprolite that crushes to sandy loam. Hard gneiss bedrock is at a depth of about 52 inches. The soils have cobbles throughout.

Chestnut soils are moderately deep. Typically, the surface layer is brown loam about 6 inches thick. The subsoil extends to a depth of 21 inches. It is dark yellowish brown gravelly loam. The substratum extends to a depth of 33 inches. It is yellowish brown gravelly sandy loam. Soft bedrock is at a depth of about 33 inches.

Saunook soils are very deep. Typically, the surface layer is very dark brown loam about 9 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is dark yellowish brown loam, the next part is dark yellowish brown clay loam, and the lower part is dark yellowish brown sandy clay loam.

Of minor extent in the unit are Bradson, Cowee, and Evard soils. Bradson soils are on toe slopes and in coves. Cowee and Evard soils are generally at the lower elevations and in the less sloping areas. Areas of rock outcrop commonly occur on very narrow ridge crests or on very steep slopes.

Soils in this map unit are mainly wooded. The slope, stoniness, the depth to bedrock, and the hazard of erosion are the major management concerns.

Broad Land Use Considerations

Soils in Fannin and Union Counties vary widely in their suitability for major land uses. Current uses include cropland, pastureland, urban or built-up land, woodland, recreational areas, and wildlife areas. The general soil maps are useful in planning for broad areas but are not detailed enough to locate a site for a specific structure.

About 90 percent of the survey area is used as woodland. Most soils have moderate or high potential for woodland production. The Junaluska-Tsali-Cataska map units have low potential because of the depth to bedrock. The hazard of erosion and an equipment limitation on steep slopes are the primary management concerns.

About 8 percent of the survey area is used for pasture. Nearly level to strongly sloping soils in general soil map units 1 and 2 in both counties are moderately suited or well suited to the establishment of pastures. Soils on moderately steep to very steep slopes are not suited to hay or pasture crops.

About 1 percent of the survey area is cropland. The Thurmont-Arkaqua-Suches general soil map units are the best suited to row crops and truck crops. Wetness and flooding are management concerns. Gently sloping soils in map unit 2 in both counties have moderate suitability for crop production. The hazard of erosion is the primary management concern. Conservation tillage and water management systems help to control runoff and erosion on these soils.

About 1 percent of the survey area is urban or built-up land. Most soils have severe limitations affecting urban development because of flooding, the depth to bedrock, stoniness, the slope, and wetness. Gently sloping soils in map unit 2 in both counties have moderate limitations affecting most urban uses.

Most soils in the survey area have moderate or severe limitations affecting recreational development because of the slope and stoniness. Arkaqua soils in map unit 1 in both counties are limited because of flooding and wetness. In general, all of the soils have severe limitations for playground areas, camp areas, and picnic areas where slopes are more than 15 percent and for paths and trails where slopes are more than 25 percent.

The potential for use as wildlife habitat is generally good throughout the survey area. Soils in map units 1, 2, and 4 in both counties have fair or good potential for openland habitat. Soils in map units 1, 2, 4, and 5 have fair or good potential for woodland habitat. Arkaqua soils in map unit 1 in both counties have fair potential for wetland habitat.

Detailed Soil Map Units

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

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

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

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

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases.* Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Chestnut loam, 10 to 25 percent slopes, is a phase of the Chestnut series.

Some map units are made up of two or more soils or miscellaneous areas. These map units are called soil complexes. A *soil complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Clifton-Evard complex, 10 to 25 percent slopes, is an example.

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

This survey includes *miscellaneous areas.* Such areas have little or no soil material and support little or no vegetation. Pits, quarries, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Aa—Arkaqua loam, frequently flooded. This very deep, somewhat poorly drained, nearly level soil is on flood plains between mountains. It is frequently flooded for very brief periods from late fall to midspring.

Typically, the surface layer is dark brown loam about 9 inches thick. The subsoil extends to a depth of 46 inches. The upper part is yellowish brown clay loam that has pale brown mottles, the next part is brown fine sandy loam that has yellowish brown and grayish brown mottles, and the lower part is gray sandy clay loam that has yellowish brown mottles. The substratum extends to a depth of 72 inches or more. It is stratified gray, light gray, and dark gray loamy sand, sandy loam, and sandy clay loam.

This soil is low in natural fertility. The content of organic matter is moderate in the surface layer. Permeability is moderate. Available water capacity also is moderate. Tilth is good. The root zone is very deep except from late fall to midspring, when the water table is at a depth of 1.5 to 2.0 feet or when flooding occurs.

Included with this soil in mapping are a few small areas of Bradson, Chatuge, Colvard, Dillard, French, Suches, Thurmont, Toxaway, and Transylvania soils. Bradson soils are on high terraces and in coves. Colvard, French, Suches, Toxaway, and Transylvania soils are in positions on the landscape similar to those of the Arkaqua soil. Dillard and Thurmont soils are on stream terraces and toe slopes. Chatuge soils are on stream terraces, on toe slopes, and at the head of drainageways.

The Arkaqua soil is highly productive. However, it is only moderately suited to field crops because flooding is likely during the planting season. The soil is well suited to hay and pasture. Grasses and legumes help to maintain fertility and the content of organic matter.

The potential of this soil for woodland production is high. Eastern white pine and yellow-poplar are preferred trees to plant. Seasonal wetness and the flooding limit the use of conventional equipment and increase the seedling mortality rate. Using modified or special equipment generally helps to overcome the equipment limitation. Planting and harvesting during the drier periods also help to overcome this limitation. Proper drainage, control of competing plants, and the selection of adapted tree species generally increase the seedling survival rate.

This soil is poorly suited to most kinds of recreational development because of the wetness and the flooding. The wetness and the flooding also severely limit the use of this soil for urban development.

The capability subclass is IVw. The woodland ordination symbol is 12W.

BrC—Bradson loam, 6 to 10 percent slopes. This very deep, well drained, strongly sloping soil is on toe slopes, on high terraces, and in coves.

Typically, the surface layer is yellowish red loam about 8 inches thick. The subsoil extends to a depth of 66 inches or more. The upper part is yellowish red clay loam, the next part is predominantly red clay, and the lower part is strong brown sandy clay loam.

This soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is high. Tilth is good. The soil can be worked throughout a fairly wide range in moisture content. The root zone is very deep and can be easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Clifton, Evard, and Hayesville soils, areas of Bradson soils that have slopes of more than 10 percent, eroded soils that have a surface layer of clay loam, and soils that are darker red throughout than the Bradson soil. All of the included soils, except Clifton, Evard, and Hayesville soils, are in positions on the landscape similar to those of the major Bradson soil. Clifton, Evard, and Hayesville soils are on intermountain uplands.

The Bradson soil is only moderately suited to field crops because of the slope. However, it is well suited to hay and pasture. Good tilth can be maintained by returning crop residue to the soil. Erosion is a severe hazard if the soil is cultivated and not protected. A conservation tillage system, a water management system, or a combination of both can help to control runoff and erosion.

The potential of this soil for woodland production is high. Yellow-poplar, loblolly pine, eastern white pine, and black walnut are some of the preferred trees to plant. Although no significant limitations affect woodland use, managing and harvesting on the contour help to keep erosion to a minimum.

This soil is only moderately suited to most urban uses and to recreational development because of the slope. Generally, the slope can be overcome by special design and proper application.

The capability subclass is IIIe. The woodland ordination symbol is 12A.

BrE—Bradson loam, 10 to 25 percent slopes. This very deep, well drained, moderately steep soil is on toe slopes, on high terraces, and in coves.

Typically, the surface layer is yellowish red loam about 8 inches thick. The subsoil extends to a depth of 66 inches or more. The upper part is yellowish red clay loam, the next part is predominantly red clay, and the lower part is strong brown sandy clay loam.

This soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is high. Tilth is good. The soil can be worked throughout a fairly wide range in moisture content. The root zone is very deep and can be easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Clifton, Evard, and Hayesville soils and areas of Bradson soils that have slopes of less than 10 percent. Clifton, Evard, and Hayesville soils are on intermountain uplands.

The Bradson soil is not suited to field crops because of the slope. It is moderately suited to hay and pasture. Hay and pasture crops help to control runoff and erosion.

The potential of this soil for woodland production is high. Yellow-poplar, loblolly pine, eastern white pine, and black walnut are some of the preferred trees to plant. Because of the slope, the main management concerns are the hazard of erosion and an equipment limitation. Managing and harvesting on the contour, installing water bars in firebreaks, and establishing skid trails help to control erosion. Also, harvesting during the drier periods and using temporary cover during regeneration help to keep erosion to a minimum. Proper placement of access systems reduces the equipment limitation. Hand planting and using a winch to skid trees and logs minimize the need for heavy equipment. Placing log decks near the top of the slope also helps to overcome the equipment limitation.

This soil is poorly suited to most urban uses and to recreational development because of the slope. Generally, the slope can be overcome by special design and proper application.

The capability subclass is VIe. The woodland ordination symbol is 12R.

Ca—Chatuge loam, occasionally flooded. This very deep, poorly drained, nearly level and gently sloping soil is on low stream terraces, at the head of drainageways, or on toe slopes. It is occasionally flooded for very brief periods from late fall to midspring.

Typically, the surface layer is very dark grayish brown loam about 9 inches thick. The subsoil extends to a depth of 45 inches. The upper part is dark gray clay loam that has yellowish brown mottles, the next part is grayish brown clay loam that has yellowish brown mottles, and the lower part is gray sandy clay loam that has yellowish red and brownish yellow mottles. The substratum extends to a depth of 60 inches or more. It is gray, stratified sandy clay loam and fine sandy loam.

This soil is low in natural fertility. The content of organic matter is moderately low in the surface layer. Permeability is moderate. Available water capacity also is moderate. Tilth is good. The root zone is very deep except from late fall to late spring, when the water table is at a depth of 1 to 2 feet or when flooding occurs.

Included with this soil in mapping are a few small areas of Arkaqua, Dillard, Suches, and Thurmont soils. Arkaqua and Suches soils are on flood plains. The moderately well drained Dillard and well drained Thurmont soils are on stream terraces and toe slopes. Also included, in landscape positions similar to those of the Chatuge soil, are a few small areas of poorly drained soils that have a clayey subsoil and loamy soils that have gravelly coarse sand within a depth of 40 inches.

The Chatuge soil is only moderately suited to field crops and pasture because flooding is likely during the planting season and because of wetness. Grasses and legumes help to maintain fertility and the content of organic matter.

The potential of this soil for woodland production is high. Loblolly pine, yellow-poplar, eastern white pine, and American sycamore are some of the preferred trees to plant. The seasonal wetness limits the use of conventional equipment and increases the seedling mortality rate. The equipment limitation generally can be overcome by using modified or special equipment, by controlling surface water, or by planting and harvesting during the drier periods. Providing proper drainage, controlling plant competition, and planting adapted tree species generally increase the seedling survival rate.

This soil is poorly suited to most urban uses and to recreational development because of the wetness and the flooding. These limitations can only be overcome if major flood-control structures and extensive drainage systems are established and maintained.

The capability subclass is IVw. The woodland ordination symbol is 11W.

CeE—Chestnut loam, 10 to 25 percent slopes. This moderately deep, well drained, moderately steep soil is on broad mountain ridges at elevations of 2,500 to more than 4,700 feet. Slopes mainly face the south.

Typically, the surface layer is brown loam about 6 inches thick. The subsoil extends to a depth of 21 inches. It is dark yellowish brown gravelly loam. The substratum extends to a depth of 33 inches. It is yellowish brown gravelly sandy loam. Soft bedrock is at a depth of about 33 inches.

This soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderately rapid. Available water capacity is low. The effective root zone is limited by soft bedrock at a depth of 26 to 40 inches.

Included with this soil in mapping are a few small areas of Clifton, Cowee, Evard, Porters, and Saunook soils. Also included are a few small areas of rock outcrop. Clifton, Cowee, and Evard soils are on intermountain uplands and on mountains. Porters soils are in positions on the landscape similar to those of the Chestnut soil. Saunook soils are in mountain coves and on toe slopes.

The Chestnut soil is not suited to field crops because of the slope. It is moderately suited to pasture.

This soil is mainly wooded. The potential for woodland production is moderate. Eastern white pine and yellow-poplar are preferred trees to plant. Because of the slope, the main management concerns are the hazard of erosion and an equipment limitation. Managing and harvesting on the contour and installing water bars in firebreaks help to control erosion. Also, harvesting during the drier periods and maintaining temporary cover during regeneration help to keep erosion to a minimum. Proper placement of access systems reduces the equipment limitation. Hand planting and using a winch to skid trees and logs during harvesting can minimize the need for heavy equipment. Placing log decks near the top of the slope also helps to overcome the equipment limitation.

This soil is poorly suited to most urban uses and to recreational development because of the slope and the depth to bedrock.

The capability subclass is VIe. The woodland ordination symbol is 4R.

ChF—Chestnut loam, 25 to 45 percent slopes, stony. This moderately deep, well drained, steep soil is on broad mountain ridges at elevations of 2,500 to more than 4,500 feet. Slopes dominantly face the south. Rock fragments that average about 15 inches in diameter are about 75 feet apart on the surface.

Typically, the surface layer is brown loam about 6 inches thick. The subsoil extends to a depth of 21 inches. It is dark yellowish brown gravelly loam. The substratum extends to a depth of 33 inches. It is yellowish brown gravelly sandy loam. Soft bedrock is at a depth of about 33 inches.

This soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderately rapid. Available water capacity is low. The effective root zone is limited by bedrock at a depth of 26 to 40 inches.

Included with this soil in mapping are a few small areas of Clifton, Cowee, Evard, and Saunook soils and areas of rock outcrop. Clifton, Cowee, and Evard soils are on intermountain uplands and on mountains. Saunook soils are in mountain coves and on toe slopes.

The Chestnut soil is not suited to field crops or pasture because of the slope.

This soil is mainly wooded. The potential for woodland production is moderate. Eastern white pine and yellow-poplar are preferred trees to plant. The main management concerns are the hazard of erosion and an equipment limitation. Using harvesting procedures that minimize cutting, limiting harvesting activities to the drier periods, managing and harvesting on the contour, and seeding access systems as appropriate after harvesting help to keep erosion to a minimum. In some places erosion-control measures are needed to minimize soil exposure. Proper placement of access systems reduces the equipment limitation. Also, hand planting and using a winch to skid trees and logs during harvesting can minimize the need for heavy equipment. Placing log decks near the top of the slope also helps to overcome the equipment limitation.

This soil is poorly suited to most urban uses and to recreational development because of the slope and the depth to bedrock.

The capability subclass is VIIe. The woodland ordination symbol is 4R.

ChG—Chestnut loam, 45 to 60 percent slopes, stony. This moderately deep, well drained, very steep soil is on side slopes of mountains at elevations of 2,500 to more than 4,500 feet. Slopes dominantly face the south. Rock fragments that average about 15 inches in diameter are about 75 feet apart on the surface.

Typically, the surface layer is brown loam about 6 inches thick. The subsoil extends to a depth of 21 inches. It is dark yellowish brown gravelly loam. The substratum extends to a depth of 33 inches. It is yellowish brown gravelly sandy loam. Soft bedrock is at a depth of about 33 inches.

This soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderately rapid. Available water capacity is low. The effective root zone is limited by soft bedrock at a depth of 20 to 40 inches.

Included with this soil in mapping are a few small areas of Saunook soils in mountain coves. Also included are a few small areas of rock outcrop.

The Chestnut soil is not suited to field crops or pasture because of the slope.

This soil is mainly wooded. The potential for woodland production is moderate. Eastern white pine and yellow-poplar are preferred trees to plant. The main management concerns are the hazard of erosion and an equipment limitation. Using harvesting procedures that minimize cutting, limiting harvesting activities to the drier periods, managing on the contour, and seeding access systems as appropriate after harvesting help to keep erosion to a minimum. In some places erosion-control measures are needed to minimize soil exposure. Proper placement of access systems reduces the equipment limitation. Also, hand planting and using a winch to skid trees and logs during harvesting can minimize the need for heavy equipment. Placing log decks near the top of the slope also helps to overcome the equipment limitation.

This soil is poorly suited to most urban uses and to recreational development because of the slope and the depth to bedrock.

The capability subclass is VIIe. The woodland ordination symbol is 4R.

ClC—Clifton-Evard complex, 6 to 10 percent slopes. These very deep, well drained, strongly sloping soils are on mountain ridges and intermountain uplands at elevations of 1,500 to 2,400 feet. The Clifton soil makes up about 45 percent of the unit, and the Evard soil makes up 30 percent.

Typically, the Clifton soil has a surface layer of reddish brown fine sandy loam about 4 inches thick. The subsoil extends to a depth of 36 inches. The upper part is yellowish red clay loam, the next part is dominantly red clay, and the lower part is red loam. The substratum to a depth of 60 inches or more is red loam.

The Clifton soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is high. The root zone is very deep.

Typically, the Evard soil has a surface layer of brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 40 inches. The upper part is dominantly red clay loam, the next part is red sandy clay loam, and the lower part is red sandy loam. The substratum extends to a depth of 60 inches or more. The upper part is yellowish red sandy loam that has strong brown mottles, and the lower part is strong brown sandy loam that has yellowish red mottles.

The Evard soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity also is moderate. The root zone is very deep and can be easily penetrated by plant roots.

Included with these soils in mapping are a few small areas of Hayesville soils. Also included are a few small areas of soils that have slopes of less than 6 percent and soils that have slopes of more than 10 percent. Most of the included soils are in positions on the landscape similar to those of the Clifton and Evard soils. Soils that have slopes of more than 10 percent are in narrow draws.

The Clifton and Evard soils are only moderately suited to field crops, hay, and pasture because of the slope. Erosion is a severe hazard if the soils are cultivated and not protected. A conservation tillage system, a water management system, or a combination of both helps to control runoff and erosion.

The potential of these soils for woodland production is moderate. Eastern white pine, loblolly pine, yellow-poplar, and northern red oak are some of the preferred trees to plant. Although no significant limitations affect woodland use, managing and harvesting on the contour help to keep erosion to a minimum.

These soils are poorly suited to most urban uses and to recreational development because of the depth to bedrock and the slope.

The capability subclass is IIIe. The woodland ordination symbol is 7A for the Clifton soil and 8A for the Evard soil.

CIE—Clifton-Evard complex, 10 to 25 percent slopes. These very deep, well drained, moderately steep soils are on mountain ridges and intermountain uplands at elevations of 1,500 to 3,500 feet. The Clifton soil makes up about 45 percent of the unit, and the Evard soil makes up 30 percent.

Typically, the Clifton soil has a surface layer of reddish brown fine sandy loam about 4 inches thick. The subsoil extends to a depth of 36 inches. The upper part is yellowish red clay loam, the next part is dominantly red clay, and the lower part is red loam. The substratum to a depth of 60 inches or more is red loam.

The Clifton soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is high. The root zone is very deep.

Typically, the Evard soil has a surface layer of brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 40 inches. The upper part is dominantly red clay loam, the next part is red sandy clay loam, and the lower part is red sandy loam. The substratum extends to a depth of 60 inches or more. The upper part is yellowish red sandy loam that has strong brown mottles, and the lower part is strong brown sandy loam that has yellowish red mottles.

The Evard soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity also is moderate. The root zone is very deep and can be easily penetrated by plant roots.

Included with these soils in mapping are a few small areas of Cowee, Hayesville, and Saunook soils. Cowee soils are in positions on the landscape similar to those of the Clifton and Evard soils. Hayesville soils are on intermountain uplands. Saunook soils are in mountain coves. Also included, in landscape positions similar to those of the Clifton and Evard soils, are a few small areas of soils that are shallower over bedrock than the Clifton and Evard soils, areas of rock outcrop, and soils that have slopes of less than 10 percent. A few small areas of included soils that formed in sediments are on toe slopes.

The Clifton and Evard soils are not suited to field crops because of the slope. They are moderately suited to hay and pasture.

The potential of these soils for woodland production is moderate. Eastern white pine, loblolly pine, yellow-poplar, and northern red oak are some of the preferred trees to plant. The main management concerns are the hazard of erosion and an equipment limitation. Managing on the contour, harvesting during periods of low rainfall, using water bars in firebreaks, and using temporary cover until the stand is established can reduce the hazard of erosion. Thorough planning and proper construction of roads and access systems and placement of log decks near the top of the slope help to overcome the equipment limitation. Also, hand planting and using a winch to skid logs and trees can minimize the need for heavy equipment or vehicles.

These soils are poorly suited to most urban uses and to recreational development because of the slope.

The capability subclass is VIe. The woodland ordination symbol is 7R for the Clifton soil and 8R for the Evard soil.

Cr—Colvard fine sandy loam, occasionally flooded. This very deep, well drained, nearly level and gently sloping soil is on flood plains of perennial streams between the mountains. It is occasionally flooded for very brief periods from early winter to midspring.

Typically, the surface layer is brown fine sandy loam about 12 inches thick. The underlying material extends to a depth of 70 inches or more. The upper part is brown sandy loam, the next part is reddish yellow and light yellowish brown fine sandy loam, and the lower part is dominantly light yellowish brown sandy loam that has reddish yellow and very pale brown mottles.

This soil is low in natural fertility. The content of organic matter is moderately low in the surface layer. Permeability is moderately rapid. Available water capacity is moderate. The root zone is very deep except during the periods of flooding.

Included with this soil in mapping are a few areas of Arkaqua soils, soils that are poorly drained, and soils that have a thicker and darker surface layer than that of the Colvard soil. These soils are in positions on the landscape similar to those of the Colvard soil.

The Colvard soil is highly productive. However, this soil is only moderately suited to field crops because flooding is likely during the planting season. The soil is well suited to hay and pasture. Grasses and legumes help to maintain fertility and the content of organic matter.

The potential of this soil for woodland production is high. Eastern white pine and yellow-poplar are preferred trees to plant. No significant limitations affect woodland use and management.

This soil is only moderately suited to most kinds of recreational development because of the flooding. Also, the flooding severely restricts the use of this soil for most kinds of urban development. The flooding can only be overcome by extensive flood-control measures.

The capability subclass is IIw. The woodland ordination symbol is 8A.

CwH—Cowee fine sandy loam, 60 to 90 percent slopes. This moderately deep, well drained, very steep soil is on ridges and uneven, complex side slopes of mountains and intermountain uplands. It occurs at elevations of 1,500 to 3,500 feet.

Typically, the surface layer is dark brown fine sandy loam about 7 inches thick. The subsoil extends to a depth of 26 inches. It is yellowish red sandy clay loam. Multicolored, weathered gneiss bedrock is at a depth of about 26 inches.

This soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is low. The root zone is moderately deep.

Included with this soil in mapping are a few small areas of Chestnut and Evard soils, soils that have slopes of less than 60 percent, soils that have less clay in the subsoil than the Cowee soil, soils that are deeper over bedrock than the Cowee soil, and areas of rock outcrop. These included areas are in positions on the landscape similar to those of the Cowee soil. Also included are a few small areas of soils that formed in sediments on toe slopes.

The Cowee soil is not suited to field crops, hay, or pasture because of the slope.

This soil is mainly wooded. The potential for woodland production is moderate. Eastern white pine, loblolly pine, northern red oak, and white oak are some of the preferred trees to plant. Because of the slope, the main management concerns are the hazard of erosion and an equipment limitation. Managing and harvesting on the contour, using water bars in firebreaks, harvesting during the drier periods, and using temporary cover during regeneration help to keep erosion to a minimum. Proper placement of access systems reduces the equipment limitation. Also, hand planting and winching minimize the need for power equipment. Placing log decks near the top of the slope also helps to overcome the equipment limitation.

This soil is poorly suited to most urban uses and to recreational development. The slope is the main limitation.

The capability subclass is VIIe. The woodland ordination symbol is 3R.

CxE—Cowee-Evard complex, 10 to 25 percent slopes. These moderately steep, well drained soils are on ridges and uneven, complex side slopes of intermountain uplands. The Cowee soil is moderately deep, and the Evard soil is very deep. The soils are at elevations of 1,500 to 3,500 feet. The Cowee soil makes up about 40 percent of the unit, and the Evard soil makes up 35 percent.

Typically, the Cowee soil has a surface layer of dark brown fine sandy loam about 7 inches thick. The subsoil extends to a depth of 26 inches. It is yellowish red sandy clay loam. Multicolored, weathered gneiss bedrock is at a depth of about 26 inches.

The Cowee soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is low. The root zone is moderately deep.

Typically, the Evard soil has a surface layer of brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 40 inches. The upper part is dominantly red clay loam, the next part is red sandy clay loam, and the lower part is red sandy loam. The substratum extends to a depth of 60 inches or more. The upper part is yellowish red sandy loam that has strong brown mottles, and the lower part is strong brown sandy loam that has yellowish red mottles.

The Evard soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity also is moderate. The root zone is very deep and can be easily penetrated by plant roots.

Included with these soils in mapping are a few areas of Hayesville and Clifton soils, soils that are more shallow over bedrock than the Cowee and Evard soils, and soils that have slopes of less than 10 percent. These included soils are in positions on the landscape similar to those of the Cowee and Evard soils. Also included are a few small areas of soils that formed in sediments on toe slopes and soils in narrow draws that have slopes of more than 25 percent.

The Cowee and Evard soils are not suited to field crops because of the slope. They are moderately suited to hay and pasture.

These soils are mainly wooded. The potential for woodland production is moderate. Eastern white pine, loblolly pine, northern red oak, and white oak are some of the preferred trees to plant. Because of the slope, the main management concerns are the hazard of erosion and an equipment limitation. Managing on the contour, harvesting during periods of low rainfall, using water bars in firebreaks, and using temporary cover until the stand is established reduce the hazard of erosion. Thorough planning and proper construction of roads and access systems and the placement of log decks near the top of the slope help to overcome the equipment limitation. Also, hand planting and using a winch to skid logs and trees can minimize the need for vehicles and heavy equipment.

These soils are poorly suited to most urban uses and to recreational development. The slope is the main limitation.

The capability subclass is VIe. The woodland ordination symbol is 3R for the Cowee soil and 8R for the Evard soil.

CxF—Cowee-Evard complex, 25 to 45 percent slopes. These moderately deep and very deep, well drained, steep soils are on ridges and uneven, complex side slopes of intermountain uplands. They are at elevations of 1,500 to 3,500 feet. The Cowee soil makes up about 55 percent of the unit, and the Evard soil makes up 35 percent.

Typically, the Cowee soil has a surface layer of dark brown fine sandy loam about 7 inches thick. The subsoil extends to a depth of 26 inches. It is yellowish red sandy clay loam. Multicolored, weathered gneiss bedrock is at a depth of about 26 inches.

The Cowee soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is low. The root zone is moderately deep.

Typically, the Evard soil has a surface layer of brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 40 inches. The upper part is dominantly red clay loam, the next part is red sandy clay loam, and the lower part is red sandy loam. The substratum extends to a depth of 60 inches or more. The upper part is yellowish red sandy loam that has strong brown mottles, and the lower part is strong brown sandy loam that has yellowish red mottles.

The Evard soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity also is moderate. The root zone is very deep and can be easily penetrated by plant roots.

Included with these soils in mapping are a few small areas of soils that are shallower over bedrock than the Cowee and Evard soils, areas of rock outcrop, soils that have less clay in the subsoil than the Cowee and Evard soils, and soils that have slopes of less than 25 percent or more than 45 percent. These included areas are in positions on the landscape similar to those of the Cowee and Evard soils. Also included are a few small areas of Thurmont soils on toe slopes.

The Cowee and Evard soils are not suited to field crops, hay, or pasture because of the slope.

These soils are mainly wooded. The potential for woodland production is moderate. Eastern white pine, loblolly pine, northern red oak, and white oak are some of the preferred trees to plant. Because of the slope, the main management concerns are the hazard of erosion and an equipment limitation. Managing on the contour, harvesting during periods of low rainfall, using water bars in firebreaks, and using temporary cover until the stand is established reduce the hazard of erosion. Thorough planning and proper construction of roads and access systems and placement of log decks near the top of the slope help to overcome the equipment limitation. Also, hand planting and using a winch to skid logs and trees can minimize the need for vehicles and heavy equipment.

These soils are poorly suited to most urban uses and to recreational development. The slope is the main limitation.

The capability subclass is VIIe. The woodland ordination symbol is 3R for the Cowee soil and 8R for the Evard soil.

CxG—Cowee-Evard complex, 45 to 60 percent slopes. These moderately deep and very deep, well drained, very steep soils are on ridges and uneven, complex side slopes of intermountain uplands and mountains. They are at elevations of 1,500 to 3,500 feet. The Cowee soil makes up about 55 percent of the unit, and the Evard soil makes up 35 percent.

Typically, the Cowee soil has a surface layer of dark brown fine sandy loam about 7 inches thick. The subsoil extends to a depth of 26 inches. It is yellowish red sandy clay loam. Multicolored, weathered gneiss bedrock is at a depth of about 26 inches.

The Cowee soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is low. The root zone is moderately deep.

Typically, the Evard soil has a surface layer of brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 40 inches. The upper part is dominantly red clay loam, the next part is red sandy clay loam, and the lower part is red sandy loam. The substratum extends to a depth of 60 inches or more. The upper part is yellowish red sandy loam that has strong brown mottles, and the lower part is strong brown sandy loam that has yellowish red mottles.

The Evard soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity also is moderate. The root zone is very deep and can be easily penetrated by plant roots.

Included with these soils in mapping are a few small areas of soils that are more shallow over bedrock than the Cowee and Evard soils, areas of rock outcrop, soils that have less clay in the subsoil than the Cowee and Evard soils, and soils that have slopes of less than 45 percent. These included areas are in positions on the landscape similar to those of the Cowee and Evard soils. Also included are a few small areas of soils that formed in sediments on toe slopes.

The Cowee and Evard soils are not suited to field crops, hay, or pasture because of the slope.

These soils are mainly wooded. The potential for woodland production is moderate. Eastern white pine, loblolly pine, northern red oak, and white oak are some of the preferred trees to plant. Because of the slope, the main management concerns are the hazard of erosion and an equipment limitation. Managing and harvesting on the contour, using water bars in firebreaks, harvesting during the drier periods, and using temporary cover during regeneration help to keep erosion to a minimum. Proper placement of access systems helps to overcome the equipment limitation. Also, hand planting and winching can minimize the need for power equipment. Placing log decks near the top of the slope also helps to overcome the equipment limitation.

These soils are poorly suited to most urban uses and to recreational development. The slope is the main limitation.

The capability subclass is VIIe. The woodland ordination symbol is 3R for the Cowee soil and 8R for the Evard soil.

DaB—Dillard fine sandy loam, 2 to 6 percent slopes. This very deep, moderately well drained, gently sloping soil is mainly on stream terraces and on toe slopes.

Typically, the surface layer is dark grayish brown fine sandy loam about 8 inches thick. The subsoil extends to a depth of 37 inches. The upper part is brownish yellow sandy clay loam, the next part is brownish yellow sandy clay loam that has gray and yellowish brown mottles, and the lower part is yellowish brown sandy clay loam that has gray and strong brown mottles. The substratum extends to a depth of 60 inches or more. It is gray clay that has yellowish red mottles.

This soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderately slow. The available water capacity is low. Tilth is good. The soil can be worked throughout a fairly wide range in moisture content. The root zone is very deep except from late fall to midspring, when the water table is at a depth of 2 to 3 feet.

Included with this soil in mapping are a few small areas of Arkaqua, Bradson, Chatuge, Colvard, French, Suches, and Thurmont soils. Arkaqua, Colvard, French, and Suches soils are on flood plains. Bradson soils are on high terraces and in coves. Chatuge soils are on stream terraces, at the head of drainageways, and on toe slopes. Thurmont soils are on stream terraces and toe slopes. Also included are a few small areas of soils that have slopes of more than 6 percent.

The Dillard soil is well suited to field crops, hay, and pasture. Good tilth can be maintained by returning crop residue to the soil.

The potential of this soil for woodland production is high. Loblolly pine, eastern white pine, black walnut, and yellow-poplar are some of the preferred trees to plant. No significant limitations affect woodland use and management.

This soil is poorly suited to most urban uses mainly because of wetness. It is moderately suited to most kinds of recreational development. Generally, the wetness can be overcome by drainage measures.

The capability subclass is IIw. The woodland ordination symbol is 12A.

Fr—French fine sandy loam, frequently flooded. This very deep, moderately well drained or somewhat poorly drained, nearly level soil is on flood plains along streams between the mountains. It is frequently flooded for very brief periods from late fall to late spring.

Typically, the surface layer is brown fine sandy loam about 9 inches thick. The subsoil extends to a depth of 33 inches. The upper part is yellowish brown loam that has brown, grayish brown, and strong brown mottles. The lower part is yellowish brown sandy loam that has grayish brown and brown mottles. The substratum extends to a depth of 60 inches or more. It is yellowish brown, stratified sand and gravel and has strong brown mottles.

This soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate in the subsoil and rapid in the substratum. Available water capacity is low. Tilth is good. The root zone is very deep except from late fall to midspring, when the water table is at a depth of 1.0 foot to 2.5 feet or when flooding occurs.

Included with this soil in mapping are a few small areas of Arkaqua, Chatuge, Colvard, Dillard, Suches, and Thurmont soils. Also included are a few small areas of soils that contain more sand than the French soil and soils that are more poorly drained. Arkaqua soils are somewhat poorly drained, Chatuge soils are poorly drained, Colvard soils are well drained, and Suches soils are well drained and moderately well drained. The moderately well drained Dillard and well drained Thurmont soils are on stream terraces and toe slopes. All of the other included soils are in landscape positions similar to those of the French soil.

The French soil is highly productive, but it is only moderately suited to field crops because flooding is likely during the planting season. Drainage systems reduce the damage caused by flooding. The soil is well suited to hay and pasture. Grasses and legumes help to maintain fertility and the content of organic matter.

The potential of this soil for woodland production is high. Yellow-poplar, eastern white pine, black walnut, and white ash are some of the preferred trees to plant. Seasonal wetness limits the use of conventional equipment. The equipment limitation generally can be overcome by using modified or special equipment or by restricting management activities to the drier periods.

This soil is poorly suited to most kinds of recreational development because of the wetness and the flooding. Also, the wetness and the flooding severely limit the use of this soil for urban development. They can be overcome only by extensive flood-control and drainage measures.

The capability subclass is IIIw. The woodland ordination symbol is 9W.

HaC—Hayesville fine sandy loam, 6 to 10 percent slopes. This very deep, well drained, strongly sloping soil is on broad ridges of intermountain uplands.

Typically, the surface layer is brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of 58 inches. The upper part is dominantly red clay loam, the next part is red clay, and the lower part is red clay loam. The substratum extends to a depth of 72 inches or more. It is red loam.

This soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is high. Tilth is good. The root zone is very deep and can be easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Bradson, Clifton, and Evard soils and eroded soils that have a surface layer of clay loam. Bradson soils are on high terraces and in coves. Clifton and Evard soils are in positions on the landscape similar to those of the Hayesville soil.

The Hayesville soil is only moderately suited to field crops because of the slope. It is well suited to hay and pasture. Good tilth can be maintained by returning crop residue to the soil. Erosion is a severe hazard if the soil is cultivated and not protected. A conservation tillage system, a water management system, or a combination of both helps to control runoff and erosion.

The potential of this soil for woodland production is moderate. Loblolly pine, eastern white pine, and northern red oak are some of the preferred trees to plant. Although no significant limitations affect woodland use, managing and harvesting on the contour help to keep erosion to a minimum.

This soil is only moderately suited to most urban uses and to recreational development mainly because of the slope. Also, the moderate permeability limits the use of the soil as a site for septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

The capability subclass is IIIe. The woodland ordination symbol is 7A.

HaE—Hayesville fine sandy loam, 10 to 25 percent slopes. This very deep, well drained, moderately steep soil is on ridges and side slopes of intermountain uplands.

Typically, the surface layer is brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of 58 inches. The upper part is dominantly red clay loam, the next part is red clay, and the lower part is red clay loam. The substratum extends to a depth of 72 inches or more. It is red loam.

This soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is high. Tilth is good. The root zone is deep and can be easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Bradson, Clifton, and Evard soils and soils that have slopes of less than 10 percent. Bradson soils are on high terraces and in coves. Clifton and Evard soils are in positions on the landscape similar to those of the Hayesville soil.

The Hayesville soil is not suited to field crops because of the slope. It is moderately suited to hay and pasture. Erosion is a severe hazard if the soil is cultivated and not protected. Hay and pasture crops help to control runoff and erosion.

The potential of this soil for woodland production is moderate. Loblolly pine, eastern white pine, and northern red oak are some of the preferred trees to plant. Because of the slope, the main management concerns are the hazard of erosion and an equipment limitation. Managing and harvesting on the contour, installing water bars in firebreaks, and establishing skid trails help to control erosion. Also, harvesting during the drier periods and using temporary cover during regeneration help to keep erosion to a minimum. Proper placement of access systems reduces the equipment limitation. Also, hand planting and using a winch to skid trees and logs can minimize the need for power vehicles. Placing log decks near the top of the slope also helps to overcome the equipment limitation.

This soil is poorly suited to most urban uses and to recreational development mainly because of the slope. Generally, the slope can be overcome by special design and proper application.

The capability subclass is VIe. The woodland ordination symbol is 7R.

HaF—Hayesville fine sandy loam, 25 to 45 percent slopes. This very deep, well drained, steep soil is on side slopes of intermountain uplands.

Typically, the surface layer is brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of 58 inches. The upper part is dominantly red clay loam, the next part is red clay, and the lower part is red clay loam. The substratum extends to a depth of 72 inches or more. It is red loam.

This soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is high. Tilth is good. The root zone is very deep and can be easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Bradson, Clifton, and Evard soils and soils that have slopes of more than 45 percent. Bradson soils are on high terraces and in coves. Clifton and Evard soils are in positions on the landscape similar to those of the Hayesville soil.

The Hayesville soil is not suited to field crops, hay, or pasture because of the slope.

The potential of this soil for woodland production is moderate. Loblolly pine, eastern white pine, and northern red oak are some of the preferred trees to plant. Because of the slope, the main management concerns are the hazard of erosion and an equipment limitation. Managing and harvesting on the contour, installing water bars in firebreaks, and establishing skid trails help to control erosion. Also, harvesting during the drier periods and using temporary cover during regeneration help to keep erosion to a minimum. Proper placement of access systems reduces the equipment limitation. Also, hand planting and using a winch to skid trees and logs can minimize the need for power vehicles. Placing log decks near the top of the slope also helps to overcome the equipment limitation.

This soil is poorly suited to most urban uses and to recreational development mainly because of the slope.

The capability subclass is VIIe. The woodland ordination symbol is 7R.

JcE—Junaluska-Cataska complex, 10 to 25 percent slopes. These moderately deep and shallow, well drained and excessively drained, moderately steep soils are on ridges and side slopes of intermountain uplands. They occur at elevations of 1,500 to 2,400 feet. The Junaluska soil makes up about 50 percent of the unit, and the Cataska soil makes up 40 percent.

Typically, the Junaluska soil has a surface layer of dark reddish brown channery loam about 2 inches thick. The subsoil extends to a depth of 28 inches. The upper part is yellowish red clay loam, and the lower part is yellowish red channery clay loam. Multicolored, weathered and fractured, interbedded phyllite and metasandstone bedrock is at a depth of about 28 inches. The bedrock can be ripped.

The Junaluska soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is low. The effective root zone is limited by soft bedrock at a depth of 20 to 39 inches.

Typically, the Cataska soil has a surface layer of very dark grayish brown channery silt loam about 4 inches thick. The subsoil extends to a depth of 16 inches. The upper part is yellowish brown channery silt loam, and the lower part is yellowish brown very channery silt loam. Gray, fractured, thinly bedded phyllite and metasandstone bedrock is at a depth of about 16 inches. The bedrock can be ripped.

The Cataska soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is rapid. Available water capacity is very low. The effective root zone is limited mainly by soft bedrock at a depth of 10 to 20 inches.

Included with these soils in mapping are a few small areas of Tsali soils, soils that have a darker subsoil than the Junaluska and Cataska soils, and soils that have slopes of less than 10 percent or more than 25 percent. These included soils are in positions on the landscape similar to those of the Junaluska and Cataska soils. Also included are a few small areas of soils that formed in sediments on toe slopes.

The Junaluska and Cataska soils are not suited to field crops because of the slope. They are moderately suited to hay and pasture. Erosion is a severe hazard if the soils are cleared and not protected.

These soils are mainly wooded. The potential for woodland production is low. Eastern white pine, loblolly pine, northern red oak, and white oak are some of the preferred trees to plant. The main management concerns are the hazard of erosion, an equipment limitation, and seedling mortality. Managing and harvesting on the contour, harvesting during periods of low rainfall, installing water bars in firebreaks, and using temporary cover until the stand is established reduce the hazard of erosion. Thorough planning and proper construction of roads and access systems and placement of log decks near the top of the slope help to overcome the equipment limitation. Also, hand planting and using a winch to skid logs and trees can minimize the need for vehicles. Selecting drought-resistant varieties, planting seedlings at the proper depth, and, in some places, ripping the shallow bedrock prior to planting improve the seedling survival rate.

These soils are poorly suited to most urban uses and to recreational development because of the slope and the depth to bedrock.

The capability subclass is VIe for the Junaluska soil and VIIs for the Cataska soil. The woodland ordination symbol is 3R for the Junaluska soil and 2R for the Cataska soil.

JcF—Junaluska-Cataska complex, 25 to 45 percent slopes. These soils are on steep side slopes of intermountain uplands at elevations of 1,500 to 2,400 feet. The moderately deep, well drained Junaluska soil makes up about 40 percent of the unit, and the shallow, excessively drained Cataska soil makes up 35 percent.

Typically, the Junaluska soil has a surface layer of dark reddish brown channery loam about 2 inches thick. The subsoil extends to a depth of 28 inches. The upper part is yellowish red clay loam, and the lower part is yellowish red channery clay loam. Multicolored, weathered and fractured, interbedded phyllite and metasandstone bedrock is at a depth of about 28 inches. The bedrock can be ripped.

The Junaluska soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is low. The effective root zone is limited by soft bedrock at a depth of 20 to 39 inches.

Typically, the Cataska soil has a surface layer of very dark grayish brown channery silt loam about 4 inches thick. The subsoil extends to a depth of 16 inches. The upper part is yellowish brown channery silt loam, and the lower part is yellowish brown very channery silt loam. Gray, fractured, thinly bedded phyllite and metasandstone bedrock is at a depth of about 16 inches. The bedrock can be ripped.

The Cataska soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is rapid. Available water capacity is very low. The effective root zone is limited mainly by soft bedrock at a depth of 10 to 20 inches.

Included with these soils in mapping are a few small areas of Tsali soils, soils that have a darker subsoil than the Junaluska and Cataska soils, soils that have slopes of less than 25 percent or more than 45 percent, and soils that have stones on the surface. These included soils are in positions on the landscape similar to those of the Junaluska and Cataska soils. Also included are a few small areas of soils that formed in sediments on toe slopes.

The Junaluska and Cataska soils are not suited to field crops, hay, or pasture because of the slope.

These soils are mainly wooded. The potential for woodland production is low. Eastern white pine, loblolly pine, northern red oak, and white oak are some of the preferred trees to plant. The main management concerns are the hazard of erosion, an equipment limitation, and seedling mortality. Managing and harvesting on the contour, harvesting during periods of low rainfall, installing water bars in firebreaks, and, in places, using temporary cover until the stand is established reduce the hazard of erosion. Thorough planning and proper construction of access systems and placement of log decks near the top of the slope help to overcome the equipment limitation. Also, hand planting and using a winch to skid logs and trees can minimize the need for vehicles. Selecting drought-resistant varieties, planting seedlings at the proper depth, and, in some places, ripping the shallow bedrock prior to planting improve the seedling survival rate.

These soils are poorly suited to most urban uses and to recreational development mainly because of the slope and the depth to bedrock.

The capability subclass is VIIe for the Junaluska soil and VIIs for the Cataska soil. The woodland ordination symbol is 3R for the Junaluska soil and 2R for the Cataska soil.

JcG—Junaluska-Cataska complex, 45 to 90 percent slopes. These moderately deep and shallow, well drained and excessively drained, very steep soils are on ridges and side slopes of intermountain uplands. They are at elevations of 1,500 to 2,400 feet. The Junaluska soil makes up about 45 percent of the unit, and the Cataska soil makes up 40 percent.

Typically, the Junaluska soil has a surface layer of dark reddish brown channery loam about 2 inches thick. The subsoil extends to a depth of 28 inches. The upper part is yellowish red clay loam, and the lower part is yellowish red channery clay loam. Multicolored, weathered and fractured, interbedded phyllite and metasandstone bedrock is at a depth of about 28 inches. The bedrock can be ripped.

The Junaluska soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is low. The effective root zone is limited by soft bedrock at a depth of 20 to 39 inches.

Typically, the Cataska soil has a surface layer of very dark grayish brown channery silt loam about 4 inches thick. The subsoil extends to a depth of 16 inches. The upper part is yellowish brown channery silt loam, and the lower part is yellowish brown very channery silt loam. Gray, fractured, thinly bedded phyllite and metasandstone bedrock is at a depth of about 16 inches. The bedrock can be ripped.

The Cataska soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is rapid. Available water capacity is very low. The effective root zone is limited mainly by soft bedrock at a depth of 10 to 20 inches.

Included with these soils in mapping are a few small areas of Tsali soils, soils that have a darker subsoil than the Junaluska and Cataska soils, areas of rock outcrop, soils that have slopes of less than 45 percent, and soils that have stones on the surface. These included areas are in positions on the landscape similar to those of the Junaluska and Cataska soils. Also included are a few small areas of soils that formed in sediments on toe slopes.

The Junaluska and Cataska soils are not suited to field crops, hay, or pasture because of the slope.

These soils are mainly wooded. The potential for woodland production is low. Eastern white pine, loblolly pine, northern red oak, and white oak are some of the preferred trees to plant. The main management concerns are the hazard of erosion, an equipment limitation, and seedling mortality. Managing and harvesting on the contour, harvesting during periods of low rainfall, installing water bars in firebreaks, and, in places, using temporary cover until the stand is established reduce the hazard of erosion. Thorough planning and proper construction of roads and access systems and placement of log decks near the top of the slope help to overcome the equipment limitation. Also, hand planting and using a winch to skid logs and trees can minimize the need for vehicles. Selecting drought-resistant varieties, planting seedlings at the proper depth, and, in some places, ripping the shallow bedrock prior to planting improve the seedling survival rate.

These soils are poorly suited to most urban uses and to recreational development because of the slope and the depth to bedrock.

The capability subclass is VIIe for the Junaluska soil and VIIs for the Cataska soil. The woodland ordination symbol is 3R for the Junaluska soil and 2R for the Cataska soil.

JtC—Junaluska-Tsali complex, 6 to 10 percent slopes. These moderately deep and shallow, well drained, strongly sloping soils are on side slopes of intermountain uplands at elevations of 1,500 to 2,400 feet. The Junaluska soil makes up about 40 percent of the unit, and the Tsali soil makes up 35 percent.

Typically, the Junaluska soil has a surface layer of dark reddish brown channery loam about 2 inches thick. The subsoil extends to a depth of 28 inches. The upper part is yellowish red clay loam, and the lower part is yellowish red channery clay loam. Multicolored, weathered and fractured, interbedded phyllite and metasandstone bedrock is at a depth of about 28 inches. The bedrock can be ripped.

The Junaluska soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is low. The effective root zone is limited mainly by soft bedrock at a depth of 20 to 40 inches.

Typically, the Tsali soil has a surface layer of brown channery loam about 2 inches thick. The subsoil extends to a depth of 16 inches. It is yellowish red channery clay loam. Multicolored, weathered and fractured, thinly bedded phyllite and metasandstone bedrock is at a depth of about 16 inches. The bedrock can be ripped.

The Tsali soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is very low. The effective root zone is limited by soft bedrock at a depth of 10 to 20 inches.

Included with these soils in mapping are a few small areas of Cataska soils and soils that have slopes of less than 6 percent or more than 10 percent. These included soils are in positions on the landscape similar to those of the Junaluska and Tsali soils. Also included are a few small areas of soils that formed in sediments on toe slopes.

The Junaluska and Tsali soils are not suited to field crops because of the depth to soft bedrock. They are moderately suited to pasture. Erosion is a severe hazard if the soils are cultivated and not protected.

These soils are mainly wooded. The potential for woodland production is low. Eastern white pine, loblolly pine, northern red oak, and white oak are some of the preferred trees to plant. The main management concerns are an equipment limitation and seedling mortality. Thorough planning and proper construction of roads and access systems reduces the equipment limitation. Selecting drought-resistant varieties, planting seedlings at the proper depth, and, in some places, ripping the shallow bedrock prior to planting improve the seedling survival rate.

These soils are poorly suited to most urban uses and to recreational development because of the depth to bedrock.

The capability subclass is IVe for the Junaluska soil and VIe for the Tsali soil. The woodland ordination symbol is 3D for the Junaluska soil and 6D for the Tsali soil.

JtE—Junaluska-Tsali complex, 10 to 25 percent slopes. These moderately deep and shallow, well drained, moderately steep soils are on ridges and side slopes of intermountain uplands at elevations of 1,500 to 2,400 feet. The Junaluska soil makes up about 50 percent of the unit, and the Tsali soil makes up 40 percent.

Typically, the Junaluska soil has a surface layer of dark reddish brown channery loam about 2 inches thick. The subsoil extends to a depth of 28 inches. The upper part is yellowish red clay loam, and the lower part is yellowish red channery clay loam. Multicolored, weathered and fractured, interbedded phyllite and metasandstone bedrock is at a depth of about 28 inches. The bedrock can be ripped.

The Junaluska soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is low. The effective root zone is limited mainly by soft bedrock at a depth of 20 to 40 inches.

Typically, the Tsali soil has a surface layer of brown channery loam about 2 inches thick. The subsoil extends to a depth of 16 inches. It is yellowish red channery clay loam. Multicolored, weathered and fractured, thinly bedded phyllite and metasandstone bedrock is at a depth of about 16 inches. The bedrock can be ripped.

The Tsali soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is very low. The effective root zone is limited by soft bedrock at a depth of 10 to 20 inches.

Included with these soils in mapping are a few small areas of Clifton and Evard soils and soils that have slopes of less than 10 percent or more than 25 percent. These included soils are in positions on the landscape similar to those of the Junaluska and Tsali soils. Also included are a few small areas of soils that formed in sediments on toe slopes.

These soils are not suited to field crops because of the slope. They are moderately suited to pasture. Erosion is a severe hazard if the soils are cleared and not protected.

These soils are mainly wooded. The potential for woodland production is low. Eastern white pine, loblolly pine, northern red oak, and white oak are some of the preferred trees to plant. The main management concerns are the hazard of erosion, an equipment limitation, and seedling mortality. Managing and harvesting on the contour, harvesting during periods of low rainfall, installing water bars in firebreaks, and, in places, using temporary cover until the stand is established reduce the hazard of erosion. Thorough planning and proper construction of roads and access systems and placement of log decks near the top of the slope help to overcome the equipment limitation. Also, hand planting and using a winch to skid logs and trees can minimize the need for vehicles. Selecting drought-resistant varieties, planting seedlings at the proper depth, and, in some places, ripping the shallow bedrock prior to planting improve the seedling survival rate.

These soils are poorly suited to most urban uses and to recreational development because of the slope and the depth to bedrock.

The capability subclass is VIe. The woodland ordination symbol is 3R for the Junaluska soil and 6D for the Tsali soil.

JtF—Junaluska-Tsali complex, 25 to 45 percent slopes. These moderately deep and shallow, well drained, steep soils are on ridges and side slopes of intermountain uplands. They occur at elevations of 1,500 to 2,400 feet. The Junaluska soil makes up about 50 percent of the unit, and the Tsali soil makes up 40 percent.

Typically, the Junaluska soil has a surface layer of dark reddish brown channery loam about 2 inches thick. The subsoil extends to a depth of 28 inches. The upper part is yellowish red clay loam, and the lower part is yellowish red channery clay loam. Multicolored, weathered and fractured, interbedded phyllite and metasandstone bedrock is at a depth of about 28 inches. The bedrock can be ripped.

The Junaluska soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is low. The effective root zone is limited mainly by soft bedrock at a depth of 20 to 40 inches.

Typically, the Tsali soil has a surface layer of brown channery loam about 2 inches thick. The subsoil extends to a depth of 16 inches. It is yellowish red channery clay loam. Multicolored, weathered and fractured, thinly bedded phyllite and metasandstone bedrock is at a depth of about 16 inches. The bedrock can be ripped.

The Tsali soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is very low. The effective root zone is limited by soft bedrock at a depth of 10 to 20 inches.

Included with these soils in mapping are a few small areas of Clifton and Evard soils, soils that have slopes of less than 25 percent or more than 45 percent, and soils that have a stony surface. These included soils are in positions on the landscape similar to those of the Junaluska and Tsali soils. Also included are a few small areas of soils that formed in sediments on toe slopes.

The Junaluska and Tsali soils are not suited to field crops, hay, or pasture because of the slope.

These soils are mainly wooded. The potential for woodland production is low. Eastern white pine, loblolly pine, northern red oak, and white oak are some of the preferred trees to plant. The main management concerns are the hazard of erosion, an equipment limitation, and seedling mortality. Managing and harvesting on the contour, harvesting during periods of low rainfall, installing water bars in firebreaks, and, in places, using temporary cover until the stand is established reduce the hazard of erosion. Thorough planning and proper construction of roads and access systems and placement of log decks near the top of the slope help to overcome the equipment limitation. Also, hand planting and using a winch to skid logs and trees can minimize the need for vehicles. Selecting drought-resistant varieties, planting seedlings at the proper depth, and, in some places, ripping the shallow bedrock prior to planting improve the seedling survival rate.

These soils are poorly suited to most urban uses and to recreational development because of the slope and the depth to bedrock.

The capability subclass is VIIe. The woodland ordination symbol is 3R for the Junaluska soil and 6R for the Tsali soil.

JtG—Junaluska-Tsali complex, 45 to 90 percent slopes. These moderately deep and shallow, well drained, very steep soils are on side slopes of intermountain uplands at elevations of 1,500 to 2,400 feet. The Junaluska soil makes up about 50 percent of the unit, and the Tsali soil makes up 40 percent.

Typically, the Junaluska soil has a surface layer of dark reddish brown channery loam about 2 inches thick. The subsoil extends to a depth of 28 inches. The upper part is yellowish red clay loam, and the lower part is yellowish red channery clay loam. Multicolored, weathered and fractured, interbedded phyllite and metasandstone bedrock is at a depth of about 28 inches. The bedrock can be ripped.

The Junaluska soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is low. The effective root zone is limited mainly by soft bedrock at a depth of 20 to 40 inches.

Typically, the Tsali soil has a surface layer of brown channery loam about 2 inches thick. The subsoil extends to a depth of 16 inches. It is yellowish red channery clay loam. Multicolored, weathered and fractured, thinly bedded phyllite and metasandstone bedrock is at a depth of about 16 inches. The bedrock can be ripped.

The Tsali soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is very low. The effective root zone is limited by soft bedrock at a depth of 10 to 20 inches.

Included with these soils in mapping are a few small areas of Evard soils, soils that have slopes of less than 45 percent, areas of rock outcrop, and soils that have an extremely stony surface. These included areas are in positions on the landscape similar to those of the Junaluska and Tsali soils. Also included are a few small areas of soils that formed in sediments on toe slopes.

These soils are not suited to field crops, hay, or pasture because of the slope.

These soils are mainly wooded. The potential for woodland production is low. Eastern white pine, loblolly pine, northern red oak, and white oak are some of the preferred trees to plant. The main management concerns are the hazard of erosion, an equipment limitation, and seedling mortality. Managing and harvesting on the contour, harvesting during periods of low rainfall, installing water bars in firebreaks, and, in places, using temporary cover until the stand is established reduce the hazard of erosion. Thorough planning and proper construction of roads and access systems and placement of log decks near the top of the slope help to overcome the equipment limitation. Also, hand planting in some places and using a winch to skid logs and trees can minimize the need for vehicles. Selecting drought-resistant varieties, planting seedlings at the proper depth, and, in some places, ripping the shallow bedrock prior to planting improve the seedling survival rate.

These soils are poorly suited to most urban uses and to recreational development because of the slope and the depth to bedrock.

The capability subclass is VIIe. The woodland ordination symbol is 3R for the Junaluska soil and 6R for the Tsali soil.

Pa—Pits, quarries. This map unit consists of granite and granite gneiss quarries that make up 70 acres of the survey area. Areas range from 5 to more than 100 feet in depth.

This map unit is poorly suited or unsuited to most uses, but it is a good source of crushed stone, rock dust, and building stone.

No capability subclass or woodland ordination symbol is assigned.

PsF—Porters loam, 25 to 45 percent slopes, stony. This deep, well drained, steep soil is on side slopes of mountains at elevations above about 3,000 feet. Slopes mostly face the north. Rock fragments that average about 15 inches in diameter are about 75 feet apart on the surface.

Typically, the surface layer is very dark grayish brown loam about 9 inches thick. The subsoil extends to a depth of 45 inches. The upper part is dark yellowish brown loam, and the lower part is yellowish brown sandy loam that has grayish brown mottles. The substratum extends to a depth of 52 inches. It is mottled yellowish brown and grayish brown saprolite that crushes to sandy loam. Hard gneiss bedrock is at a depth of about 52 inches. The soil has cobbles throughout.

This soil is medium in natural fertility. The content of organic matter is moderate or high in the surface layer. Permeability is moderately rapid. Available water capacity is moderate. The effective root zone is limited by hard bedrock at a depth of 40 to 60 inches.

Included with this soil in mapping are a few small areas of rock outcrop. These areas are in positions on the landscape similar to those of the Porters soil.

The Porters soil is not suited to field crops, hay, or pasture because of the slope and the stony surface.

This soil is mainly wooded. The potential for woodland production is moderate. Yellow-poplar, eastern white pine, and northern red oak are some of the preferred trees to plant. Mountain laurel and rhododendron are common forest understory plants. The main management concerns are the hazard of erosion and an equipment limitation. Using harvesting procedures that minimize cutting, limiting management activities to the drier periods, managing and harvesting on the contour, and seeding access systems as appropriate after harvesting help to keep erosion to a minimum. In some places erosion-control measures are needed to minimize soil exposure. Proper placement of access systems reduces the equipment limitation. Also, hand planting and using a winch to skid logs and trees during harvesting can minimize the need for heavy equipment. Placing log decks near the top of the slope also helps to overcome the equipment limitation.

This soil is poorly suited to most urban uses and to recreational development mainly because of the slope.

The capability subclass is VIe. The woodland ordination symbol is 7R.

PsG—Porters loam, 45 to 60 percent slopes, stony. This deep, well drained, very steep soil is on side slopes of mountains at elevations above about 3,000 feet. Slopes mostly face the north. Rock fragments that average about 15 inches in diameter are about 75 feet apart on the surface.

Typically, the surface layer is very dark grayish brown loam about 9 inches thick. The subsoil extends to a depth of 45 inches. The upper part is dark yellowish brown loam, and the lower part is yellowish brown sandy loam that has grayish brown mottles. The substratum extends to a depth of 52 inches. It is mottled yellowish brown and grayish brown saprolite that crushes to sandy loam. Hard gneiss bedrock is at a depth of about 52 inches. The soil has cobbles throughout.

This soil is medium in natural fertility. The content of organic matter is moderate or high in the surface layer. Permeability is moderately rapid. Available water capacity is moderate. The effective root zone is limited mainly by bedrock at a depth of 40 to 60 inches.

Included with this soil in mapping are a few small areas of rock outcrop. These areas are in positions on the landscape similar to those of the Porters soil.

The Porters soil is not suited to field crops, hay, or pasture because of the slope.

This soil is mainly wooded. The potential for woodland production is moderate. Yellow-poplar, eastern white pine, and northern red oak are some of the preferred trees to plant. Mountain laurel and rhododendron are common forest understory plants.

The main management concerns are the hazard of erosion and an equipment limitation. Using harvesting procedures that minimize cutting, limiting management activities to the drier periods, managing and harvesting on the contour, and seeding access systems as appropriate after harvesting help to keep erosion to a minimum. In some places erosion-control measures are needed to minimize soil exposure. Proper placement of access systems reduces the equipment limitation. Also, hand planting and using a winch to skid logs and trees during harvesting can minimize the need for heavy equipment. Placing log decks near the top of the slope also helps to overcome the equipment limitation.

This soil is poorly suited to most urban uses and to recreational development because of the slope.

The capability subclass is VIIe. The woodland ordination symbol is 7R.

PxH—Porters-Rock outcrop complex, 60 to 90 percent slopes. This map unit is in very steep areas on side slopes of mountains at elevations above about 3,000 feet. Slopes face the north. The Porters soil is deep and well drained. It makes up about 65 percent of the unit. Rock outcrop makes up about 35 percent.

Typically, the surface layer of the Porters soil is very dark grayish brown loam about 9 inches thick. The subsoil extends to a depth of 45 inches. The upper part is dark yellowish brown loam, and the lower part is yellowish brown sandy loam that has grayish brown mottles. The substratum extends to a depth of 52 inches. It is mottled yellowish brown and grayish brown saprolite that crushes to sandy loam. Hard gneiss bedrock is at a depth of about 52 inches. The soil has cobbles throughout.

The Porters soil is medium in natural fertility. The content of organic matter is moderate or high in the surface layer. Permeability is moderately rapid. Available water capacity is moderate. The effective root zone is limited mainly by hard bedrock at a depth of 40 to 60 inches.

Typically, the Rock outcrop is hard granite, gneiss, schist, phyllite, graywacke, or quartz.

Included in mapping are a few small areas of Chestnut and Saunook soils and soils that have hard bedrock at a depth of less than 20 inches. Chestnut soils are in positions on the landscape similar to those of the Porters soil. Saunook soils are in mountain coves.

This map unit is not suited to field crops, hay, or pasture because of the slope and the areas of Rock outcrop.

Most areas of this unit are wooded. The potential for woodland production is moderate. Yellow-poplar, eastern white pine, and northern red oak are some of the preferred trees to plant. Mountain laurel and rhododendron are common forest understory plants. The main management concerns are the hazard of erosion and an equipment limitation. Using harvesting procedures that minimize cutting, limiting management activities to the drier periods, managing and harvesting on the contour, and seeding access systems as appropriate after harvesting help to keep erosion to a minimum. In some places erosion-control measures are needed to minimize soil exposure. Proper placement of access systems reduces the equipment limitation. Also, hand planting and using a winch to skid logs and trees during harvesting can minimize the need for heavy equipment. Placing log decks near the top of the slope also helps to overcome the equipment limitation.

This map unit is poorly suited to most urban uses and to recreational development because of the slope.

The Rock outcrop is poorly suited to most uses, but in some places it can be quarried and crushed and used as a source of construction material.

The capability subclass of the Porters soil is VIIe. The woodland ordination symbol is 7R. The Rock outcrop is not assigned a capability subclass or a woodland ordination symbol.

Ro—Rock outcrop. This map unit consists of exposures of hard granite, gneiss, schist, phyllite, graywacke, or quartzite bedrock. It is on escarpments and in steep or very steep areas on side slopes of mountains.

Included in mapping are pockets or crevices that have as much as 4 inches of loamy and sandy material. Organic material is in some of the pockets. Scrubby trees and shrubs, grasses, mosses, and lichens are in the pockets and crevices.

The Rock outcrop is poorly suited to most uses because there is little or no soil overburden, but in some places it can be quarried and crushed and used as a source of construction material.

No capability subclass or woodland ordination symbol is assigned.

SaE—Saunook-Evard complex, 10 to 25 percent slopes. These very deep, well drained, moderately steep soils are on uneven, complex side slopes of intermountain uplands. The Saunook soil is mainly on concave slopes, and the Evard soil is mainly on convex slopes. The soils occur at elevations of 1,500 to 2,400 feet. The Saunook soil makes up about 60 percent of the unit, and the Evard soil makes up 25 percent.

Typically, the Saunook soil has a surface layer of very dark brown loam about 9 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is dark yellowish brown loam, the next part is dark yellowish brown clay loam, and the lower part is dark yellowish brown sandy clay loam.

The Saunook soil is medium in natural fertility. The content of organic matter is moderate or high in the surface layer. Permeability is moderate. Available water capacity also is moderate. The root zone is very deep.

Typically, the Evard soil has a surface layer of brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 40 inches. The upper part is dominantly red clay loam, the next part is red sandy clay loam, and the lower part is red sandy loam. The substratum extends to a depth of 60 inches or more. The upper part is yellowish red sandy loam that has strong brown mottles, and the lower part is strong brown sandy loam that has yellowish red mottles.

The Evard soil is low in natural fertility. The content of organic matter is moderate in the surface layer. Permeability is moderate. Available water capacity also is moderate. The root zone is very deep and can be easily penetrated by plant roots.

Included with these soils in mapping are a few areas of Hayesville and Clifton soils, soils that are shallower over bedrock than the Saunook and Evard soils, soils that have slopes of less than 10 percent, and soils that formed in sediments. These included soils are in positions on the landscape similar to those of the Saunook and Evard soils. Also included, in narrow draws, are soils that have slopes of more than 25 percent.

The Saunook and Evard soils are not suited to field crops because of the slope. They are moderately suited to hay and pasture.

These soils are mainly wooded. The potential for woodland production is moderate. Yellow-poplar, eastern white pine, and northern red oak are some of the preferred trees to plant. Because of the slope, the main management concerns are the hazard of erosion and an equipment limitation. Managing on the contour, harvesting during periods of low rainfall, using water bars in firebreaks, and, in places, using temporary cover until the stand is established reduce the hazard of erosion. Thorough planning and proper construction of roads and access systems and placement of log decks near the top of the slope help to overcome the equipment limitation. Also, hand planting in some places and using a winch to skid logs and trees can minimize the need for vehicles.

These soils are poorly suited to most urban uses and to recreational development because of the slope.

The capability subclass is VIe. The woodland ordination symbol is 8R.

SnF—Saunook-Evard complex, 25 to 45 percent slopes, stony. These very deep, well drained, steep soils are on uneven, complex side slopes of intermountain uplands at elevations of 1,500 to 2,400 feet. The Saunook soil is mainly on concave slopes, and the Evard soil is mainly on convex slopes. Rock fragments that average about 15 inches in diameter are on the surface. The Saunook soil makes up about 55 percent of the unit, and the Evard soil makes up 25 percent.

Typically, the Saunook soil has a surface layer of very dark brown loam about 9 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is dark yellowish brown loam, the next part is dark yellowish brown clay loam, and the lower part is dark yellowish brown sandy clay loam.

The Saunook soil is medium in natural fertility. The content of organic matter is moderate or high in the surface layer. Permeability is moderate. Available water capacity also is moderate. The root zone is very deep.

Typically, the Evard soil has a surface layer of brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 40 inches. The upper part is dominantly red clay loam, the next part is red sandy clay loam, and the lower part is red sandy loam. The substratum extends to a depth of 60 inches or more. The upper part is yellowish red sandy loam that has strong brown mottles, and the lower part is strong brown sandy loam that has yellowish red mottles.

The Evard soil is low in natural fertility. The content of organic matter is moderate in the surface layer. Permeability is moderate. Available water capacity also is moderate. The root zone is very deep and can be easily penetrated by plant roots.

Included with these soils in mapping are a few small areas of soils that formed in sediments, soils that are shallower over bedrock than the Saunook and Evard soils, areas of rock outcrop, soils that have less clay in the subsoil than the Saunook and Evard soils, and soils that have slopes of less than 25 percent or more than 45 percent. These included areas are in positions on the landscape similar to those of the Saunook and Evard soils.

The Saunook and Evard soils are not suited to field crops, hay, or pasture because of the slope.

These soils are mainly wooded. The potential for woodland production is moderate. Yellow-poplar, eastern white pine, and northern red oak are some of the preferred trees to plant. Because of the slope, the main management concerns are the hazard of erosion and an equipment limitation. Managing on the contour, harvesting during periods of low rainfall, using water bars in firebreaks, and, in places, using temporary cover until the stand is established reduce the hazard of erosion. Thorough planning and proper construction of roads and access systems and placement of log decks near the top of the slope help to overcome the equipment limitation. Also, hand planting in some places and using a winch to skid logs and trees can minimize the need for vehicles.

These soils are poorly suited to most urban uses and to recreational development because of the slope.

The capability subclass is VIIe. The woodland ordination symbol is 8R.

SpG—Saunook-Porters complex, 45 to 60 percent slopes, stony. These very deep and deep, well drained, very steep soils are on ridges and uneven, complex side slopes of mountains at elevations of 2,600 to 4,700 feet. The Saunook soil is mainly on concave slopes, and the Porters soil is mainly on convex slopes. Rock fragments that average about 15 inches in diameter are about 75 feet apart on the surface. The Saunook soil makes up about 55 percent of the unit, and the Porters soil makes up 25 percent.

Typically, the Saunook soil has a surface layer of very dark brown loam about 9 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is dark yellowish brown loam, the next part is dark yellowish brown clay loam, and the lower part is dark yellowish brown sandy clay loam.

The Saunook soil is medium in natural fertility. The content of organic matter is moderate or high in the surface layer. Permeability is moderate. Available water capacity also is moderate. The root zone is very deep.

Typically, the Porters soil has a surface layer of very dark grayish brown loam about 9 inches thick. The subsoil extends to a depth of 45 inches. The upper part is dark yellowish brown loam, and the lower part is yellowish brown sandy loam that has grayish brown mottles. The substratum extends to a depth of 52 inches. It is mottled yellowish brown and grayish brown saprolite that crushes to sandy loam. Hard gneiss bedrock is at a depth of about 52 inches. The soil has cobbles throughout.

The Porters soil is moderate in natural fertility. The content of organic matter is moderate or high in the surface layer. Permeability is moderately rapid. Available water capacity is moderate. The effective root zone is limited mainly by hard bedrock at a depth of 40 to 60 inches.

Included with these soils in mapping are a few small areas of soils that are more shallow over bedrock than the Saunook and Porters soils, areas of rock outcrop, soils that have less clay in the subsoil than the Saunook and Porters soils, and soils that have slopes of less than 45 percent. These included areas are in positions on the landscape similar to those of the Saunook and Porters soils.

The Saunook and Porters soils are not suited to field crops, hay, or pasture because of the slope.

These soils are mainly wooded. The potential for woodland production is moderate. Yellow-poplar, eastern white pine, and northern red oak are some of the preferred trees to plant. Because of the slope, the main management concerns are the hazard of erosion and an equipment limitation. Managing and harvesting on the contour, using water bars in firebreaks, harvesting during the drier periods, and using temporary cover during regeneration help to keep erosion to a minimum. Proper placement of access systems reduces the equipment limitation. Also, hand planting and using a winch to skid logs and trees can minimize the need for power equipment. Placing log decks near the top of the slope also helps to overcome the equipment limitation.

These soils are poorly suited to most urban uses and to recreational development because of the slope.

The capability subclass is VIIe. The woodland ordination symbol is 8R for the Saunook soil and 7R for the Porters soil.

Su—Suches loam, 0 to 2 percent slopes, occasionally flooded. This very deep, well drained and moderately well drained, nearly level soil is on flood plains between mountains. It is occasionally flooded for very brief periods from late fall to midspring.

Typically, the surface layer is dark grayish brown loam about 10 inches thick. It has yellowish brown mottles. The subsoil extends to a depth of 44 inches. The upper part is light yellowish brown sandy clay loam, the next part is brownish yellow sandy clay loam that has pale brown mottles, and the lower part is light yellowish brown sandy clay loam that has yellowish brown mottles. The substratum extends to a depth of 60 inches or more. It is mottled light gray, light yellowish brown, and dark yellowish brown loamy sand.

This soil is low in natural fertility. The content of organic matter is moderate. Permeability and available water capacity also are moderate. Tilth is good. The root zone is very deep except from late fall to midspring, when the water table is at a depth of 2.5 to 4.0 feet or when flooding occurs.

Included with this soil in mapping are small areas of Arkaqua, Bradson, Chatuge, Colvard, Dillard, French, Thurmont, Toxaway, and Transylvania soils. Arkaqua, Colvard, French, Toxaway, and Transylvania soils are in positions on the landscape similar to those of the Suches soil. Bradson soils are on high terraces and in coves. Dillard and Thurmont soils are on stream terraces and toe slopes. Chatuge soils are on stream terraces and toe slopes and at the head of drainageways.

The Suches soil is highly productive, but it is only moderately suited to field crops because flooding is likely during the planting season. The soil is well suited to hay and pasture. Grasses and legumes help to maintain fertility and the content of organic matter.

The potential of this soil for woodland production is high. Yellow-poplar, eastern white pine, loblolly pine, northern red oak, and black walnut are some of the preferred trees to plant. No significant limitations affect woodland use and management.

This soil is poorly suited to most kinds of recreational development because of the flooding. Also, the flooding severely limits urban development. The flooding can only be overcome by extensive flood-control measures.

The capability subclass is IIw. The woodland ordination symbol is 9A.

ThB—Thurmont fine sandy loam, 2 to 6 percent slopes. This very deep, well drained, gently sloping soil is on stream terraces and on toe slopes.

Typically, the surface layer is brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 42 inches. The upper part is reddish yellow sandy clay loam, and the lower part is dominantly reddish yellow gravelly sandy clay loam. The substratum extends to a depth of 60 inches or more. It is mottled brownish yellow and reddish yellow sandy loam.

This soil is low in natural fertility. The content of organic matter is moderately low in the surface layer. Permeability is moderate. Available water capacity also is moderate. Tilth is good. The soil can be worked throughout a fairly wide range in moisture content. The root zone is very deep and can be easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Arkaqua, Bradson, Chatuge, Clifton, Colvard, Dillard, Evard, French, Junaluska, Suches, and Tsali soils and soils that have a yellower subsoil than that of the Thurmont soil. Arkaqua, French, Suches, and Colvard soils are on flood plains. Bradson, Chatuge, and Dillard soils are in positions on the landscape similar to those of the Thurmont soil. Clifton, Evard, Junaluska, and Tsali soils are on intermountain uplands.

The Thurmont soil is well suited to field crops, hay, and pasture. Good tilth can be maintained by returning crop residue to the soil. Erosion is a moderate hazard if the soil is cultivated and not protected. A conservation tillage system, a water management system, or a combination of both helps to control runoff and erosion.

The potential of this soil for woodland production is moderate. Yellow-poplar and eastern white pine are preferred trees to plant. Although no significant limitations affect woodland use, managing and harvesting on the contour help to keep erosion to a minimum.

This soil is only moderately suited to most urban uses because of wetness. Also, the moderate permeability limits the use of this soil as a site for septic tank absorption fields. In most places these limitations can be overcome by special design and proper application. The soil is well suited to most kinds of recreational development.

The capability subclass is IIe. The woodland ordination symbol is 4A.

ThC—Thurmont fine sandy loam, 6 to 12 percent slopes. This very deep, well drained, strongly sloping and moderately steep soil is on stream terraces and on toe slopes.

Typically, the surface layer is brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 42 inches. The upper part is reddish yellow sandy clay loam, and the lower part is dominantly reddish yellow gravelly sandy clay loam. The substratum extends to a depth of 60 inches or more. It is mottled brownish yellow and reddish yellow sandy loam.

This soil is low in natural fertility. The content of organic matter is moderately low in the surface layer. Permeability is moderate. Available water capacity also is moderate. Tilth is good. The soil can be worked throughout a fairly wide range in moisture content. The root zone is very deep and can be easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Arkaqua, Bradson, Chatuge, Clifton, Colvard, Dillard, Evard, French, Junaluska, Suches, and Tsali soils, soils that have a yellower subsoil than that of the Thurmont soil, and soils that have more than 15 percent cobbles in the surface layer. Arkaqua, French, Suches, and Colvard soils are on flood plains. Bradson, Chatuge, and Dillard soils are in positions on the landscape similar to those of the Thurmont soil. Clifton, Evard, Junaluska, and Tsali soils are on intermountain uplands.

The Thurmont soil is only moderately suited to field crops because of the slope. It is well suited to hay and pasture. Good tilth can be maintained by returning crop residue to the soil. Erosion is a severe hazard if the soil is cultivated and not protected. A conservation tillage system, a water management system, or a combination of both helps to control runoff and erosion.

The potential of this soil for woodland production is moderate. Yellow-poplar and eastern white pine are preferred trees to plant. Although no significant limitations affect woodland use, managing and harvesting on the contour help to keep erosion to a minimum.

This soil is only moderately suited to most kinds of urban and recreational development. The slope and the wetness are the main limitations. Also, the moderate permeability limits the use of this soil as a site for septic tank absorption fields. In most places these limitations can be overcome by special design and proper application.

The capability subclass is IIIe. The woodland ordination symbol is 4A.

ThE—Thurmont fine sandy loam, 12 to 25 percent slopes. This very deep, well drained, moderately steep soil is on stream terraces and on toe slopes.

Typically, the surface layer is brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 42 inches. The upper part is reddish yellow sandy clay loam, and the lower part is dominantly reddish yellow gravelly sandy clay loam. The substratum extends to a depth of 60 inches or more. It is mottled brownish yellow and reddish yellow sandy loam.

This soil is low in natural fertility. The content of organic matter is moderately low in the surface layer. Permeability is moderate. Available water capacity also is moderate. Tilth is good. The soil can be worked throughout a fairly wide range in moisture content. The root zone is very deep and can be easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Bradson, Clifton, Evard, Junaluska, and Tsali soils and soils that have a yellower subsoil than that of the Thurmont soil. Bradson soils are in positions on the landscape similar to those of the Thurmont soil. Clifton, Evard, Junaluska, and Tsali soils are on intermountain uplands.

The Thurmont soil is poorly suited to field crops because of the slope. It is moderately suited to hay and pasture. Erosion is a severe hazard if the soil is cultivated and not protected. Grasses and legumes help to control runoff and erosion.

The potential of this soil for woodland production is moderate. Yellow-poplar and eastern white pine are preferred trees to plant. Because of the slope, the main management concerns are the hazard of erosion and an equipment limitation. Managing and harvesting on the contour, installing water bars in firebreaks, and establishing skid trails help to control erosion. Also, harvesting during the drier periods and using temporary cover during regeneration help to keep erosion to a minimum. Proper placement of access systems reduces the equipment limitation. Also, hand planting and using a winch to skid trees and logs can minimize the need for power vehicles. Placing log decks near the top of the slope also helps to overcome the equipment limitation.

This soil is poorly suited to most kinds of urban and recreational development. The slope is the main limitation.

The capability subclass is IVe. The woodland ordination symbol is 4R.

Tt—Transylvania-Toxaway complex, occasionally flooded. These very deep, well drained to very poorly drained, nearly level soils are on moderately broad flood plains. They are subject to occasional flooding. The well drained and moderately well drained Transylvania soil makes up about 45 percent of the unit, and the poorly drained and very poorly drained Toxaway soil makes up 30 percent.

Typically, the Transylvania soil has a surface soil of very dark grayish brown loam about 24 inches thick. The subsoil extends to a depth of 40 inches. It is dark yellowish brown clay loam. The substratum extends to a depth of 60 inches or more. It is grayish brown loamy sand.

The Transylvania soil is medium in natural fertility. The content of organic matter is moderate or high in the surface layer. Permeability is moderate. Available water capacity also is moderate. Tilth is good. The root zone is very deep except from late fall to midspring, when the water table is at a depth of 2.5 to 3.5 feet or when flooding occurs.

Typically, the surface layer of the Toxaway soil is about 28 inches thick. The upper part is dark brown loam, and the lower part is very dark grayish brown loam. The underlying material extends to a depth of 60 inches or more. The upper part is dark grayish brown clay loam that has strong brown mottles, the next part is dark grayish brown sandy clay loam that has dark yellowish brown mottles, and the lower part is very dark gray sandy loam.

The Toxaway soil is medium in natural fertility. The content of organic matter is moderate or high in the surface layer. Permeability is rapid. Available water capacity is moderate. Tilth is good. The root zone is very deep except from late fall to midspring, when the water table is within a depth of 1 foot or when flooding occurs.

Included with these soils in mapping are a few small areas of Chatuge, Colvard, Dillard, French, and Suches soils. Chatuge and Dillard soils are mainly on stream terraces. Colvard, French, and Suches soils are in positions on the landscape similar to those of the Transylvania and Toxaway soils.

The Transylvania and Toxaway soils are highly productive, but they are only moderately suited to field crops because of the wetness and because flooding is likely during the planting season. The soils are only moderately suited to hay and pasture mainly because of the wetness.

The potential of these soils for woodland production is high. Yellow-poplar, eastern white pine, northern red oak, black walnut, and American sycamore are some of the preferred trees to plant. The seasonal wetness and the flooding limit the use of conventional equipment and increase the seedling mortality rate. The equipment limitation generally can be overcome by using modified or special equipment or by planting and harvesting during the drier periods. Proper drainage, control of competing vegetation, and the selection of adapted tree species generally increase the seedling survival rate.

These soils are poorly suited to recreational development mainly because of the flooding and the wetness. These limitations severely limit the use of these soils for urban development. They can be overcome only if major flood-control structures and extensive drainage systems are established and maintained.

The capability subclass is IIw for the Transylvania soil and IVw for the Toxaway soil. The woodland ordination symbol is 12A for the Transylvania soil and 6W for the Toxaway soil.

UeE—Urban land-Evard-Clifton complex, 10 to 35 percent slopes. This map unit consists of areas of Urban land and areas of very deep, well drained, moderately steep and steep Evard and Clifton soils on ridges and side slopes of mountains and intermountain uplands. Urban land makes up about 40 percent of the unit, the Evard soil makes up 35 percent, and the Clifton soil makes up 20 percent.

Most areas of Urban land consist of shopping centers, schools, churches, parking lots, industrial sites, streets, commercial buildings, and private dwellings. The areas have been altered by cutting, filling, and shaping.

Typically, the Evard soil has a surface layer of brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 40 inches. The upper part is dominantly red clay loam, the next part is red sandy clay loam, and the lower part is red sandy loam. The substratum extends to a depth of 60 inches or more. The upper part is yellowish red sandy loam that has strong brown mottles, and the lower part is strong brown sandy loam that has yellowish red mottles.

The Evard soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity also is moderate. The root zone is very deep and can be easily penetrated by plant roots.

Typically, the Clifton soil has a surface layer of reddish brown fine sandy loam about 4 inches thick. The subsoil extends to a depth of 36 inches. The upper part is yellowish red clay loam, the next part is dominantly red clay, and the lower part is red loam. The substratum to a depth of 60 inches or more is red loam.

The Clifton soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is high. The root zone is very deep.

Included in mapping are a few small areas of Cowee and Hayesville soils and soils that are shallower over bedrock than the Clifton and Evard soils. These included soils are in positions on the landscape similar to those of the Clifton and Evard soils. Also included are a few small areas of soils that formed in sediments on toe slopes.

This map unit is poorly suited to most urban uses and to recreational development because of the slope. The suitability of the soils can be improved if they are modified to overcome the slope. Erosion is a hazard on construction sites. It can be reduced by establishing a permanent vegetative cover and by mulching. Mulching also helps to control erosion in areas used for vegetable gardens.

The capability subclass of the Evard and Clifton soils is VIIe. The woodland ordination symbol is 8R for the Evard soil and 7R for the Clifton soil.

UtE—Urban land-Junaluska-Tsali complex, 6 to 35 percent slopes. This map unit consists of areas of Urban land and areas of moderately deep and shallow, well drained, strongly sloping to steep Junaluska and Tsali soils on ridges and side slopes of intermountain uplands. Urban land makes up about 40 percent of the unit, the Junaluska soil makes up 35 percent, and the Tsali soil makes up 20 percent.

Most areas of Urban land consist of shopping centers, schools, churches, parking lots, industrial sites, streets, commercial buildings, and private dwellings. The areas have been altered by cutting, filling, and shaping.

Typically, the Junaluska soil has a surface layer of dark reddish brown channery loam about 2 inches thick. The subsoil extends to a depth of 28 inches. The upper part is yellowish red clay loam, and the lower part is yellowish red channery clay loam. Multicolored, weathered and fractured, interbedded phyllite and metasandstone bedrock is at a depth of about 28 inches. The bedrock can be ripped.

The Junaluska soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is low. The effective root zone is limited mainly by soft bedrock at a depth of 20 to 40 inches.

Typically, the Tsali soil has a surface layer of brown channery loam about 2 inches thick. The subsoil extends to a depth of 16 inches. It is yellowish red channery clay loam. Multicolored, weathered and fractured, thinly bedded phyllite and metasandstone bedrock is at a depth of about 16 inches. The bedrock can be ripped.

The Tsali soil is low in natural fertility. The content of organic matter is moderately low or moderate in the surface layer. Permeability is moderate. Available water capacity is very low. The effective root zone is limited by soft bedrock at a depth of 10 to 20 inches.

Included in mapping are a few small areas of Clifton and Evard soils. These included soils are in positions on the landscape similar to those of the Junaluska and Tsali soils. Also included are a few small areas of soils that formed in sediments on toe slopes.

This map unit is poorly suited to most urban uses and to recreational development because of the slope and the depth to bedrock. The suitability of the soils can be improved if they are modified to overcome the slope and the depth to bedrock. Erosion is a hazard on construction sites. The hazard of erosion can be reduced by establishing a permanent vegetative cover and by mulching. Mulching also helps to control erosion in areas used for vegetable gardens.

The capability subclass of the Junaluska and Tsali soils is VIIe. The woodland ordination symbol is 3R for the Junaluska soil and 6R for the Tsali soil.

Important Farmland

In this section, prime farmland and additional farmland of statewide importance are described. The map units that are prime farmland and additional farmland of statewide importance, and the acreage of each, are listed in table 5. This list does not constitute a recommendation for a particular land use. The location of each map unit is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units."

Prime Farmland

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

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

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

Prime farmland soils receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent.

About 8,300 acres in the survey area, or about 2 percent of the total acreage, meets the soil requirements for prime farmland (see table 5).

Additional Farmland of Statewide Importance

About 40,000 acres in the survey area is considered additional farmland of statewide importance (see table 5). This farmland is an important part of the agricultural resource base in the area, but it does not meet the requirements for prime farmland. It is seasonally wet, cannot be easily cultivated, is more erodible, or is generally less productive than prime farmland.

Use and Management of the Soils

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

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

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

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

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

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

Crops and Pasture

James E. Dean, conservation agronomist, and Jimmy C. Taff, district conservationist, Natural Resources Conservation Service, helped prepare this section.

The major management concerns affecting the use of the soils for crops and pasture are described in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Natural Resources Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to land users, equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Detailed Soil Map Units."

Erosion is the main concern on about one-half of the cropland and pasture in the survey area. It is a hazard in areas where the slope is more than 2 percent.

The loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as Bradson, Clifton, and Hayesville soils. On these soils, tilling or preparing a good seedbed is difficult because the original, friable surface soil has eroded away. Second, erosion on farmland results in the sedimentation of streams. Controlling erosion minimizes this pollution and improves water quality for municipal and recreational uses and for fish and wildlife.

Erosion-control measures provide a protective surface cover, help to control runoff, and increase the rate of water infiltration. A cropping system that keeps plant cover on the surface for extended periods can hold soil losses to amounts that will not reduce the productive capacity of the soils. On livestock farms, including legume and grass forage crops in the cropping system reduces the hazard of erosion, provides nitrogen, and improves soil tilth for the following crop.

Slopes are so short and irregular in cultivated areas in Fannin and Union Counties that terraces are not practical. A cropping system that provides a substantial cover of plant residue is needed. Crop residue management, conservation tillage, stripcropping, and a crop rotation that includes grasses and legumes help to maintain a vegetative cover, increase the rate of water infiltration, and help to control runoff and erosion. These conservation practices can be adapted to most soils in the survey area. No-till farming, a form of conservation tillage, is becoming increasingly common.

Most soils used for cropland are subject to erosion if they are plowed in the fall and left bare until spring. Winter cover crops should be planted if the cropland is plowed in the fall.

The production of crops and pasture in most areas of bottom land is not generally possible unless a drainage system is provided. Soils in these areas are also subject to flooding. Bottom-land soils in the survey area include Arkaqua, Chatuge, Colvard, French, Suches, Transylvania, and Toxaway soils. Existing drainage systems should be maintained in areas of these soils.

Information about erosion control and drainage practices for each kind of soil is available in local offices of the Natural Resources Conservation Service.

Soil fertility is naturally low in most of the upland soils in the survey area. Most of the soils in the survey area are naturally acid. The soils on flood plains, such as Arkaqua, Chatuge, Colvard, French, Suches, Transylvania, and Toxaway soils, range from slightly acid to strongly acid. Many soils in the uplands are naturally strongly acid or very strongly acid. Applications of ground limestone are needed to raise the pH level sufficiently for good growth of legumes and other crops because levels of available phosphorus and potash are naturally low in most of these soils. On all soils, the amount of lime, fertilizer, and organic wastes to be applied should be based on the results of soil tests.

Local offices of the Cooperative Extension Service and the Natural Resources Conservation Service can provide specific information concerning nutrient management plans.

The content of organic matter is an important factor in the germination of seeds, root growth, the infiltration of water into the soil, and the hazard of erosion. Soils that have good tilth are granular and porous.

Most of the soils used for crops in the survey area have a loamy surface layer that is moderately low or moderate in organic matter content. The structure of these soils generally is poor, and intense rainfall causes the formation of a crust on the surface. This crust is hard when dry. It reduces the rate of water infiltration, inhibits plant growth, and increases the runoff rate. Crop residue management, conservation tillage, stripcropping, a crop rotation that includes grasses and legumes, and regular additions of manure and other organic material improve soil structure and minimize the formation of crusts.

Crops commonly grown in the survey area include field corn, sweet corn, sorghum cane, potatoes, green beans, peppers, collards, and other vegetables. Some field crops suited to the soils and climate of the survey area are not commonly grown. For example, winter small grain is suited to the soils and could be grown in the area.

Specialty crops grown include apples, peaches, blueberries, other small fruits, and nursery plants. Apples are the major specialty crop grown in the survey area (fig. 2).

Deep soils that have good natural drainage and warm up early in the spring are especially well suited to many vegetables and small fruits. Bradson, Dillard, Clifton, Evard, Hayesville, and Thurmont soils that have slopes of less than 10 percent are well suited to such crops.

Most of the well drained soils in the survey area are suitable for orchards and nursery plants. However, soils at the lower elevations, where frost is frequent and air drainage is poor, generally are poorly suited to early vegetables, small fruits, orchards, and nursery plants.

If adequately managed, properly drained, and protected from flooding, most of the soils on flood plains, such as Transylvania and Toxaway soils, are suited to a wide range of vegetable crops.

Irrigation is becoming more widely used in the production of row crops and orchard and specialty crops. The major source of water for irrigation is surface water from streams and ponds.

The pastureland and hayland are commonly seeded to tall fescue, orchardgrass, and clovers. The well drained soils in the area are suited to alfalfa and hybrid bermudagrasses.

Technical assistance and information about growing specialty crops is available from local agricultural agencies.

Yields per Acre

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

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

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage,

Figure 2.—Apple trees in an area of Hayesville fine sandy loam, 10 to 25 percent slopes. These trees are grown for research at the Georgia Mountain Branch Experiment Station near Blairsville.

erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

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

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

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland *(8)*. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

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

Class I soils have few limitations that restrict their use. There are no class I soils in this survey area.

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

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use. There are no class V soils in this survey area.

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

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

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production. There are no class VIII soils in this survey area.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the 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 very cold or very dry.

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

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

Woodland Management and Productivity

Gary L. Tyre, forester, Natural Resources Conservation Service, helped prepare this section.

Among the most significant forest types in Fannin and Union Counties are oak-hickory, loblolly-shortleaf pine, oak-pine, and smaller acreages of white pine-hemlock. These forest types were also predominant in the virgin forests that occupied a large majority of the land in the survey area.

About two-thirds of the forested acreage in Fannin County is oak-hickory, 18 percent is loblolly-shortleaf pine, 12 percent is oak-pine, and 3 percent is white pine-hemlock. In Union County, about 56 percent of the woodland is oak-hickory, one-fourth is loblolly-shortleaf pine, 14 percent is oak-pine, and 6 percent is white pine-hemlock *(3)*.

A large portion of the woodland in both counties is federally owned. About 41 percent of Fannin County and 58 percent of Union County is National forest. Farmers and other individuals own 56 percent of the woodland in Fannin County and 36 percent in Union County.

Union County has a higher proportion of productive woodland than Fannin County. In Union County, about 41 percent of the woodland can produce a cord or more per acre per year. In Fannin County, only about 23 percent of the woodland can produce at that rate. Stocking rates are somewhat similar in both counties. About one-fourth of the forest land in Fannin County is stocked at a rate of 100 percent or more, and about one-third of Union County is stocked at this rate.

A wide variety of soils in the survey area support woodland. Major soils include Evard, Clifton, Cowee, and Saunook soils. These soils are on gently sloping to moderately steep, broad ridge crests and side slopes in intermountain basins and on mountains. They commonly support forest cover, including such species as white pine, poplar, Virginia pine, oaks, and hickories. Clifton and Saunook soils are highly productive. Clifton soils have a site index of 93 for white pine, and Saunook soils have a site index of 107 for yellow-poplar. Evard and Cowee soils are less productive, having a site index of about 80 for white pine.

In the steeper areas that support woodland, the hazard of erosion, equipment limitations, and seedling mortality are management concerns.

Saunook soils commonly occur in association with Porters and Chestnut soils. These soils make up much of the acreage in the survey area. They are on strongly sloping to very steep, broad, high mountains of the Blue Ridge. Porters and Chestnut soils are highly productive. Porters soils have a site index of 96 for yellow-poplar, and Chestnut soils have a site index of 97 for yellow-poplar.

Junaluska, Tsali, and Cataska soils are some of the less extensive soils in the survey area. They are on gently sloping to very steep, narrow ridges and are largely forested. They have low or moderate productivity. Thurmont, Arkaqua, and Suches soils also are among the less extensive soils in the survey area. They are on gently sloping to strongly sloping terraces and nearly level flood plains. They are very productive, having a site index ranging from 88 to 100 for white pine. They are generally used for pasture, corn, or truck crops but are well suited to woodland. Few limitations affect woodland management in areas of these soils. Native trees include mixed hardwoods, mainly oaks and hickories.

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

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

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

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation affecting use and management. The letter *R* indicates a soil that has a significant limitation because of steepness of slope. The letter *X* indicates that a soil has restrictions because of stones or rocks on the surface. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *T* indicates a soil that has, within the root zone, excessive alkalinity or acidity, sodium salts, or other toxic substances that limit the development of desirable trees. The letter *D* indicates a soil that has a limitation because of a restricted rooting depth, such as a shallow soil that is underlain by hard bedrock or other layers that restrict roots. The letter *C* indicates a soil that has a limitation because of the kind or amount of clay in the upper part of the profile. The letter *S* indicates a dry, sandy soil. The letter *F* indicates a soil that has a large amount of coarse fragments. The letter *A* indicates a soil having no significant limitations that affect forest use and management. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation or harvesting activities expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion-control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of moderate or severe indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning harvesting and reforestation activities, or the use of special equipment.

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

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

The *potential productivity* of *common trees* on a soil is expressed as a *site index*. Common trees are listed in the order of their observed general occurrence. Generally, only two or three tree species dominate. The first tree listed for each soil is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands.

The *productivity class* represents an expected volume produced by the most important trees, expressed in cubic meters per hectare per year.

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

Recreation

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

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

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

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

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock should be considered.

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

Wildlife Habitat

Louis Justice, biologist, Natural Resources Conservation Service, helped prepare this section.

Fannin and Union Counties generally are characterized by a rural mountain environment that provides good habitat for wildlife, mainly in pastured and wooded areas. About 90 percent of the survey area is forested. The rest is used for field crops or pasture. The forests are about 80 percent hardwoods and 20 percent pine and mixed pine and hardwoods. Much of the woodland in the survey area is in the Chattahoochee National Forest.

The major plants of importance to terrestrial wildlife include greenbrier, grape, honeysuckle, shrub lespedeza, annual lespedeza, panicgrass, croton, ragweed, partridge pea, paspalum, tickclover, and sumac. The important overstory and understory plants are hickory, sweetgum, oak, hackberry, cherry, plum, pine, elm, dogwood, persimmon, rhododendron, mountain laurel, and maple. The domestic plants of importance to wildlife include corn, soybeans, grasses, legumes, and small grain.

Areas of cropland and pasture interspersed with pine and hardwood forests or hardwood forest provide habitat for white-tailed deer, turkey, eastern ruffed grouse, mourning dove, raccoon, squirrel, opossum, fox, and other wildlife. Rabbit and bobwhite quail populations are good in areas that have suitable food and cover. Unmanaged pasture, old fields, young pine plantations, tracts of mixed pine and hardwoods, and thinned tracts of woodland produce numerous native woody and herbaceous plants that provide food and cover for black bear, deer, turkey, rabbit, fox, quail, and other wildlife. Restoring hedgerows, field borders, windbreaks, and certain areas in pastures and cropland fields improves the habitat for wildlife. Also, prescribed burning, thinning, and retaining mast-producing trees, such as oaks, can improve the ability of pine plantations to support wildlife.

Wetland habitat supports a variety of furbearers, such as otter, beaver, bobcat, and raccoon. They also provide necessary habitat for waterfowl. The best wetland habitat is in the areas of bottom-land hardwoods along the Conasauga River, the Jacks River, Tumbling Creek, the Toccoa River, Fightingtown Creek, Sugar Creek, Cutcane Creek, Blue Ridge Lake, Hathouse Creek, Wolf Creek, Lovingood Creek, Noontootla Creek, Cooper Creek, Rock Creek, and Skeenah Creek in Fannin County and along Dooley Creek, Butler Creek, Nottely Lake, Camp Creek, Ivylog Creek, the Nottely River, Camp Creek, Youngcane Creek, Canada Creek, the Toccoa River, the Chattahoochee River, Town Creek, Coosa Creek, and Cooper Creek in Union County. In both counties, numerous beaver ponds provide excellent wetland habitat.

Fishing is good in the major streams and in many farm ponds in the survey area. Important sport fish include rainbow trout, brown trout, largemouth bass, white bass, crappie, channel catfish, bullheads, bluegill, and redear sunfish. Because of the fragile habitat requirements of fish, special efforts are needed to control water pollution from both point and nonpoint sources.

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

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

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

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

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

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

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, lespedeza, goldenrod, beggarweed, partridge pea, threeawn, aster, and ragweed.

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

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine and red cedar.

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

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

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

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

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

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

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

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

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

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

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

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

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

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

Building Site Development

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

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

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

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

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

Sanitary Facilities

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

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

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

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

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

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

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

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

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

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones, and soil reaction affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

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

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

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

Construction Materials

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

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

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

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

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

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

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

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

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

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

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

Soils rated *fair* are loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

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

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

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

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

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

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement, permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, and susceptibility to flooding. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. Availability of drainage outlets is not considered in the ratings.

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

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of water erosion, and restricted permeability adversely affect maintenance.

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

Soil Properties

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

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

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

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

Engineering Index Properties

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

Depth to the upper and lower boundaries of each layer is indicated. Information on other properties of each layer is given for each soil series under the heading "Soil Series and Their Morphology."

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

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

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

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

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

Rock fragments 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

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

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

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

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

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

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence the shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

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

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

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

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

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

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

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

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

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

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

Soil and Water Features

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

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

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

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

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

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

If a soil is assigned to two hydrologic groups in table 17, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

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

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

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

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table, the kind of water table, and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 17. An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot.

"More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

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

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

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

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(9)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

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

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (*Hapl*, meaning minimal horizonation, plus *udult*, the suborder of the Ultisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is clayey, mixed, mesic Typic Hapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(10)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(9)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Arkaqua Series

The Arkaqua series consists of very deep, somewhat poorly drained, moderately permeable soils on flood plains of perennial streams that drain from the mountains. These soils formed in loamy sediments. Slopes range from 0 to 2 percent. The soils are fine-loamy, mixed, mesic Fluvaquentic Dystrochrepts.

Arkaqua soils are geographically associated with Bradson, Chatuge, Clifton, Colvard, Dillard, Evard, French, Suches, and Thurmont soils. The well drained Bradson and Thurmont soils and the moderately well drained Dillard soils are in the somewhat higher landscape positions. They have an argillic horizon. Also, Bradson soils have a red, clayey subsoil. The poorly drained Chatuge soils are on low stream terraces, at the head of drainageways, and on toe slopes. They have an argillic horizon. The well drained Clifton and Evard soils are on mountains and intermountain uplands. The well drained Colvard soils, the well drained and moderately well drained Suches soils, and the moderately well drained and somewhat poorly drained French soils are in positions on the landscape similar to those of the Arkaqua soils. Colvard soils are in a coarse-loamy family and do not have a cambic horizon. French soils have sand and gravel layers above a depth of 40 inches.

Typical pedon of Arkaqua loam, frequently flooded, 7.5 miles west of Blairsville on old Georgia Highway 2; 0.4 mile north on Dock Jones Road; 75 feet east of the road; 150 feet north of Little Young Cane Creek; in Union County:

Ap—0 to 9 inches; dark brown (10YR 4/3) loam; weak fine granular structure; very friable; common fine and very fine roots; common fine pores; common fine flakes of mica; moderately acid; abrupt smooth boundary.

Bw1—9 to 20 inches; yellowish brown (10YR 5/4) clay loam; common fine distinct yellowish brown (10YR 5/8) and few fine faint pale brown (10YR 6/3) mottles; moderate fine and medium subangular blocky structure; friable; few fine roots; few fine pores; common fine flakes of mica; strongly acid; gradual smooth boundary.

Bw2—20 to 30 inches; brown (10YR 5/3) fine sandy loam; many medium distinct yellowish brown (10YR 5/6) and common medium faint grayish brown (10YR 5/2) mottles; moderate fine and medium subangular blocky structure; friable; few fine roots; few fine pores; common fine flakes of mica; strongly acid; gradual smooth boundary.

Bg—30 to 46 inches; gray (10YR 5/1) sandy clay loam; many medium prominent yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; few fine roots; few fine pores; common fine flakes of mica; very strongly acid; abrupt wavy boundary.

Cg—46 to 72 inches; stratified gray (5Y 5/1), light gray (10YR 7/2), and dark gray (10YR 4/1) loamy sand, sandy loam, and sandy clay loam; massive; friable; few fine old roots; common fine flakes of mica; common rounded quartz pebbles; strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to stratified sandy and loamy materials is 44 to more than 72 inches. Reaction ranges from very strongly acid to moderately acid. Few to many flakes of mica are throughout the profile.

The A horizon is 8 to 10 inches thick. It has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4.

The Bw1 horizon has hue of 10YR to 5Y and value and chroma of 3 to 6. It is sandy loam, fine sandy loam, silt loam, or clay loam. Few to many mottles in shades of yellow, brown, or red are throughout the horizon. Light brownish gray or grayish brown mottles are within a depth of 24 inches.

The Bw2 horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 3 or 4. It is fine sandy loam, silt loam, loam, sandy clay loam, clay loam, or sandy loam. It has few to many mottles in shades of red, brown, yellow, or gray.

The Bg horizon, if it occurs, has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 or 2. It is sandy loam, silt loam, loam, sandy clay loam, or clay loam. It has many mottles in shades of red, brown, yellow, or gray.

The C horizon, if it occurs, has hue of 7.5YR to 5Y and value and chroma of 3 to 6. It is very gravelly loamy sand, loamy sand, sandy loam, sandy clay loam, or clay loam.

The Cg horizon has hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 or 2. It has the same range in textures as the C horizon.

Bradson Series

The Bradson series consists of very deep, well drained, moderately permeable soils on toe slopes, on high terraces, and in coves (fig. 3). These soils formed in loamy and clayey material. Slopes range from 6 to 25 percent. The soils are clayey, oxidic, mesic Typic Hapludults.

Bradson soils are geographically associated with Clifton, Evard, and Hayesville soils. These associated soils are generally in the higher uplands. They have a thinner solum than the Bradson soils. Also, Evard soils are in a fine-loamy family.

The Bradson soils in this survey area are taxadjuncts because they have low-activity clay and a kandic horizon. These differences, however, do not significantly affect the use and management of the soils.

Typical pedon of Bradson loam, 10 to 25 percent slopes, about 20 miles south on Georgia Highway 60 from Morganton; about 2 miles northeast up Grizzle

Creek; 450 feet north of the creek; in Union County:

Ap—0 to 8 inches; yellowish red (5YR 4/6) loam; weak fine granular structure; very friable; many fine roots; moderately acid; clear smooth boundary.

Bt1—8 to 16 inches; yellowish red (5YR 4/6) clay loam; moderate fine subangular blocky structure; friable; common fine roots; few distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—16 to 25 inches; red (2.5YR 5/6) clay; moderate medium subangular blocky structure; firm; common fine roots; common distinct clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt3—25 to 40 inches; red (2.5YR 5/6) clay; weak coarse prismatic structure; firm; common fine roots; common distinct clay films on faces of peds; few quartz pebbles; strongly acid; gradual smooth boundary.

Bt4—40 to 52 inches; yellowish red (5YR 5/6) clay; weak fine subangular blocky structure; firm; common fine roots; few distinct clay films on faces of peds; about 5 percent gravel, by volume; strongly acid; clear smooth boundary.

BC—52 to 66 inches; strong brown (7.5YR 5/8) sandy clay loam; weak coarse subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds and in root channels; common fine flakes of mica; about 5 percent gravel; strongly acid.

The thickness of the solum ranges from 60 to more than 80 inches. The content of pebbles and cobbles ranges from 0 to 10 percent, by volume, in the upper part of the profile and from 0 to 15 percent, by volume, in the BC horizon. The soils are strongly acid or very strongly acid throughout, except in areas where the surface layer has been limed.

The A horizon is 5 to 10 inches thick. It has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 6.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. It is clay loam or clay.

The BC horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 6 to 8. It is sandy clay loam or clay loam.

The C horizon, if it occurs, is saprolite that crushes to sandy loam, sandy clay loam, or clay loam.

Cataska Series

The Cataska series consists of shallow, excessively drained, rapidly permeable soils on ridges and side slopes of intermountain uplands. These soils formed in material weathered from thinly bedded metasedimentary rocks, such as phyllite and metasandstone. Elevation ranges from 1,500 to 2,400 feet. Slopes range from 10 to 60 percent but are mainly 10 to 45 percent. The soils are loamy-skeletal, mixed, mesic, shallow Typic Dystrochrepts.

Cataska soils are geographically associated with Junaluska and Tsali soils. These associated soils are in positions on the landscape similar to those of the Cataska soils. Junaluska and Tsali soils have less than 35 percent coarse fragments in the control section and have an argillic horizon. Also, Junaluska soils are deeper to paralithic contact than the Cataska soils.

Typical pedon of Cataska channery silt loam, in an area of Junaluska-Cataska complex, 25 to 45 percent slopes; 0.4 mile southwest on Hog Back Road from Georgia Highway 60 in Mineral Bluff; 0.4 mile northwest across Hemptown Creek at Mountain Rivers and across lake dam to west of Dickey Ridge; 0.3 mile southwest on graveled ridgecrest road, to the end of the road; 50 feet north of a gravel road; in Fannin County:

A—0 to 4 inches; very dark grayish brown (10YR 3/2) channery silt loam; weak fine granular structure; very friable; common fine and medium roots; about 20 percent channers, by volume; very strongly acid; clear smooth boundary.

Bw1—4 to 8 inches; yellowish brown (10YR 5/4) channery silt loam; weak medium subangular blocky structure; friable; common fine roots; about 35 percent channers, by volume; very strongly acid; clear wavy boundary.

Bw2—8 to 16 inches; yellowish brown (10YR 5/6) very channery silt loam; weak medium subangular blocky structure; friable; common fine and few medium roots; about 40 percent channers, by volume; very strongly acid; clear irregular boundary.

Cr—16 to 40 inches; gray, fractured, thinly bedded phyllite and metasandstone bedrock that is tilted at a 45-degree angle and that can be ripped.

The thickness of the solum and the depth to soft bedrock range from 10 to 20 inches. The content of channers ranges from 15 to 31 percent in the A horizon and from 35 to 80 percent below the A horizon.

The A horizon is 2 to 6 inches thick. It has hue of 10YR, value of 3, and chroma of 2 to 4.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. The fine-earth fraction is silt loam or loam.

The BC horizon, if it occurs, has colors and textures similar to those of the Bw horizon.

The Cr horizon is gray or dark gray, thinly laminated, weathered and fractured soft bedrock that consists of metasedimentary rocks, such as phyllite and thinly bedded metasandstone. The bedrock is rippable.

Chatuge Series

The Chatuge series consists of very deep, poorly drained, moderately permeable soils on low stream terraces, at the head of drainageways, or on toe slopes. These soils formed in thick loamy sediments. Slopes range from 0 to 3 percent but are mainly 1 or 2 percent. The soils are fine-loamy, mixed, mesic Typic Ochraquults.

Chatuge soils are geographically associated with Arkaqua, Dillard, Suches, and Thurmont soils. The somewhat poorly drained Arkaqua soils and the well drained and moderately well drained Suches soils are on flood plains. They have a cambic horizon. The moderately well drained Dillard and well drained Thurmont soils are in the somewhat higher landscape positions.

Typical pedon of Chatuge loam, occasionally flooded, 8.1 miles west on old Georgia Highway 2 from Blairsville; 150 feet north-northeast of the junction of old Georgia Highway 2 and Skeenah Gap Road; in Union County:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loam; weak medium granular structure; very friable; many fine and medium roots; few fine flakes of mica; moderately acid; abrupt smooth boundary.

Btg1—9 to 18 inches; dark gray (10YR 4/1) clay loam; few fine distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable; common fine and medium roots; few distinct clay films on faces of peds; common fine flakes of mica; moderately acid; clear smooth boundary.

Btg2—18 to 28 inches; grayish brown (10YR 5/2) clay loam; common fine prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds; many fine flakes of mica; moderately acid; clear smooth boundary.

Btg3—28 to 45 inches; gray (10YR 6/1) sandy clay loam; few medium prominent yellowish red (5YR 4/6) and brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; friable; few faint clay films on faces of peds; many fine flakes of mica; moderately acid; clear smooth boundary.

Cg—45 to 60 inches; gray (10YR 6/1), stratified sandy clay loam and fine sandy loam; massive; friable; many fine and medium flakes of mica; moderately acid.

The thickness of the solum ranges from 40 to 50 inches. Reaction ranges from very strongly acid to moderately acid. Few to many flakes of mica are throughout the profile.

The A horizon is 6 to 10 inches thick. It has hue of 10YR, value of 3, and chroma of 1 to 3. The content of pebbles ranges from 0 to 5 percent by volume.

The Btg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is loam, sandy clay loam, or clay loam. It has few or common mottles in shades of red, brown, or gray. The content of pebbles ranges from 0 to 3 percent by volume.

The Cg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 6. The Cg horizon is sandy clay loam, fine sandy loam, loamy sand, coarse sand, or the gravelly analogs of these textures. Commonly, the sand and gravel are stratified. The content of pebbles ranges from 0 to 25 percent by volume.

Chestnut Series

The Chestnut series consists of moderately deep, well drained, moderately rapidly permeable soils on mountains. These soils formed in material weathered from biotite gneiss interrupted by narrow dikes of schist. Elevation ranges from 2,500 to more than 4,700 feet. Slopes range from 10 to 60 percent but are mainly 20 to 60 percent. Aspect is dominantly toward the south. The soils are coarse-loamy, mixed, mesic Typic Dystrochrepts.

Chestnut soils are geographically associated with Porters and Saunook soils. Porters soils are in positions on the landscape similar to those of the Chestnut soils. They have an umbric epipedon. Saunook soils are in coves and on toe slopes of mountains. They are in a fine-loamy family and have an umbric epipedon.

Typical pedon of Chestnut loam, 25 to 45 percent slopes, stony, 9.9 miles south of downtown Blairsville on U.S. Highway 19; 3.4 miles southwest on Georgia Highway 180 to Wolfpen Gap; 3.0 miles northwest on Forest Service Road 39 past Coosa Bald on Duncan Ridge; 1.5 miles northwest of a quarry; south of Whiteoak Stomp; on the east bank of the road; in Union County:

A—0 to 6 inches; brown (10YR 4/3) loam; weak medium granular structure; very friable; many very fine and fine roots; few fine flakes of mica; about 10 percent pebbles, cobbles, and stones, by volume; very strongly acid; clear smooth boundary.

Bw—6 to 21 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak medium subangular blocky structure; very friable; common fine roots; common fine flakes of mica; about 15 percent pebbles, cobbles, and stones, by volume; very strongly acid; gradual wavy boundary.

C—21 to 33 inches; yellowish brown (10YR 5/4) gravelly sandy loam; massive; very friable; common fine flakes of mica; about 20 percent pebbles,

cobbles, and stones, by volume; very strongly acid; clear wavy boundary.
Cr—33 to 50 inches; biotite gneiss saprolite.

The thickness of the solum ranges from 17 to 36 inches. Soft bedrock is at a depth of 26 to 40 inches. Reaction is very strongly acid or strongly acid throughout. The content of pebbles, cobbles, and stones ranges from about 5 to 20 percent by volume in the A and B horizons and from 15 to 30 percent by volume in the C horizon.

The A horizon is 4 to 10 inches thick. It has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. Where value is less than 3.5, the horizon is less than 6 inches thick.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. The fine-earth fraction is loam, sandy loam, or fine sandy loam.

The C horizon has the same range in colors as the Bw horizon.

Clifton Series

The Clifton series consists of very deep, well drained, moderately permeable soils on mountains and intermountain uplands (fig. 4). These soils formed in material weathered from granite, gneiss, and schist. Elevation ranges from 1,500 to more than 3,500 feet. Slopes range from 6 to 25 percent but are mainly 10 to 25 percent. The soils are clayey, mixed, mesic Typic Hapludults.

Clifton soils are geographically associated with Chestnut, Evard, Hayesville, Porters, and Saunook soils. Chestnut and Porters soils are shallower over bedrock than the Clifton soils and have a brownish subsoil. They commonly are on mountains. Evard soils are in positions on the landscape similar to those of the Clifton soils. They are in a fine-loamy family. Hayesville soils have a thicker solum than the Clifton soils. They are on intermountain uplands. Saunook soils are in coves and on toe slopes of mountains. They are in a fine-loamy family.

Typical pedon of Clifton fine sandy loam, in an area of Clifton-Evard complex, 10 to 25 percent slopes; 9.3 miles northwest on U.S. Highway 129 from Blairsville; 3.6 miles west on Georgia Highway 325 to Mount Zion Church; 0.9 mile west on Loving Road; 1.6 miles northwest on Jonica Gap Road from Zion Hill Church; 0.7 mile northeast on Culberson Road along Butler Creek; 72 feet from the center of a curve in the creek; 15 feet southeast of the road; in Union County:

A—0 to 4 inches; reddish brown (5YR 4/4) fine sandy loam; weak fine granular structure; very friable; few fine and medium roots; common fine flakes of mica; very strongly acid; clear smooth boundary.
Bt1—4 to 8 inches; yellowish red (5YR 4/6) clay loam; weak fine and medium subangular blocky structure; friable; common fine roots; few faint clay films on faces of peds; common fine flakes of mica; very strongly acid; clear smooth boundary.
Bt2—8 to 21 inches; red (2.5YR 5/6) clay; moderate fine subangular blocky structure; firm; common fine and few medium roots; common distinct clay films on faces of peds; common fine flakes of mica; strongly acid; clear smooth boundary.
Bt3—21 to 27 inches; red (2.5YR 4/6) clay loam; moderate medium subangular blocky structure; firm; common fine and few medium roots; common distinct clay films on faces of peds; common fine flakes of mica; strongly acid; clear smooth boundary.
BC—27 to 36 inches; red (2.5YR 4/6) loam; weak coarse subangular blocky structure; friable; few fine and common medium roots; common fine flakes of mica; strongly acid; abrupt smooth boundary.
C—36 to 60 inches; red (2.5YR 5/6) loam; massive; friable; common fine flakes of mica; strongly acid.

The thickness of the solum ranges from 30 to 40 inches. The content of pebbles and cobbles ranges from 0 to 10 percent by volume throughout the profile. Reaction ranges from very strongly acid to moderately acid throughout, except in areas where the surface layer has been limed. Few or common flakes of mica are throughout the profile.

The A horizon is 4 to 8 inches thick. It has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 4.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is fine sandy loam or loam.

The BA horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is sandy clay loam, loam, or clay loam.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. It is sandy clay, clay loam, or clay.

The BC horizon has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 6 to 8. It is loam, sandy clay loam, or clay loam.

The C horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. In some pedons it has few or common mottles in shades of red, brown, or yellow. Some pedons have gray or black mottles of relict rock material. The C horizon is fine sandy loam or loam and contains as much as 90 percent soft saprolite.

Colvard Series

The Colvard series consists of very deep, well drained, moderately rapidly permeable soils on flood plains of perennial streams between mountains. These soils formed in loamy sediments (fig. 5). Slopes range from 0 to 4 percent. The soils are coarse-loamy, mixed, nonacid, mesic Typic Udifluvents.

Colvard soils are geographically associated with Arkaqua, Chatuge, Suches, Toxaway, and Transylvania soils. These associated soils are in a fine-loamy family. Arkaqua, Suches, Toxaway, and Transylvania soils are in positions on the landscape similar to those of the Colvard soils. Arkaqua soils are somewhat poorly drained. They have a cambic horizon. Suches soils are well drained and moderately well drained. The poorly drained and very poorly drained Toxaway soils and the well drained and moderately well drained Transylvania soils have an umbric epipedon. Chatuge soils are mainly on low stream terraces and are poorly drained.

Typical pedon of Colvard fine sandy loam, occasionally flooded, 7.0 miles west of Blairsville on U.S. Highway 76; 0.25 mile south on Georgia Highway 325; 2,800 feet southeast on Byers Road to Wildwater at Young Cane Creek; 465 feet generally north downstream; 75 feet west of the creek; in Union County:

Ap—0 to 12 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; many fine roots; common fine flakes of mica; strongly acid; abrupt wavy boundary.

C1—12 to 36 inches; brown (7.5YR 5/4) sandy loam; massive; friable; common fine roots; common fine flakes of mica; strongly acid; gradual smooth boundary.

C2—36 to 46 inches; reddish yellow (7.5YR 6/6) fine sandy loam; massive; friable; common fine roots; common fine flakes of mica; strongly acid; clear wavy boundary.

C3—46 to 60 inches; light yellowish brown (10YR 6/4) fine sandy loam; common medium distinct light gray (10YR 7/2) and yellowish brown (10YR 5/8) mottles; massive; friable; few fine roots; common fine flakes of mica; strongly acid; clear wavy boundary.

C4—60 to 70 inches; light yellowish brown (10YR 6/4) sandy loam; common medium prominent reddish yellow (7.5YR 6/8) and common medium faint very pale brown (10YR 7/3) mottles; massive; friable; common fine flakes of mica; strongly acid.

Thickness of the loamy sediments ranges from 40 to more than 60 inches. The depth to stratified sand and gravel ranges from 40 to more than 70 inches. Reaction is moderately acid or strongly acid throughout, except in areas where the surface layer has been limed. Few or common flakes of mica are throughout the profile.

The A horizon is 6 to 12 inches thick. It has hue of 7.5YR or 10YR and value and chroma of 3 or 4.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. In some pedons it has few or common mottles in shades of brown, yellow, or gray below a depth of 40 inches. This horizon is sandy loam, fine sandy loam, or loam.

Cowee Series

The Cowee series consists of moderately deep, well drained, moderately permeable soils on intermountain uplands and on mountains (fig. 6). These soils formed in material weathered from granite or gneiss interrupted by narrow dikes of schist. Elevation ranges from 1,500 to 3,500 feet. Slopes range from 8 to 90 percent but are mainly 25 to 45 percent. The soils are fine-loamy, mixed, mesic Typic Hapludults.

Cowee soils are geographically associated with Clifton, Evard, and Thurmont soils. Clifton and Evard soils are in positions on the landscape similar to those of the Cowee soils. Clifton soils are in a clayey family. Evard soils are more than 40 inches deep to a paralithic contact. Thurmont soils are on toe slopes and stream terraces.

Typical pedon of Cowee fine sandy loam, in an area of Cowee-Evard complex, 10 to 25 percent slopes; 3.8 miles north on Georgia Highway 5 from U.S. Highway 76 at Blue Ridge; 6.0 miles west on Watson Gap Road to Hipp Chapel Church; 0.6 mile west of the church; on the south bank of Watson Gap Road; in Fannin County:

A—0 to 7 inches; dark brown (7.5YR 4/4) fine sandy loam; weak fine granular structure; very friable; many fine and common medium roots; few fine flakes of mica; strongly acid; clear smooth boundary.

Bt1—7 to 11 inches; yellowish red (5YR 5/8) sandy clay loam; weak fine subangular blocky structure; friable; common fine and few medium roots; few distinct clay films on faces of peds; few fine flakes of mica; strongly acid; gradual smooth boundary.

Bt2—11 to 26 inches; yellowish red (5YR 5/6) sandy clay loam; weak fine subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds; few fine flakes of mica; strongly acid; clear smooth boundary.

Cr—26 to 60 inches; multicolored, weathered gneiss bedrock; partly consolidated but rippable.

The thickness of the solum ranges from 20 to 39 inches over paralithic contact with soft bedrock. Hard bedrock is at a depth of about 40 inches or more. The content of pebbles, cobbles, and stones ranges from 0 to 10 percent in the A and B horizons. Reaction is very strongly acid or strongly acid throughout the profile.

The A horizon is 2 to 8 inches thick. It has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 6.

The BA horizon, if it occurs, has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. It is sandy clay loam or clay loam.

The BC horizon, if it occurs, has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 6 to 8. In some pedons it has few or common mottles in shades of red, brown, or yellow. It is sandy loam, loam, sandy clay loam, or clay loam.

The C horizon, if it occurs, has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 6. In some pedons it has common reddish, brownish, or yellowish mottles. Some pedons have gray or black mottles of relict rock material. The C horizon is sandy loam or loam.

The Cr horizon is multicolored, weathered bedrock that is rippable.

Dillard Series

The Dillard series consists of very deep, moderately well drained, moderately slowly permeable soils mainly on stream terraces or toe slopes. These soils formed in loamy sediments. Slopes range from 2 to 6 percent. The soils are fine-loamy, mixed, mesic Aquic Hapludults.

Dillard soils are geographically associated with Arkaqua, Bradson, Chatuge, Colvard, Evard, Suches, and Thurmont soils. The somewhat poorly drained Arkaqua soils, the well drained Colvard soils, and the well drained and moderately well drained Suches soils are on flood plains. They do not have an argillic horizon. The well drained Bradson and Thurmont soils are in the somewhat higher landscape positions. Also, Bradson soils have a red, clayey subsoil. The poorly drained Chatuge soils are in the somewhat lower landscape positions. The well drained Evard soils are on mountains and intermountain uplands.

Typical pedon of Dillard fine sandy loam, 2 to 6 percent slopes, 4.5 miles southwest of Blairsville on old Georgia Highway 2; 60 feet south of the road at Pleasant Grove Church; in Union County:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; few fine flakes of mica; moderately acid; abrupt wavy boundary.

Bt1—8 to 20 inches; brownish yellow (10YR 6/6) sandy clay loam; weak fine subangular blocky structure; friable; few fine and medium roots; common distinct clay films on faces of peds; few fine flakes of mica; moderately acid; gradual wavy boundary.

Bt2—20 to 28 inches; brownish yellow (10YR 6/6) sandy clay loam; common medium prominent gray (10YR 5/1) and few fine faint yellowish brown mottles; moderate medium subangular blocky structure; friable; few fine and medium roots; common distinct clay films on faces of peds; common fine flakes of mica; moderately acid; gradual wavy boundary.

Bt3—28 to 37 inches; yellowish brown (10YR 5/6) sandy clay loam; many medium prominent gray (10YR 5/1) and many medium distinct strong brown (7.5YR 5/6) mottles; moderate coarse subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; common fine flakes of mica; moderately acid; gradual wavy boundary.

2Cg—37 to 60 inches; gray (10YR 5/1) clay; many medium prominent yellowish red (5YR 4/6) mottles; massive; firm; common fine flakes of mica; moderately acid.

The thickness of the solum ranges from 30 to 60 inches. Reaction is strongly acid or moderately acid in the A horizon and very strongly acid to moderately acid in the B and C horizons. Few or common flakes of mica are throughout the profile.

The A horizon is 6 to 9 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 1 to 3. The content of pebbles ranges from 0 to 5 percent by volume.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 8. It has few or common fine to coarse gray mottles in the lower part. It is sandy clay loam or clay loam. The content of pebbles ranges from 0 to 15 percent by volume.

The Cg or 2Cg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. It has few or common mottles in shades of red, brown, yellow, or gray. It is clay, silty clay, or sandy loam. The content of pebbles ranges from 0 to 35 percent by volume.

Evard Series

The Evard series consists of very deep, well drained, moderately permeable soils on mountains and intermountain uplands. These soils formed in material weathered from granite or gneiss interrupted by narrow dikes of schist (fig. 7). Elevation ranges from 1,500 to 3,500 feet. Slopes range from 6 to 60 percent but are mainly 25 to 45 percent. The soils are fine-loamy, oxidic, mesic Typic Hapludults.

Evard soils are geographically associated with Chestnut, Clifton, Cowee, Hayesville, Porters, and

Saunook soils. Commonly, Chestnut and Porters soils are on the higher mountains. They are in a coarse-loamy family. Clifton and Cowee soils are in positions on the landscape similar to those of the Evard soils. Clifton soils are in a clayey family. Cowee soils have a paralithic contact at a depth of less than 40 inches. Hayesville soils are on the lower intermountain uplands. They are in a clayey family and have a thicker solum than the Evard soils. Saunook soils are in coves and on toe slopes of mountains. They have an umbric epipedon.

Typical pedon of Evard fine sandy loam, in an area of Cowee-Evard complex, 10 to 25 percent slopes; 3.8 miles north on Georgia Highway 5 from Blue Ridge; 6.0 miles west on Watson Gap Road to Hipps Chapel Church; 0.6 mile west of the church; on the south bank of Watson Gap Road; in Fannin County:

A—0 to 6 inches; brown (7.5YR 4/4) fine sandy loam; weak fine granular structure; very friable; many fine and common medium roots; few fine flakes of mica; moderately acid; clear smooth boundary.

BE—6 to 10 inches; yellowish red (5YR 5/6) loam; weak fine subangular blocky structure; friable; many fine and common medium roots; few fine flakes of mica: very strongly acid; clear smooth boundary.

Bt1—10 to 20 inches; red (2.5YR 4/8) clay loam; moderate fine subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt2—20 to 30 inches; red (2.5YR 4/6) sandy clay loam; moderate medium subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—30 to 40 inches; red (2.5YR 4/8) sandy loam; weak coarse subangular blocky structure; friable; few fine roots; few fine flakes of mica; strongly acid; clear wavy boundary.

C1—40 to 54 inches; yellowish red (5YR 4/6) sandy loam; common medium prominent strong brown (7.5YR 5/8) mottles; massive; friable; few fine flakes of mica; strongly acid; gradual wavy boundary.

C2—54 to 60 inches; strong brown (7.5YR 5/6) sandy loam; common medium distinct yellowish red (5YR 5/6) mottles; massive; firm; strongly acid.

The thickness of the solum ranges from 20 to 40 inches. Hard bedrock is at a depth of 5 feet or more. The content of pebbles, cobbles, and stones ranges from 0 to 25 percent by volume in the A horizon and from 0 to 8 percent by volume in the B horizon. Few or common fine flakes of mica are throughout the solum, and few to many are in the underlying material. Reaction ranges from moderately acid to very strongly acid throughout, except in areas where the surface layer has been limed.

The A horizon is 2 to 6 inches thick. It has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6.

The E horizon, if it occurs, has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 8.

The BE horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 7, and chroma of 4 to 8. It is sandy loam, loam, sandy clay loam, or clay loam.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8. It is sandy clay loam or clay loam.

The BC horizon, if it occurs, has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 6 to 8. In some pedons it has few or common mottles in shades of red, brown, or yellow. It is sandy loam, loam, sandy clay loam, or clay loam.

The C horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 6 to 8. In some pedons it has few or common mottles in shades of red, brown, or yellow. Gray or black mottles of relict rock material are in some pedons. This horizon is sandy loam, loam, or loamy sand that contains as much as 90 percent soft saprolite.

French Series

The French series consists of very deep, moderately well drained or somewhat poorly drained, moderately permeable over rapidly permeable soils on flood plains along streams between mountains. These soils formed in loamy sediments overlying sandy and gravelly material. Slopes range from 0 to 2 percent. The soils are fine-loamy over sandy or sandy-skeletal, mixed, mesic Fluvaquentic Dystrochrepts.

French soils are geographically associated with Arkaqua, Bradson, Chatuge, Clifton, Colvard, Dillard, Evard, Suches, and Thurmont soils. None of the associated soils have sand and gravel layers above a depth of 40 inches. The somewhat poorly drained Arkaqua soils, the well drained Colvard soils, and the well drained and moderately well drained Suches soils are in positions on the landscape similar to those of the French soils. The poorly drained Chatuge soils are on stream terraces, at the head of drainageways, and on toe slopes. The well drained Bradson and Thurmont soils and the somewhat poorly drained Dillard soils are on stream terraces, on toe slopes, or in coves. The well drained Clifton and Evard soils are on mountains and intermountain uplands.

Typical pedon of French fine sandy loam, frequently flooded, 5.5 miles north of Blue Ridge on Georgia Highway 5 from the intersection with U.S. Highway 76; 0.8 mile west on paved county road to Damascus

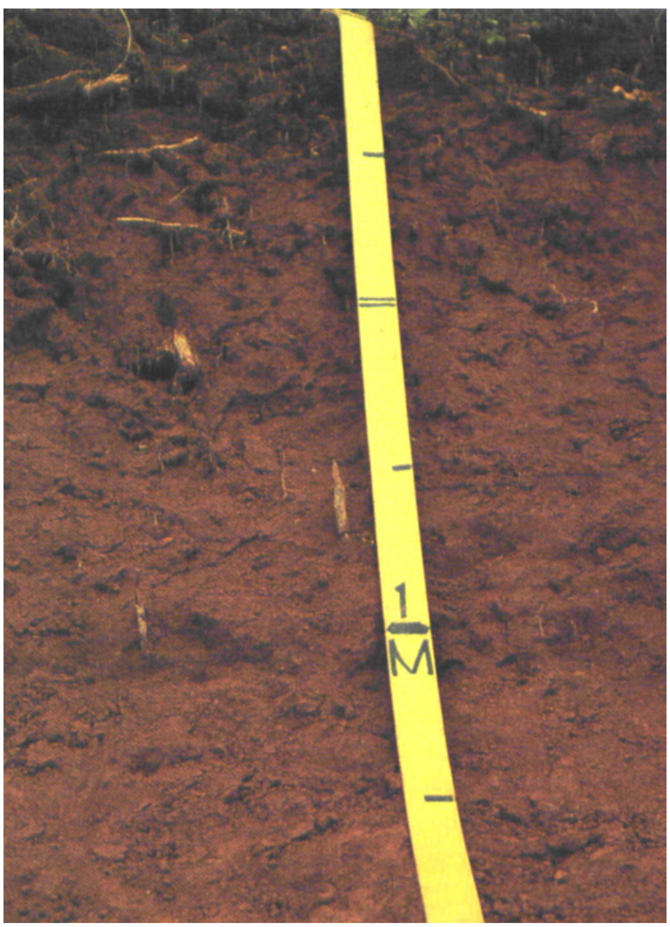

Figure 3.—Profile of a Bradson loam. Typically, the surface layer is yellowish red and the subsoil is red.

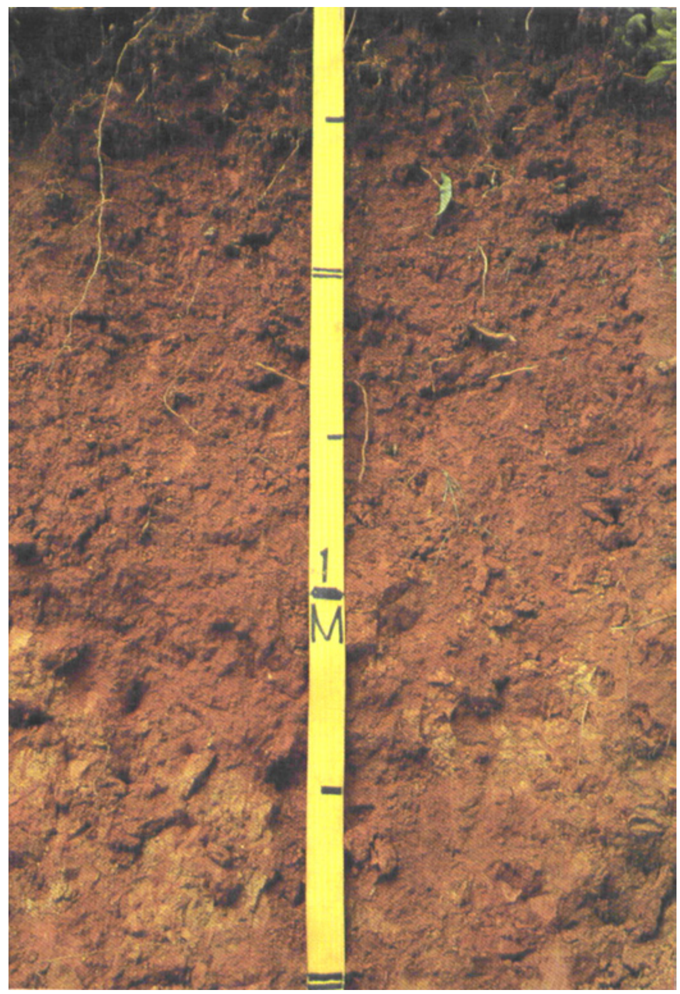

Figure 4.—Profile of a Clifton fine sandy loam. This clayey soil formed in residuum weathered from gneiss, granite, schist, and rocks high in ferromagnesium minerals. Typically, the surface layer is reddish brown and the subsoil is red or yellowish red.

Figure 5.—Profile of a Colvard fine sandy loam. This well drained soil formed in loamy alluvium on flood plains. Stratified sediments are at a depth of about 125 centimeters.

Figure 6.—Profile of a Cowee fine sandy loam. Typically, the surface layer is dark brown and the subsoil is yellowish red sandy clay loam. Rippable bedrock of weathered gneiss, granite, or schist is at a depth of about 75 centimeters.

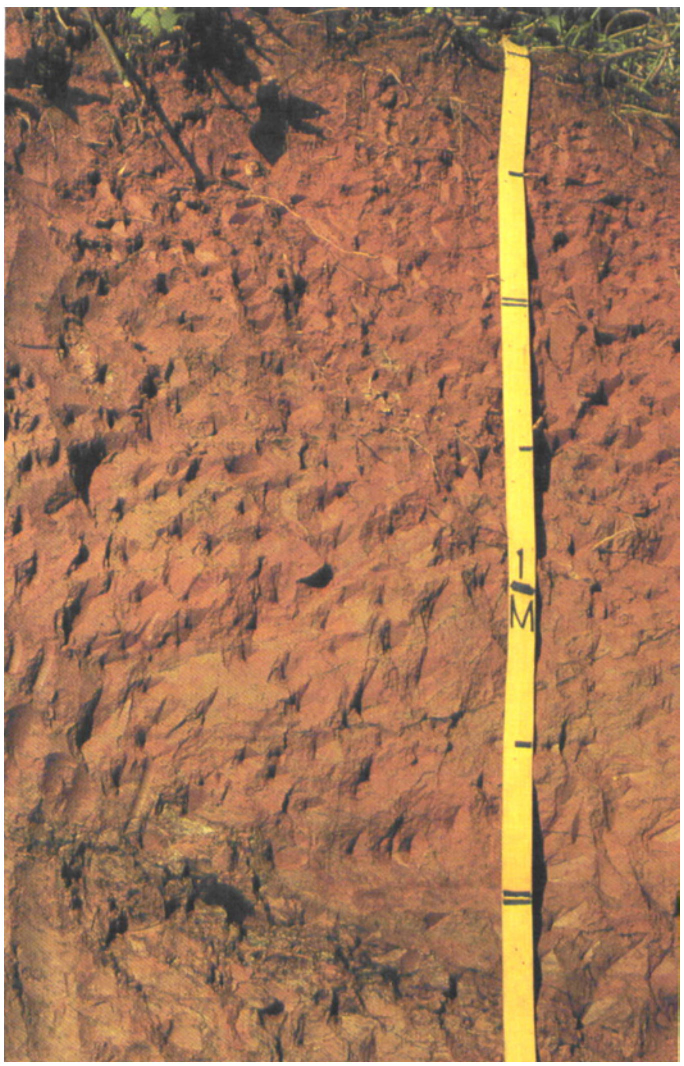

Figure 7.—Profile of an Evard fine sandy loam. The solum extends to a depth of about 125 centimeters. Saprolite consists of highly weathered igneous and metamorphic rocks.

Figure 8.—Profile of a Junaluska channery loam. This fine-loamy soil formed in residuum derived from sedimentary rocks, including metasandstone and phyllite. The depth to rippable bedrock is about 75 centimeters.

Figure 9.—Profile of a Porters loam. Hard bedrock is at a depth of about 140 centimeters. Typically, the surface layer is very dark brown and the subsoil is yellowish brown or dark yellowish brown.

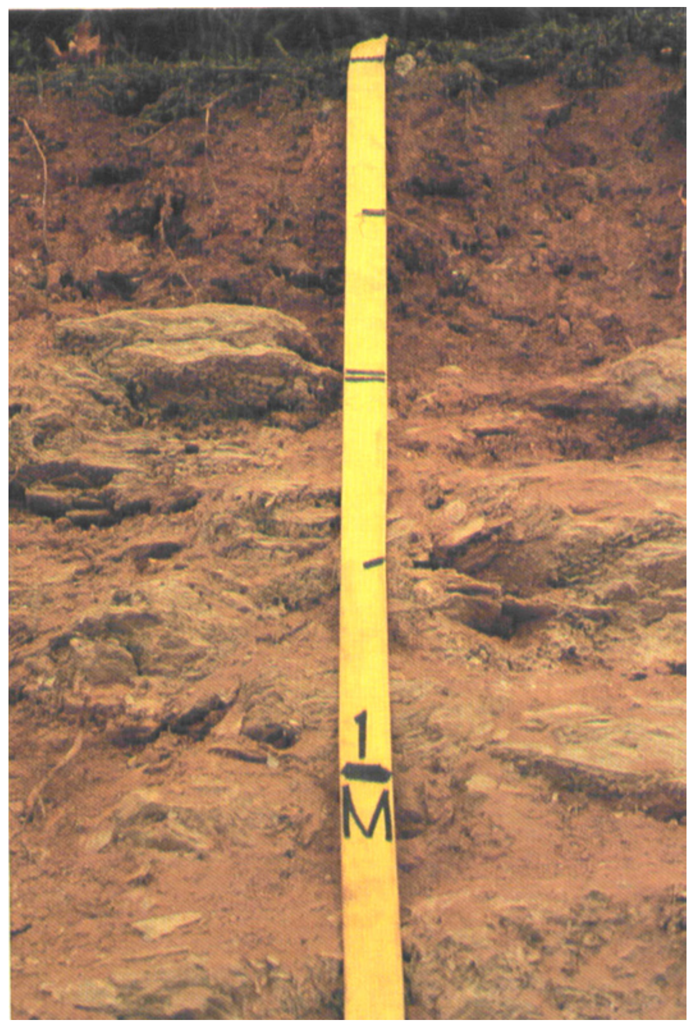

Figure 10.—Profile of a Tsali channery loam. The thickness of the solum and the depth to rippable bedrock are about 45 centimeters.

Church; southwest 0.1 mile to private road; 0.2 mile south on private road to a creek in a pasture; 600 feet west along the creek; 30 feet north of the creek; in Fannin County:

A—0 to 9 inches; brown (7.5YR 4/4) fine sandy loam; weak fine granular structure; very friable; many fine roots; common fine flakes of mica; strongly acid; clear smooth boundary.

Bw1—9 to 18 inches; yellowish brown (10YR 5/6) loam; common medium distinct brown (10YR 5/3), grayish brown (10YR 5/2), and strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine roots; common fine flakes of mica; strongly acid; gradual smooth boundary.

Bw2—18 to 33 inches; yellowish brown (10YR 5/4) sandy loam; common medium distinct grayish brown (10YR 5/2) and many coarse faint brown (10YR 5/3) mottles; weak medium subangular blocky structure; friable; common fine flakes of mica; strongly acid; clear smooth boundary.

C—33 to 60 inches; yellowish brown (10YR 5/6), stratified sand and gravel; few medium distinct strong brown (7.5YR 5/6) mottles; single grained; loose; few fine flakes of mica; strongly acid.

The thickness of the solum ranges from 20 to 40 inches. Reaction is strongly acid or moderately acid throughout, except in areas where the surface layer has been limed. Few or common flakes of mica are throughout the profile.

The A horizon is 6 to 12 inches thick. It has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 1 to 4.

The Bw horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. It has few to many mottles in shades of gray, yellow, or brown. It is sandy loam, sandy clay loam, or loam.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6. It has few to many mottles in shades of brown, yellow, or gray. It is sand, loamy sand, or sandy loam that is stratified with gravelly, very gravelly, or cobbly sand, loamy sand, or sandy loam.

Hayesville Series

The Hayesville series consists of very deep, well drained, moderately permeable soils on intermountain uplands. These soils formed in material weathered from granite, gneiss, and schist. Elevation commonly ranges from 1,800 to 3,400 feet. Slopes range from 6 to 45 percent but are mainly 10 to 25 percent. The soils are clayey, kaolinitic, mesic Typic Kanhapludults.

Hayesville soils are geographically associated with Bradson, Clifton, and Evard soils. Bradson soils are on high terraces and in coves. They have a thicker solum than the Hayesville soils. Clifton and Evard soils are on mountains and intermountain uplands. Clifton soils have a thinner solum than the Hayesville soils. Evard soils are in a fine-loamy family.

The Hayesville soils in this survey area are taxadjuncts because they do not have a kandic horizon. This difference, however, does not significantly affect the use and management of the soils.

Typical pedon of Hayesville fine sandy loam, 10 to 25 percent slopes, 3.3 miles south of Blairsville on U.S. Highway 129; 0.4 mile northeast, in Georgia Mountain Branch Experiment Station, in an apple orchard; 10 feet south of access road; in Union County:

Ap—0 to 5 inches; brown (10YR 4/3) fine sandy loam; weak medium granular structure; very friable; many fine and very fine roots; moderately acid; abrupt wavy boundary.

BA—5 to 8 inches; brown (7.5YR 5/4) loam; weak medium subangular blocky structure; friable; many fine roots; few fine flakes of mica; slightly acid; abrupt wavy boundary.

Bt1—8 to 19 inches; red (2.5YR 5/6) clay loam; moderate medium subangular blocky structure; firm; many fine roots; common distinct clay films on faces of peds; few fine flakes of mica; slightly acid; clear wavy boundary.

Bt2—19 to 32 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; common fine roots; common distinct clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.

BC—32 to 58 inches; red (2.5YR 5/6) clay loam; weak medium subangular blocky structure; friable; few fine roots; common fine flakes of mica; strongly acid; clear wavy boundary.

C—58 to 72 inches; red (2.5YR 5/6) loam; massive; friable; common fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The content of pebbles and cobbles ranges from 0 to 10 percent by volume throughout. Few or common flakes of mica are throughout the profile. Reaction ranges from very strongly acid to moderately acid throughout, except in areas where the surface layer has been limed.

The A horizon is 2 to 5 inches thick. It has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 4.

The E horizon, if it occurs, has hue of 7.5YR, value of 5, and chroma of 4 to 6. It is loam or sandy loam.

The BA horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is loam, sandy clay loam, or clay loam.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. It is clay loam or clay.

The BC horizon has the same range in colors as the Bt horizon. The BC horizon is loam, sandy clay loam, or clay loam.

The C horizon has hue of 10YR to 2.5YR, value of 4 to 7, and chroma of 2 to 8, or it is mottled with these colors and has no dominant matrix color. It is saprolite that crushes to fine sandy loam, sandy clay loam, or loam.

Junaluska Series

The Junaluska series consists of moderately deep, well drained, moderately permeable soils on ridges and side slopes of intermountain uplands. These soils formed in material weathered from metasedimentary rocks, such as phyllite and thinly bedded metasandstone (fig. 8). Elevation ranges from 1,500 to 2,400 feet. Slopes range from 6 to 90 percent but are mainly 10 to 45 percent. The soils are fine-loamy, mixed, mesic Typic Hapludults.

Junaluska soils are geographically associated with Cataska and Tsali soils. These associated soils are in positions on the landscape similar to those of the Junaluska soils. Cataska soils have more than 35 percent coarse fragments in the control section, are shallow to a paralithic contact, and do not have an argillic horizon. Tsali soils are shallow to a paralithic contact.

Typical pedon of Junaluska channery loam, in an area of Junaluska-Tsali complex, 25 to 45 percent slopes; in a roadbank 0.3 mile east of Georgia Highway 5 on U.S. Highway 2 at Blue Ridge; 0.8 mile northeast of U.S. Highway 2 on Ada Road; 0.5 mile northeast on Hogback Road; on the east side of the road; in Fannin County:

A—0 to 2 inches; dark reddish brown (5YR 3/4) channery loam; weak fine granular structure; very friable; many fine, common medium, and few large roots; about 20 percent metasandstone and phyllite channers, by volume; few fine flakes of mica; strongly acid; clear smooth boundary.

Bt1—2 to 6 inches; yellowish red (5YR 4/6) clay loam; moderate medium subangular blocky structure; friable; many fine and common medium roots; few faint clay films on faces of peds; about 10 percent metasandstone and phyllite channers, by volume; few fine flakes of mica; strongly acid; clear smooth boundary.

Bt2—6 to 15 inches; yellowish red (5YR 4/6) clay loam; weak medium subangular blocky structure; friable; common fine and few medium roots; common distinct clay films on faces of peds; about 10 percent metasandstone and phyllite channers, by volume; few fine flakes of mica; strongly acid; gradual smooth boundary.

Bt3—15 to 28 inches; yellowish red (5YR 4/6) channery clay loam; weak medium subangular blocky structure; friable; common fine and few medium roots; few faint clay films on faces of peds; about 15 percent metasandstone and phyllite channers, by volume; few fine flakes of mica; strongly acid; abrupt irregular boundary.

Cr—28 to 60 inches; multicolored, weathered and fractured, interbedded phyllite and metasandstone bedrock that can be ripped.

The thickness of the solum and depth to the Cr horizon range from 20 to 39 inches. Reaction ranges from moderately acid to very strongly acid, except in areas where the surface layer has been limed. The content of channers ranges from 10 to 35 percent by volume in the A, B, and C horizons. Few or common flakes of mica are throughout the profile.

The A horizon is 2 to 8 inches thick. It has hue of 5YR to 10YR, value of 3 or 4, and chroma of 3 to 6.

The E horizon, if it occurs, has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 6.

The Bt horizon has hue of 2.5YR or 5YR, value of 4, and chroma of 6 to 8. It is clay loam or channery clay loam.

The C horizon, if it occurs, has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. In some pedons it has few or common mottles in shades of red, brown, or yellow. Gray or black mottles of relict rock material are in some pedons. This horizon is sandy loam, loam, sandy clay loam, loamy fine sand, or the channery analogs of these textures. It contains as much as 90 percent soft saprolite.

The Cr horizon is multicolored, weathered and fractured metasedimentary bedrock, such as phyllite and thinly bedded metasandstone. It is rippable.

Porters Series

The Porters series consists of deep, well drained, moderately rapidly permeable soils on mountains. These soils formed in residuum weathered mainly from biotite gneiss interrupted by dikes of schist (fig. 9). Elevation commonly ranges from about 3,000 to more than 4,500 feet. Slopes range from 25 to 90 percent but are mainly 25 to 60 percent. Aspect is toward the north. The soils are coarse-loamy, mixed, mesic Umbric Dystrochrepts.

Porters soils are geographically associated with Chestnut and Saunook soils. Chestnut soils are in positions on the landscape similar to those of the Porters soils. They have an ochric epipedon. Saunook soils are in mountain coves and on toe slopes. They are in a fine-loamy family.

Typical pedon of Porters loam, 25 to 45 percent slopes, stony, 3.8 miles north on Georgia Highway 5 from U.S. Highway 76 at Blue Ridge; 10.3 miles west on Watson Gap Road to Watson Gap; 2.3 miles south on Forest Service Road 65 to Dyer Gap; 2.0 miles south on Forest Service Road 64A to Flat Top Mountain; 100 feet east of the base of an old fire tower, in a roadbank; in Fannin County:

A—0 to 9 inches; very dark grayish brown (10YR 3/2) loam; moderate very fine granular structure; very friable; many fine and common large roots; about 5 percent stones and cobbles, by volume; few fine flakes of mica; strongly acid; clear smooth boundary.

Bw1—9 to 14 inches; dark yellowish brown (10YR 4/4) loam; weak fine and medium subangular blocky structure; very friable; few fine and large roots; about 5 percent cobbles, by volume; few fine flakes of mica; moderately acid; gradual wavy boundary.

Bw2—14 to 29 inches; dark yellowish brown (10YR 4/6) loam; weak medium subangular blocky structure; friable; few fine and medium roots; about 10 percent cobbles, by volume; few fine flakes of mica; moderately acid; gradual smooth boundary.

BC—29 to 45 inches; yellowish brown (10YR 5/4) sandy loam; common medium prominent grayish brown (2.5Y 5/2), lithochromic mottles; weak medium subangular blocky structure; very friable; few fine and medium roots; about 15 percent cobbles, by volume; few fine flakes of mica; moderately acid; gradual wavy boundary.

C—45 to 52 inches; mottled yellowish brown (10YR 5/4) and grayish brown (2.5Y 5/2) saprolite that crushes to sandy loam; massive; friable; about 20 percent cobbles; common fine flakes of mica; moderately acid; abrupt wavy boundary.

R—52 inches; hard gneiss bedrock.

The thickness of the solum ranges from 20 to 50 inches. Hard bedrock is at a depth of 40 to 60 inches. Reaction is strongly acid or moderately acid throughout. The content of stones and cobbles ranges from 2 to 15 percent by volume in the solum and from 15 to 30 percent by volume in the C horizon.

The A horizon is 7 to 10 inches thick. It has hue of 7.5YR or 10YR, value of 3, and chroma of 2 or 3.

The BA horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4, and chroma of 3 or 4. It is sandy loam or loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is sandy loam, fine sandy loam, or loam.

The BC horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. In some pedons it has few or common mottles in shades of brown, yellow, or gray. It is sandy loam or loam.

The C horizon is commonly material weathered from gneiss. It has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 6.

Saunook Series

The Saunook series consists of very deep, well drained, moderately permeable soils in mountain coves and on toe slopes. These soils formed in colluvium weathered from felsic crystalline rocks. Elevation ranges from 1,500 to 4,700 feet. Slopes range from 10 to 60 percent but are mainly 25 to 60 percent. The soils are fine-loamy, mixed, mesic Humic Hapludults.

Saunook soils are geographically associated with Chestnut, Clifton, Evard, Hayesville, and Porters soils. These associated soils are on mountains or intermountain uplands. Except for the Porters soils, all of the associated soils have an ochric epipedon. Chestnut and Porters soils are in a coarse-loamy family. Clifton and Hayesville soils are in a clayey family. Evard soils have a red subsoil.

Typical pedon of Saunook loam, in an area of Saunook-Porters complex, 45 to 60 percent slopes, stony; 3.8 miles north on Georgia Highway 5 from Blue Ridge; 10.3 miles west on Watson Gap Road to Watson Gap; 3.0 miles north of Watson Gap on Forest Service Road 22; on the west bank of the road; in Fannin County:

A—0 to 9 inches; very dark brown (10YR 2/2) loam; weak fine granular structure; very friable; many fine and large roots; about 5 percent channers and stones, by volume; very strongly acid; clear wavy boundary.

Bt1—9 to 22 inches; dark yellowish brown (10YR 4/4) loam; weak fine subangular blocky structure; friable; common fine and medium roots; few distinct clay films on faces of peds; about 5 percent channers, by volume; strongly acid; gradual wavy boundary.

Bt2—22 to 39 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine subangular blocky structure; friable; few medium and large roots; common distinct clay films on faces of peds; about 10 percent channers, by volume; strongly acid; gradual wavy boundary.

Bt3—39 to 55 inches; dark yellowish brown (10YR 4/6) clay loam; weak fine subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; about 10 percent channers, by volume; strongly acid; gradual wavy boundary.

BC—55 to 60 inches; dark yellowish brown (10YR 4/6) sandy clay loam; weak coarse subangular blocky structure; friable; strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. Hard bedrock is at a depth of more than 60 inches. The content of rock fragments ranges from 2 to 35 percent in the A and B horizons and from 2 to 60 percent in the BC and C horizons. Few or common fine flakes of mica are throughout the profile. Reaction is strongly acid or very strongly acid throughout, except in areas where the surface layer has been limed.

The A horizon is 7 to 10 inches thick. It has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 2 to 4.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is loam, sandy clay loam, clay loam, or the gravelly, channery, or cobbly analogs of these textures.

The BC horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is sandy loam, loam, sandy clay loam, or the gravelly, channery, or cobbly analogs of these textures.

The C horizon, if it occurs, is loamy or sandy colluvial material that is variable in color.

Suches Series

The Suches series consists of very deep, well drained and moderately well drained, moderately permeable soils on flood plains of perennial streams that drain from the mountains. These soils formed in loamy sediments. Slopes range from 0 to 2 percent. The soils are fine-loamy, mixed, mesic Fluventic Dystrochrepts.

Suches soils are geographically associated with Arkaqua, Chatuge, Colvard, Dillard, and French soils. Arkaqua, Colvard, and French soils are in positions on the landscape similar to those of the Suches soils. Arkaqua soils are somewhat poorly drained, and French soils are moderately well drained and somewhat poorly drained. Also, French soils have sand and gravel layers above a depth of 40 inches. The poorly drained Chatuge soils are on stream terraces, at the head of drainageways, or on toe slopes. They have an argillic horizon. The well drained Colvard soils are in a coarse-loamy family. The moderately well drained Dillard soils are on stream terraces and toe slopes. They have an argillic horizon.

Typical pedon of Suches loam, 0 to 2 percent slopes, occasionally flooded, 6 miles west of the Fannin and Union County line on old U.S. Highway 76; north on secondary road to Hemptown Creek Bridge; 1,250 feet east along a stream channel; 520 feet south of the stream; in Fannin County:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak medium granular structure; friable; common fine and very fine roots; common fine pores; common fine flakes of mica; moderately acid; clear smooth boundary.

Bw1—10 to 18 inches; light yellowish brown (10YR 6/4) sandy clay loam; weak medium subangular blocky structure; friable; few fine and very fine roots; few fine pores; common fine flakes of mica; moderately acid; gradual wavy boundary.

Bw2—18 to 36 inches; brownish yellowish (10YR 6/6) sandy clay loam; many fine distinct pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable; few fine and very fine roots; few fine pores; common fine flakes of mica; moderately acid; clear wavy boundary.

Bw3—36 to 44 inches; light yellowish brown (10YR 6/4) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium granular structure; very friable; few fine and very fine roots; many fine flakes of mica; moderately acid; clear wavy boundary.

C—44 to 60 inches; mottled light gray (10YR 7/2), light yellowish brown (10YR 6/4), and dark yellowish brown (10YR 4/4) loamy sand; single grained; loose; many fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to stratified sand and gravel is 40 to more than 72 inches. Reaction ranges from very strongly acid to moderately acid throughout. Few to many flakes of mica are throughout the profile.

The Ap horizon is 8 to 10 inches thick. It has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 4.

The Bw1 horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 3 to 8. It is sandy loam, fine sandy loam, sandy clay loam, or clay loam. In some pedons it has few to many mottles in shades of brown or yellow.

The Bw2 and Bw3 horizons have hue of 7.5YR or 10YR, value of 3 to 7, and chroma of 3 to 6. They are sandy loam, fine sandy loam, silt loam, loam, sandy clay loam, or clay loam. The have few to many mottles in shades of red, brown, yellow, or gray. Mottles with chroma of 2 or less are at a depth of more than 24 inches in some pedons.

The Bg horizon, if it occurs, has hue of 7.5YR or 10YR, value of 3 to 7, and chroma of 1 or 2. It has mottles in shades of red, brown, yellow, or gray. It is sandy loam, fine sandy loam, silt loam, loam, sandy clay loam, or clay loam.

The C horizon has hue of 10YR or 7.5YR, value of 3 to 7, and chroma of 3 to 8. It has mottles in shades of red, brown, yellow, or gray, or it is mottled with these colors and has no dominant matrix color. It is loamy sand, sandy loam, sandy clay loam, clay loam, or the gravelly or very gravelly analogs of these textures.

The Cg horizon, if it occurs, has hue of 7.5YR or 10YR or is neutral in hue. It has value of 4 to 7 and chroma of 0 to 2. It has mottles in shades of red, brown, yellow, or gray. It is loamy sand, sandy loam, fine sandy loam, sandy clay loam, silt loam, clay loam, or the gravelly analogs of these textures.

Thurmont Series

The Thurmont series consists of very deep, well drained, moderately permeable soils mainly on stream terraces or toe slopes. These soils formed in loamy sediments. Slopes range from 2 to 25 percent. The soils are fine-loamy, mixed, mesic Typic Hapludults.

Thurmont soils are geographically associated with Arkaqua, Bradson, Chatuge, Colvard, Dillard, Evard, French, and Suches soils. Arkaqua, Colvard, French, and Suches soils do not have an argillic horizon. They are on flood plains. Also, French soils have sand and gravel layers above a depth of 40 inches. Bradson and Evard soils have oxidic mineralogy. Also, Bradson soils are in a clayey family. The poorly drained Chatuge soils are in the somewhat lower landscape positions. Dillard soils are in an aquic subgroup.

Typical pedon of Thurmont fine sandy loam, 6 to 12 percent slopes, 6.9 miles southwest of Blairsville on old Georgia Highway 2; 0.7 mile south on a county road; 0.6 mile east on a private lane to a branch at the corner of a pasture; 100 feet south of the branch and 200 feet east of a drainage channel, in a pasture; in Union County:

Ap—0 to 6 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; very friable; many fine roots; strongly acid; clear smooth boundary.

Bt1—6 to 12 inches; reddish yellow (7.5YR 6/6) sandy clay loam; weak medium subangular blocky structure; friable; common fine roots; strongly acid; clear smooth boundary.

Bt2—12 to 19 inches; reddish yellow (7.5YR 6/6) gravelly sandy clay loam; weak medium subangular blocky structure; firm; common fine roots; few faint clay films on faces of peds; about 18 percent quartz gravel, by volume; few fine flakes of mica; strongly acid; clear smooth boundary.

Bt3—19 to 29 inches; reddish yellow (7.5YR 6/6) gravelly clay loam; moderate medium angular blocky structure; firm; common fine roots; common distinct clay films on faces of peds; about 20 percent quartz gravel, by volume; common fine flakes of mica; strongly acid; gradual smooth boundary.

Bt4—29 to 42 inches; reddish yellow (7.5YR 6/6) gravelly sandy clay loam; moderate medium angular blocky structure; firm; few distinct clay films on faces of peds; common fine flakes of mica; about 34 percent quartz gravel, by volume; strongly acid; abrupt smooth boundary.

2C—42 to 60 inches; mottled brownish yellow (10YR 6/6) and reddish yellow (7.5YR 6/6) sandy loam; massive; very friable; many fine flakes of mica; strongly acid.

The thickness of the solum ranges from 40 to 60 inches. Reaction is very strongly acid or strongly acid throughout, except in areas where the surface layer has been limed. Depth to the lithologic discontinuity ranges from 30 to 60 inches. The content of rock fragments ranges from 0 to 35 percent by volume throughout.

The A or Ap horizon is 4 to 6 inches thick. It has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 or 4. It is fine sandy loam, sandy loam, or loam.

The BE horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma 3 to 6. It is fine sandy loam or loam.

The Bt horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 4 to 8. It is sandy clay loam or clay loam.

The BC horizon, if it occurs, has colors similar to those of the Bt horizon. It is sandy loam, loam, or sandy clay loam in the fine-earth fraction.

The C or 2C horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8, or it is mottled in shades of red, brown, or yellow. It has streaks or mottles of gray in some pedons. It is sandy clay loam, loam, sandy loam, or the gravelly analogs of these textures.

Toxaway Series

The Toxaway series consists of very deep, poorly drained and very poorly drained, moderately permeable soils on flood plains of perennial streams that drain from the mountains. These soils formed in loamy sediments. Slopes range from 0 to 2 percent. The soils are fine-loamy, mixed, nonacid, mesic Cumulic Humaquepts.

Toxaway soils are geographically associated with Arkaqua, Bradson, Chatuge, Colvard, Dillard, French, Suches, Thurmont, and Transylvania soils. Arkaqua, Chatuge, Colvard, French, Suches, and Transylvania soils are in positions on the landscape similar to those of the Toxaway soils. Except for the Transylvania soils, all of the associated soils have an ochric epipedon. The well drained Bradson soils have a red subsoil. Dillard soils are moderately well drained and are in the slightly higher landscape positions. Thurmont soils are well drained. Suches and Transylvania soils are well drained and moderately well drained.

Typical pedon of Toxaway loam, in an area of Transylvania-Toxaway complex, occasionally flooded; 20.8 miles south of Morganton on Georgia Highway 60; 1,000 feet northeast of Gaddistown Road; 300 feet north of Georgia Highway 60; 300 feet south of the Toccoa River; 300 feet east of poultry houses; in Union County:

Ap—0 to 9 inches; dark brown (10YR 3/3) loam; weak fine granular structure; very friable; few fine roots; few fine flakes of mica; moderately acid; abrupt smooth boundary.

A—9 to 28 inches; very dark grayish brown (10YR 3/2) loam; weak fine granular structure; friable; few fine roots; few fine flakes of mica; moderately acid; gradual wavy boundary.

Cg1—28 to 40 inches; dark grayish brown (10YR 4/2) clay loam; few fine prominent strong brown (7.5YR 5/8) mottles; massive; friable; few fine roots; few fine flakes of mica; moderately acid; gradual wavy boundary.

Cg2—40 to 52 inches; dark grayish brown (10YR 4/2) sandy clay loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; few fine roots; few fine flakes of mica; strongly acid; gradual wavy boundary.

Cg3—52 to 60 inches; very dark gray (10YR 3/1) sandy loam; massive; friable; few fine old roots; common fine flakes of mica; moderately acid.

The loamy horizons are 40 to 60 inches thick over sandier material. Reaction ranges from strongly acid to slightly acid throughout the profile. Few to many flakes of mica are throughout. The content of pebbles or cobbles ranges from 0 to 5 percent by volume in the A horizon and from 0 to 15 percent by volume in the Cg horizon.

Total thickness of the A horizon is 24 to 36 inches. This horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It is loam or silt loam.

The Cg horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. It has few to many mottles in shades of brown or yellow. It is loam, sandy loam, silt loam, clay loam, or sandy clay loam above a depth of 40 inches. It is loamy sand or sand or is stratified with various textures below that depth. It contains gravel in some pedons.

Transylvania Series

The Transylvania series consists of very deep, well drained and moderately well drained, moderately permeable soils on flood plains of perennial streams that drain from the mountains. These soils formed in loamy sediments. Slopes range from 0 to 2 percent. The soils are fine-loamy, mixed, mesic Cumulic Haplumbrepts.

Transylvania soils are geographically associated with Arkaqua, Bradson, Chatuge, Colvard, Dillard, French, Suches, and Toxaway soils. Except for the Toxaway soils, all of the associated soils have an ochric epipedon. Arkaqua, Chatuge, Colvard, French, and Suches soils are in positions on the landscape similar to those of the Transylvania soils. Bradson and Dillard soils are in the higher landscape positions. They have an argillic horizon. Toxaway soils are poorly drained and very poorly drained.

Typical pedon of Transylvania loam, in an area of Transylvania-Toxaway complex, occasionally flooded; 20.8 miles south of Morganton on Georgia Highway 60; 1,000 feet northeast of Gaddistown Road; 400 feet north of Georgia Highway 60; 300 feet south of the Toccoa River; 50 feet east of chicken houses; in Union County:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loam; weak fine granular structure; very friable; few fine roots; few fine flakes of mica; moderately acid; abrupt smooth boundary.

A—9 to 24 inches; very dark grayish brown (10YR 3/2) loam; moderate medium granular structure; friable; few fine roots; few fine flakes of mica; moderately acid; clear smooth boundary.

Bw—24 to 40 inches; dark yellowish brown (10YR 4/4) clay loam; weak fine subangular blocky structure; friable; few fine roots; few fine flakes of mica; moderately acid; gradual wavy boundary.

Cg—40 to 60 inches; grayish brown (10YR 5/2) loamy sand; massive; very friable; common fine flakes of mica; moderately acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to stratified sand and gravel is 40 to more than 72 inches. Reaction ranges from very strongly acid to moderately acid throughout the profile. Few to many flakes of mica are throughout.

Total thickness of the A horizon is 22 to 30 inches. This horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

The Bw horizon has hue of 10YR to 2.5Y, value of 3 to 5, and chroma of 3 to 6. It is loam, silt loam, or clay loam. In some pedons it has few or common mottles in shades of brown, yellow, or gray.

The Cg horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. It consists of loamy and sandy alluvial sediments.

Tsali Series

The Tsali series consists of shallow, well drained, moderately permeable soils on intermountain uplands. These soils formed in material weathered from thinly bedded metasedimentary rocks, such as phyllite and metasandstone (fig. 10). Elevation ranges from 1,500 to 2,400 feet. Slopes range from 8 to 60 percent but are mainly 10 to 45 percent. The soils are loamy, mixed, mesic, shallow Typic Hapludults.

Tsali soils are geographically associated with Cataska and Junaluska soils. Junaluska soils are deeper to a paralithic contact than the Tsali soils. Cataska soils have more than 35 percent coarse fragments in the control section and do not have an argillic horizon.

Typical pedon of Tsali channery loam, in an area of Junaluska-Tsali complex, 25 to 45 percent slopes; in a roadbank 0.3 mile east of Georgia Highway 5 on U.S. Highway 2 at Blue Ridge; 0.8 mile northeast of U.S. Highway 2 on Ada Road; 0.5 mile northeast on Hogback Road; on the east side of the road; in Fannin County:

A—0 to 2 inches; brown (7.5YR 4/4) channery loam; weak fine granular structure; very friable; many fine and common medium roots; about 20 percent channers, by volume; strongly acid; clear smooth boundary.

Bt1—2 to 12 inches; yellowish red (5YR 4/6) channery clay loam; weak medium subangular blocky structure; friable; common fine and few medium roots; few faint clay films on faces of peds; about 15 percent channers, by volume; strongly acid; clear wavy boundary.

Bt2—12 to 16 inches; yellowish red (5YR 4/6) channery clay loam; moderate fine and medium subangular blocky structure; very friable; common fine and few medium roots; common distinct clay films on faces of peds; about 30 percent channers, by volume; strongly acid; abrupt irregular boundary.

Cr—16 to 60 inches; multicolored, weathered and fractured, thinly bedded phyllite and metasandstone bedrock that can be ripped.

The thickness of the solum and the depth to soft bedrock range from 10 to 20 inches. The content of channers ranges from 15 to 35 percent by volume throughout the profile. Reaction ranges from moderately acid to very strongly acid throughout, except in areas where the surface layer has been limed.

The A horizon is 1 to 4 inches thick. It has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 or 4.

The Bt horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is channery loam or channery clay loam.

The BC horizon, if it occurs, has colors and textures similar to those of the Bt horizon.

The Cr horizon is multicolored, weathered and fractured bedrock consisting of metasedimentary rocks, such as phyllite and thinly bedded metasandstone. It is rippable.

Formation of the Soils

Soils form through the interaction of parent materials, living organisms, climate, relief, and time *(6)*. All of these factors influence the characteristics of every soil, but the relative importance of each factor varies from place to place. In some areas one factor of soil formation may dominate and may determine most of a soil's properties. In another area, a different factor may dominate. The relationships between the factors of soil formation are complex, and the effect of any one factor cannot be isolated from those of the others.

Parent Material

Parent material is the unconsolidated mass in which soil forms. It is largely responsible for the chemical and mineralogical composition of a soil. Most of the soils in Fannin and Union Counties formed in material weathered from the underlying rock. Most of the survey area is underlain by mica schist and biotite gneiss *(4)*. Clifton, Evard, and Cowee soils are the dominant upland soils that formed in these materials at the lower elevations, and Porters and Chestnut soils are the dominant soils at the higher elevations. A narrow band of phyllite crosses near the center of Fannin County in a southwest-to-northeast direction. Junaluska, Tsali, and Cataska soils are the major soils in this area.

Some of the soils in the survey area formed in old colluvium on toe slopes and in coves and in old alluvium on stream terraces. These materials have been transported by gravity or by water and deposited. Soils that form in these materials are generally very deep. Bradson and Thurmont soils are examples.

Nearly level soils on flood plains formed in recent alluvium and are less developed than most soils on uplands and terraces. Many of the soils are occasionally or frequently flooded and receive sediments during the periods of flooding. Arkaqua, Colvard, French, and Suches soils are the major soils on flood plains.

Climate

Climate affects the formation of soils through its influence on the type and rate of weathering of rocks, the removal and redeposition of materials, and the decomposition of minerals and organic matter. It also affects biological activity in the soils and the leaching and movement of weathered materials.

The survey area has a moist, temperate climate. The average temperature in winter is about 40 degrees F, and the average temperature in summer is about 73 degrees F. The warm, moist climate promotes rapid weathering of rock. As a result, most of the soils in the survey area are 2 to 4 feet thick over a layer of weathered rock that covers the underlying hard rock.

About 62 inches of precipitation falls annually in the survey area. Most of the precipitation moves down through the soil. Dissolved or suspended materials are carried downward. As a result, most of the soils in the area are relatively low in bases.

Climate affects the rate of decomposition and removal of organic matter. Most of the soils in the area are moderately low or moderate in organic matter content. Soils in the cooler areas on north-facing slopes, such as Porters and Saunook soils, generally have a higher content of organic matter than soils in the warmer areas on south-facing slopes, such as Chestnut and Evard soils. Also, soils in the warmer areas generally have more reddish colors than soils in the cooler areas. Well drained soils at the lower elevations, such as Hayesville, Bradson, Clifton, and Cowee soils, have a red subsoil, whereas well drained soils at the higher elevations, such as Porters, Chestnut, and Saunook soils, have a brownish subsoil.

Relief

Relief influences soil formation through its effect on runoff, movement of water within the soil, plant cover, and soil temperature. The length, shape, and steepness of slopes affect runoff. Soils on the steeper slopes generally have more runoff than soils in the less sloping areas. As a result, they are more susceptible to erosion. Also, less water moves through these soils. Soils on the steeper slopes commonly are shallower or less developed than soils on the gentler slopes. Porters and Chestnut soils commonly are in steep and very steep areas and are less developed than many of the upland soils in Fannin and Union Counties.

Aspect, or the direction a slope faces, also affects soil characteristics. Soils on north-facing slopes at the higher elevations are commonly cooler, support different vegetation, and have a higher organic matter content than similar soils on south-facing slopes. Porters and Saunook soils are mainly on north-facing slopes and have a higher organic matter content in the surface layer than similar soils on south-facing slopes.

Living Organisms

Plants, animals, bacteria, and other organisms are active in soil formation. They provide organic matter to the soil, recycle plant nutrients, and mix and stabilize the soil.

Most of the soils in Fannin and Union Counties formed under a forest of mainly hardwoods and some softwoods at the higher elevations. These trees supply most of the organic matter to the soils.

Plant roots break up soil and rock particles, develop channels for water movement, and recycle nutrients from deep within the soil back to the surface. Burrowing animals mix the soil and develop channels for water and air movement. Earthworms, insects, and micro-organisms break down plant residue and continually mix the soil and organic matter. Bacteria, fungi, and other micro-organisms hasten the weathering of rocks and the decomposition of organic matter.

Time

The characteristics of a soil depend on the length of time that the soil-forming factors have been active. Most of the soils in Fannin and Union Counties have been in place long enough for the formation of distinct horizons. The surface layer contains an accumulation of organic matter, and silicate clays have formed, moved downward, and accumulated in the subsoil to produce horizons with a relatively high clay content. Oxidation and reduction of iron have had an effect on the soils, depending on the natural drainage conditions. Many of the soils, such as Clifton and Hayesville soils, are well drained and have a red subsoil with a high content of oxidized iron. A few soils that are less well drained, such as Toxaway and Chatuge soils, have a gray subsoil that has reduced iron. Much of the calcium, magnesium, potassium, and other weatherable minerals has been removed from the soils through leaching, and the amount of exchangeable hydrogen has increased.

Soils that formed in similar kinds of parent materials and that have similar drainage conditions commonly differ in their degree of profile development because of time. Colvard and Dillard soils are similar in drainage and texture. Dillard soils are on stream terraces and have been in place long enough to have formed a subsoil with an accumulation of clay and for the development of soil structure. Colvard soils, however, are on flood plains and have not been in place long enough for the formation of distinct horizons.

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Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

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

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

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

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

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

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

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

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

Hard.—When dry, moderately resistant to

pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Depth, soil. The total thickness of weathered soil material over bedrock. Depth classes used in this survey are:

Very shallow	less than 10 inches
Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	more than 60 inches

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid

than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured soil. Sandy clay, silty clay, or clay.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. In this survey, terms describing the content of organic matter are:

Moderately low	1 or 2 percent
Moderate	2 to 4 percent
High	4 to 8 percent

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 drawbar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, the slope classes are:

Nearly level	0 to 2 percent
Gently sloping	2 to 6 percent
Strongly sloping	6 to 10 percent
Moderately steep	10 to 25 percent
Steep	25 to 45 percent
Very steep	45 to 90 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1957-77 at Blue Ridge, Georgia)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	50.0	27.8	38.9	71	0	50	5.83	3.78	7.68	8	1.4
February	52.9	28.9	40.9	72	2	32	5.63	2.83	8.05	8	.4
March	61.1	36.3	48.7	80	14	129	6.69	3.93	9.15	9	.2
April	71.5	44.0	57.8	86	24	240	5.66	2.90	8.06	7	.0
May	77.6	50.9	64.3	89	31	443	4.88	2.57	6.90	7	.0
June	83.3	58.4	70.9	94	41	627	4.91	2.56	6.96	8	.0
July	85.5	62.4	74.0	93	48	744	5.68	3.09	7.96	9	.0
August	85.5	61.9	73.7	93	48	735	4.77	2.23	6.96	7	.0
September	80.8	56.7	68.8	91	38	564	4.63	3.02	6.09	7	.0
October	72.3	43.6	58.0	86	23	264	3.96	1.69	5.94	5	.0
November	61.7	36.6	49.2	79	14	70	4.52	2.91	5.98	7	.1
December	52.2	29.6	40.9	72	4	25	5.15	2.75	7.26	8	1.2
Yearly:											
Average	69.5	44.8	57.2	---	---	---	---	---	---	---	---
Extreme	---	---	---	96	4	---	---	---	---	---	---
Total	---	---	---	---	---	3,923	62.31	53.92	70.41	90	3.3

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1957-77 at Blue Ridge, Georgia)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 9	Apr. 24	May 17
2 years in 10 later than--	Apr. 3	Apr. 20	May 11
5 years in 10 later than--	Mar. 23	Apr. 12	Apr. 30
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 20	Oct. 9	Sept. 25
2 years in 10 earlier than--	Oct. 28	Oct. 18	Oct. 3
5 years in 10 earlier than--	Nov. 11	Nov. 4	Oct. 19

TABLE 3.--GROWING SEASON

(Recorded in the period 1957-77 at Blue Ridge, Georgia)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	208	172	146
8 years in 10	216	184	155
5 years in 10	232	205	172
2 years in 10	248	227	189
1 year in 10	257	238	197

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Fannin County	Union County	Total-- Area	Extent
		Acres	Acres	Acres	Pct
Aa	Arkaqua loam, frequently flooded	2,780	3,700	6,480	1.4
BrC	Bradson loam, 6 to 10 percent slopes	825	2,050	2,875	0.6
BrE	Bradson loam, 10 to 25 percent slopes	5,780	7,580	13,360	2.9
Ca	Chatuge loam, occasionally flooded	105	1,195	1,300	0.3
CeE	Chestnut loam, 10 to 25 percent slopes	695	1,840	2,535	0.5
ChF	Chestnut loam, 25 to 45 percent slopes, stony	5,635	6,560	12,195	2.6
ChG	Chestnut loam, 45 to 60 percent slopes, stony	2,960	9,290	12,250	2.7
ClC	Clifton-Evard complex, 6 to 10 percent slopes	4,025	6,625	10,650	2.3
ClE	Clifton-Evard complex, 10 to 25 percent slopes	38,815	42,350	81,165	17.6
Cr	Colvard fine sandy loam, occasionally flooded	3,250	1,565	4,815	1.0
CwH	Cowee fine sandy loam, 60 to 90 percent slopes	2,350	0	2,350	0.5
CxE	Cowee-Evard complex, 10 to 25 percent slopes	6,100	1,890	7,990	1.7
CxF	Cowee-Evard complex, 25 to 45 percent slopes	59,223	37,490	96,713	21.0
CxG	Cowee-Evard complex, 45 to 60 percent slopes	14,925	5,460	20,385	4.4
DaB	Dillard fine sandy loam, 2 to 6 percent slopes	950	1,740	2,690	0.6
Fr	French fine sandy loam, frequently flooded	3,720	3,400	7,120	1.5
HaC	Hayesville fine sandy loam, 6 to 10 percent slopes	1,665	1,635	3,300	0.7
HaE	Hayesville fine sandy loam, 10 to 25 percent slopes	690	5,810	6,500	1.4
HaF	Hayesville fine sandy loam, 25 to 45 percent slopes	45	6,190	6,235	1.4
JcE	Junaluska-Cataska complex, 10 to 25 percent slopes	575	100	675	0.1
JcF	Junaluska-Cataska complex, 25 to 45 percent slopes	1,435	200	1,635	0.4
JcG	Junaluska-Cataska complex, 45 to 90 percent slopes	1,155	20	1,175	0.3
JtC	Junaluska-Tsali complex, 6 to 10 percent slopes	340	5	345	0.1
JtE	Junaluska-Tsali complex, 10 to 25 percent slopes	4,675	120	4,795	1.0
JtF	Junaluska-Tsali complex, 25 to 45 percent slopes	8,255	390	8,645	1.9
JtG	Junaluska-Tsali complex, 45 to 90 percent slopes	1,265	20	1,285	0.3
Pa	Pits, quarries	0	70	70	*
PsF	Porters loam, 25 to 45 percent slopes, stony	3,495	15,100	18,595	4.0
PsG	Porters loam, 45 to 60 percent slopes, stony	2,825	5,900	8,725	1.9
PxH	Porters-Rock outcrop complex, 60 to 90 percent slopes	390	1,550	1,940	0.4
Ro	Rock outcrop	15	335	350	0.1
SaE	Saunook-Evard complex, 10 to 25 percent slopes	10,750	14,300	25,050	5.4
SnF	Saunook-Evard complex, 25 to 45 percent slopes, stony	11,480	8,370	19,850	4.3
SpG	Saunook-Porters complex, 45 to 60 percent slopes, stony	2,620	4,580	7,200	1.6
Su	Suches loam, 0 to 2 percent slopes, occasionally flooded	2,345	1,500	3,845	0.8
ThB	Thurmont fine sandy loam, 2 to 6 percent slopes	520	1,290	1,810	0.4
ThC	Thurmont fine sandy loam, 6 to 12 percent slopes	4,930	5,100	10,030	2.2
ThE	Thurmont fine sandy loam, 12 to 25 percent slopes	2,990	670	3,660	0.8
Tt	Transylvania-Toxaway complex, occasionally flooded	90	700	790	0.2
UeE	Urban land-Evard-Clifton complex, 10 to 35 percent slopes	230	330	560	0.1
UtE	Urban land-Junaluska-Tsali complex, 6 to 35 percent slopes	745	0	745	0.2
	Water	3,445	4,180	7,625	1.7
	Cohutta Wilderness Area	30,692	0	30,692	6.7
	Total	249,800	211,200	461,000	100.0

* Less than 0.1 percent.

TABLE 5.--IMPORTANT FARMLAND

(Only the soils considered prime farmland or additional farmland of statewide importance are listed)

Map symbol	Soil name	Prime farmland	Additional farmland of statewide importance
		Acres	Acres
Aa	Arkaqua loam, frequently flooded	---	6,480
BrC	Bradson loam, 6 to 10 percent slopes	---	2,875
Ca	Chatuge loam, occasionally flooded	---	1,300
ClC	Clifton-Evard complex, 6 to 10 percent slopes	---	10,650
Cr	Colvard fine sandy loam, occasionally flooded	---	4,815
DaB	Dillard fine sandy loam, 2 to 6 percent slopes	2,690	---
HaC	Hayesville fine sandy loam, 6 to 10 percent slopes	---	3,300
Su	Suches loam, 0 to 2 percent slopes, occasionally flooded	3,845	---
ThB	Thurmont fine sandy loam, 2 to 6 percent slopes	1,810	---
ThC	Thurmont fine sandy loam, 6 to 12 percent slopes	---	10,030
Tt	Transylvania-Toxaway complex, occasionally flooded	---	790
	Total	8,345	40,240

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Corn silage	Grass-legume hay	Pasture
		Bu	Tons	Tons	AUM*
Aa------------------------ Arkaqua	IVw	115	20	4.0	7.5
BrC----------------------- Bradson	IIIe	100	---	5.8	9.0
BrE----------------------- Bradson	VIe	---	---	5.0	8.0
Ca------------------------ Chatuge	IVw	100	20	3.5	6.5
CeE----------------------- Chestnut	VIe	---	---	2.5	4.0
ChF, ChG------------------ Chestnut	VIIe	---	---	---	---
ClC:					
Clifton------------------	IIIe	95	20	4.0	6.5
Evard--------------------	IIIe	95	20	3.8	6.0
ClE:					
Clifton------------------	VIe	---	---	3.8	6.0
Evard--------------------	VIe	---	---	3.0	5.0
Cr------------------------ Colvard	IIw	125	30	5.0	8.0
CwH----------------------- Cowee	VIIe	---	---	---	---
CxE:					
Cowee--------------------	VIe	---	---	3.4	5.5
Evard--------------------	VIe	---	---	3.4	5.5
CxF:					
Cowee--------------------	VIIe	---	---	---	---
Evard--------------------	VIIe	---	---	---	---
CxG:					
Cowee--------------------	VIIe	---	---	---	---
Evard--------------------	VIIe	---	---	---	---
DaB----------------------- Dillard	IIw	100	20	7.0	12.0
Fr------------------------ French	IIIw	130	26	4.8	8.0
HaC----------------------- Hayesville	IIIe	90	20	3.4	6.5

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Grass-legume hay	Pasture
		Bu	Tons	Tons	AUM*
HaE------------------------ Hayesville	VIe	---	---	2.5	5.0
HaF------------------------ Hayesville	VIIe	---	---	---	---
JcE:					
Junaluska-----------------	VIe	---	---	3.4	5.5
Cataska-------------------	VIIs	---	---	---	---
JcF, JcG:					
Junaluska-----------------	VIIe	---	---	---	---
Cataska-------------------	VIIs	---	---	---	---
JtC:					
Junaluska-----------------	IVe	---	---	4.0	6.0
Tsali---------------------	VIe	---	---	2.5	4.0
JtE:					
Junaluska-----------------	VIe	---	---	3.4	5.5
Tsali---------------------	VIe	---	---	1.6	2.5
JtF, JtG:					
Junaluska-----------------	VIIe	---	---	---	---
Tsali---------------------	VIIe	---	---	---	---
Pa. Pits, quarries					
PsF------------------------ Porters	VIe	---	---	---	---
PsG------------------------ Porters	VIIe	---	---	---	---
PxH:					
Porters-------------------	VIIe	---	---	---	---
Rock outcrop.					
Ro. Rock outcrop					
SaE:					
Saunook-------------------	VIe	---	---	4.7	7.5
Evard---------------------	VIe	---	---	3.4	5.5
SnF:					
Saunook-------------------	VIIe	---	---	---	---
Evard---------------------	VIIe	---	---	---	---
SpG:					
Saunook-------------------	VIIe	---	---	---	---

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Grass-legume hay	Pasture
		Bu	Tons	Tons	AUM*
SpG:					
Porters	VIIe	---	---	---	---
Su Suches	IIw	135	22	5.0	8.0
ThB Thurmont	IIe	125	25	4.5	7.0
ThC Thurmont	IIIe	115	23	4.0	6.0
ThE Thurmont	IVe	100	20	4.0	6.0
Tt:					
Transylvania	IIw	125	24	5.0	8.5
Toxaway	IVw	---	---	---	7.5
UeE:					
Urban land.					
Evard	VIIe	---	---	---	---
Clifton	VIIe	---	---	---	---
UtE:					
Urban land.					
Junaluska	VIIe	---	---	---	---
Tsali	VIIe	---	---	---	---

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

(Miscellaneous areas are excluded. Dashes indicate no acreage)

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I:				
Fannin County	---	---	---	---
Union County	---	---	---	---
II:				
Fannin County	7,119	520	6,599	---
Union County	6,515	1,290	5,225	---
III:				
Fannin County	15,165	11,445	3,720	---
Union County	18,810	15,410	3,400	---
IV:				
Fannin County	6,115	3,194	2,921	---
Union County	5,848	673	5,175	---
V:				
Fannin County	---	---	---	---
Union County	---	---	---	---
VI:				
Fannin County	72,033	72,033	---	---
Union County	89,244	89,244	---	---
VII:				
Fannin County	114,679	113,257	---	1,422
Union County	85,520	85,376	---	144
VIII:				
Fannin County	---	---	---	---
Union County	---	---	---	---

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
Aa-----------------Arkaqua	12W	Slight	Moderate	Moderate	Eastern white pine---	90	12	Eastern white pine, yellow-poplar.
					Black walnut---------	100	---	
					Yellow-poplar--------	100	8	
					Shortleaf pine-------	75	8	
					Virginia pine--------	80	8	
BrC----------------Bradson	12A	Slight	Slight	Slight	Eastern white pine---	93	12	Loblolly pine, eastern white pine, northern red oak, yellow-poplar.
					Pitch pine-----------	77	---	
					Shortleaf pine-------	71	8	
					Virginia pine--------	76	8	
					Northern red oak-----	80	4	
					Yellow-poplar--------	95	7	
					Loblolly pine--------	90	9	
BrE----------------Bradson	12R	Moderate	Moderate	Slight	Eastern white pine---	93	12	Loblolly pine, eastern white pine, northern red oak, yellow-poplar.
					Pitch pine-----------	77	---	
					Shortleaf pine-------	71	8	
					Virginia pine--------	76	8	
					Northern red oak-----	80	4	
					Yellow-poplar--------	95	7	
					Loblolly pine--------	90	9	
Ca-----------------Chatuge	11W	Slight	Severe	Severe	Loblolly pine--------	100	11	Loblolly pine, yellow-poplar, eastern white pine, American sycamore.
					Sweetgum-------------	91	8	
					Yellow-poplar--------	95	7	
					Northern red oak-----	80	4	
CeE----------------Chestnut	4R	Moderate	Moderate	Slight	Northern red oak-----	76	4	Eastern white pine, yellow-poplar.
					Eastern white pine---	78	10	
					Yellow-poplar--------	97	7	
					Scarlet oak----------	68	4	
					White oak------------	70	4	
					Black oak------------	71	4	
					Chestnut oak---------	69	4	
					Shortleaf pine-------	---	---	
					Pitch pine-----------	---	---	
ChF, ChG-----------Chestnut	4R	Severe	Severe	Slight	Northern red oak-----	76	4	Eastern white pine, yellow-poplar.
					Eastern white pine---	78	10	
					Yellow-poplar--------	97	7	
					Scarlet oak----------	68	4	
					White oak------------	70	4	
					Black oak------------	71	4	
					Chestnut oak---------	69	4	
					Shortleaf pine-------	---	---	
					Pitch pine-----------	---	---	
ClC:								
Clifton-----------	7A	Slight	Slight	Slight	Yellow-poplar--------	93	7	Loblolly pine, yellow-poplar, eastern white pine, northern red oak, black walnut.
					Eastern white pine---	93	12	
					Northern red oak-----	---	---	
					Virginia pine--------	---	---	
					Pitch pine-----------	---	---	
					Shortleaf pine-------	---	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
ClC:								
Evard	8A	Slight	Slight	Slight	Shortleaf pine	70	8	Loblolly pine, eastern white pine, yellow-poplar.
					Pitch pine	70	---	
					Virginia pine	70	8	
					Eastern white pine	80	10	
					Yellow-poplar	90	6	
					White oak	75	4	
					Southern red oak	75	4	
					Northern red oak	---	---	
					Hickory	---	---	
ClE:								
Clifton	7R	Moderate	Moderate	Slight	Yellow-poplar	93	7	Loblolly pine, yellow-poplar, eastern white pine, northern red oak, black walnut.
					Eastern white pine	93	12	
					Northern red oak	---	---	
					Virginia pine	---	---	
					Pitch pine	---	---	
					Shortleaf pine	---	---	
Evard	8R	Moderate	Moderate	Slight	Shortleaf pine	70	8	Loblolly pine, eastern white pine, yellow-poplar.
					Pitch pine	70	---	
					Virginia pine	70	8	
					Eastern white pine	80	10	
					Yellow-poplar	90	6	
					White oak	75	4	
					Southern red oak	75	4	
					Northern red oak	---	---	
					Hickory	---	---	
Cr: Colvard	8A	Slight	Slight	Slight	Yellow-poplar	102	8	Eastern white pine, yellow-poplar.
					Eastern white pine	83	11	
					Virginia pine	75	8	
					Shortleaf pine	75	8	
					White oak	---	---	
					White ash	---	---	
					American sycamore	---	---	
					Northern red oak	---	---	
					Black oak	---	---	
					River birch	---	---	
CwH: Cowee	3R	Severe	Severe	Slight	Chestnut oak	55	3	Eastern white pine, loblolly pine, northern red oak, white oak.
					Virginia pine	63	7	
					Scarlet oak	54	3	
					Shortleaf pine	78	9	
					Eastern white pine	78	10	
					Yellow-poplar	80	5	
					Pitch pine	52	---	
					Northern red oak	---	---	
					Black oak	---	---	
					White oak	---	---	
					Hickory	---	---	
					Red maple	---	---	
					Blackgum	---	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
CxE:								
Cowee	3R	Moderate	Moderate	Slight	Chestnut oak	55	3	Eastern white pine, loblolly pine, northern red oak, white oak.
					Virginia pine	63	7	
					Scarlet oak	54	3	
					Shortleaf pine	78	9	
					Eastern white pine	78	10	
					Yellow-poplar	80	5	
					Pitch pine	52	---	
					Northern red oak	---	---	
					Black oak	---	---	
					White oak	---	---	
					Hickory	---	---	
					Red maple	---	---	
					Blackgum	---	---	
Evard	8R	Moderate	Moderate	Slight	Shortleaf pine	70	8	Loblolly pine, eastern white pine, yellow-poplar.
					Pitch pine	70	---	
					Virginia pine	70	8	
					Eastern white pine	80	10	
					Yellow-poplar	90	6	
					White oak	75	4	
					Southern red oak	75	4	
					Northern red oak	---	---	
					Hickory	---	---	
CxF, CxG:								
Cowee	3R	Severe	Severe	Slight	Chestnut oak	55	3	Eastern white pine, loblolly pine, northern red oak, white oak.
					Virginia pine	63	7	
					Scarlet oak	54	3	
					Shortleaf pine	78	9	
					Eastern white pine	78	10	
					Yellow-poplar	80	5	
					Pitch pine	52	---	
					Northern red oak	---	---	
					Black oak	---	---	
					White oak	---	---	
					Hickory	---	---	
					Red maple	---	---	
					Blackgum	---	---	
Evard	8R	Severe	Severe	Slight	Shortleaf pine	70	8	Loblolly pine, eastern white pine, yellow-poplar.
					Pitch pine	70	---	
					Virginia pine	70	8	
					Eastern white pine	80	10	
					Yellow-poplar	90	6	
					White oak	75	4	
					Southern red oak	75	4	
					Northern red oak	---	---	
					Hickory	---	---	
DaB: Dillard	12A	Slight	Slight	Slight	Eastern white pine	90	12	Eastern white pine, loblolly pine, black walnut, yellow-poplar.
					Shortleaf pine	75	8	
					Virginia pine	80	8	
					Loblolly pine	90	9	
					Yellow-poplar	95	7	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
Fr: French	9W	Slight	Moderate	Slight	Yellow-poplar	110	9	Yellow-poplar, eastern white pine, black walnut, white ash.
					Eastern white pine	110	13	
					Northern red oak	---	---	
					American sycamore	---	---	
					Shortleaf pine	---	---	
					Black walnut	---	---	
					Red maple	---	---	
HaC: Hayesville	7A	Slight	Slight	Slight	Yellow-poplar	93	7	Eastern white pine, loblolly pine, northern red oak.
					Eastern white pine	85	11	
					Northern red oak	---	---	
					Pitch pine	82	8	
					Shortleaf pine	70	8	
					Virginia pine	74	8	
HaE: Hayesville	7R	Moderate	Moderate	Slight	Yellow-poplar	93	7	Eastern white pine, loblolly pine, northern red oak.
					Eastern white pine	85	11	
					Northern red oak	---	---	
					Pitch pine	82	8	
					Shortleaf pine	70	8	
					Virginia pine	74	8	
HaF: Hayesville	7R	Severe	Severe	Slight	Yellow-poplar	93	7	Eastern white pine, loblolly pine, northern red oak.
					Eastern white pine	85	11	
					Northern red oak	---	---	
					Pitch pine	82	8	
					Shortleaf pine	70	8	
					Virginia pine	74	8	
JcE:								
Junaluska	3R	Moderate	Moderate	Moderate	Scarlet oak	65	3	Eastern white pine, loblolly pine, northern red oak, white oak.
					Chestnut oak	56	3	
					White oak	61	3	
					Shortleaf pine	68	7	
					Virginia pine	65	7	
					Eastern white pine	86	11	
					Pitch pine	66	7	
					Northern red oak	---	---	
					Black oak	---	---	
					Hickory	---	---	
					Red maple	---	---	
					Blackgum	---	---	
Cataska	2R	Slight	Moderate	Moderate	Chestnut oak	50	2	Eastern white pine, loblolly pine, northern red oak, white oak.
					Scarlet oak	50	2	
					Pitch pine	50	---	
JcF, JcG:								
Junaluska	3R	Severe	Severe	Moderate	Scarlet oak	65	3	Eastern white pine, loblolly pine, northern red oak, white oak.
					Chestnut oak	56	3	
					White oak	61	3	
					Shortleaf pine	68	7	
					Virginia pine	65	7	
					Eastern white pine	86	11	
					Pitch pine	66	7	
					Northern red oak	---	---	
					Black oak	---	---	
					Hickory	---	---	
					Red maple	---	---	
					Blackgum	---	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
JcF, JcG:								
Cataska	2R	Moderate	Severe	Moderate	Chestnut oak	50	2	Eastern white pine, loblolly pine, northern red oak, white oak.
					Scarlet oak	50	2	
					Pitch pine	50	---	
JtC:								
Junaluska	3D	Slight	Slight	Slight	Scarlet oak	65	3	Eastern white pine, loblolly pine, northern red oak, white oak.
					Chestnut oak	56	3	
					White oak	61	3	
					Shortleaf pine	68	7	
					Virginia pine	65	7	
					Eastern white pine	86	11	
					Pitch pine	66	7	
					Northern red oak	---	---	
					Black oak	---	---	
					Hickory	---	---	
					Red maple	---	---	
					Blackgum	---	---	
Tsali	6D	Slight	Severe	Moderate	Shortleaf pine	56	6	Eastern white pine, loblolly pine, northern red oak, white oak.
					Virginia pine	66	7	
					White oak	48	2	
					Scarlet oak	52	2	
					Southern red oak	58	3	
					Chestnut oak	---	---	
					Black oak	---	---	
					Hickory	---	---	
					Pitch pine	---	---	
JtE:								
Junaluska	3R	Moderate	Moderate	Moderate	Scarlet oak	65	3	Eastern white pine, loblolly pine, northern red oak, white oak.
					Chestnut oak	56	3	
					White oak	61	3	
					Shortleaf pine	68	7	
					Virginia pine	65	7	
					Eastern white pine	86	11	
					Pitch pine	66	7	
					Northern red oak	---	---	
					Black oak	---	---	
					Hickory	---	---	
					Red maple	---	---	
					Blackgum	---	---	
Tsali	6D	Moderate	Severe	Moderate	Shortleaf pine	56	6	Eastern white pine, loblolly pine, northern red oak, white oak.
					Virginia pine	66	7	
					White oak	48	2	
					Scarlet oak	52	2	
					Southern red oak	58	3	
					Chestnut oak	---	---	
					Black oak	---	---	
					Hickory	---	---	
					Pitch pine	---	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
JtF, JtG:								
Junaluska	3R	Severe	Severe	Moderate	Scarlet oak	65	3	Eastern white pine, loblolly pine, northern red oak, white oak.
					Chestnut oak	56	3	
					White oak	61	3	
					Shortleaf pine	68	7	
					Virginia pine	65	7	
					Eastern white pine	86	11	
					Pitch pine	66	7	
					Northern red oak	---	---	
					Black oak	---	---	
					Hickory	---	---	
					Red maple	---	---	
					Blackgum	---	---	
Tsali	6R	Severe	Severe	Moderate	Shortleaf pine	56	6	Eastern white pine, loblolly pine, northern red oak, white oak.
					Virginia pine	66	7	
					White oak	48	2	
					Scarlet oak	52	2	
					Southern red oak	58	3	
					Chestnut oak	---	---	
					Black oak	---	---	
					Hickory	---	---	
					Pitch pine	---	---	
PsF, PsG Porters	7R	Severe	Severe	Slight	Yellow-poplar	96	7	Eastern white pine, yellow-poplar, northern red oak.
					Virginia pine	80	8	
					Eastern white pine	89	11	
					Northern red oak	75	4	
					Shortleaf pine	70	8	
					Hickory	---	---	
					Red maple	---	---	
					Black locust	---	---	
PxH:								
Porters	7R	Severe	Severe	Slight	Yellow-poplar	96	7	Eastern white pine, yellow-poplar, northern red oak.
					Virginia pine	80	8	
					Eastern white pine	89	11	
					Northern red oak	75	4	
					Shortleaf pine	70	8	
					Hickory	---	---	
					Red maple	---	---	
					Black locust	---	---	
Rock outcrop.								
SaE:								
Saunook	8R	Moderate	Moderate	Slight	Yellow-poplar	107	8	Yellow-poplar, eastern white pine, northern red oak.
					Eastern white pine	---	---	
					Northern red oak	---	---	
					White oak	---	---	
					Scarlet oak	---	---	
					Eastern hemlock	---	---	
					Red maple	---	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
SaE:								
Evard	8R	Moderate	Moderate	Slight	Shortleaf pine	70	8	Loblolly pine, eastern white pine, yellow-poplar.
					Pitch pine	70	---	
					Virginia pine	70	8	
					Eastern white pine	80	10	
					Yellow-poplar	90	6	
					White oak	75	4	
					Southern red oak	75	4	
					Northern red oak	---	---	
					Hickory	---	---	
SnF:								
Saunook	8R	Severe	Severe	Slight	Yellow-poplar	107	8	Yellow-poplar, eastern white pine, northern red oak.
					Eastern white pine	---	---	
					Northern red oak	---	---	
					White oak	---	---	
					Scarlet oak	---	---	
					Eastern hemlock	---	---	
					Red maple	---	---	
Evard	8R	Severe	Severe	Slight	Shortleaf pine	70	8	Loblolly pine, eastern white pine, yellow-poplar.
					Pitch pine	70	---	
					Virginia pine	70	8	
					Eastern white pine	80	10	
					Yellow-poplar	90	6	
					White oak	75	4	
					Southern red oak	75	4	
					Northern red oak	---	---	
					Hickory	---	---	
SpG:								
Saunook	8R	Severe	Severe	Slight	Yellow-poplar	107	8	Yellow-poplar, eastern white pine, northern red oak.
					Eastern white pine	---	---	
					Northern red oak	---	---	
					White oak	---	---	
					Scarlet oak	---	---	
					Eastern hemlock	---	---	
					Red maple	---	---	
Porters	7R	Severe	Severe	Slight	Yellow-poplar	96	7	Eastern white pine, yellow-poplar, northern red oak.
					Virginia pine	80	8	
					Eastern white pine	89	11	
					Northern red oak	75	4	
					Shortleaf pine	70	8	
					Hickory	---	---	
					Red maple	---	---	
					Black locust	---	---	
Su: Suches	9A	Slight	Slight	Slight	Loblolly pine	90	9	Loblolly pine, eastern white pine, northern red oak, black walnut, yellow-poplar.
					Shortleaf pine	80	9	
					Eastern white pine	100	13	
					Northern red oak	90	4	
					Black walnut	100	---	
					Yellow-poplar	105	8	
ThB, ThC: Thurmont	4A	Slight	Slight	Slight	Northern red oak	76	4	Eastern white pine, yellow-poplar.
					Yellow-poplar	88	6	
					Eastern white pine	88	11	
					Shortleaf pine	77	9	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
ThE: Thurmont	4R	Moderate	Moderate	Slight	Northern red oak	76	4	Eastern white pine, yellow-poplar.
					Yellow-poplar	88	6	
					Eastern white pine	88	11	
					Shortleaf pine	77	9	
Tt:								
Transylvania	12A	Slight	Slight	Slight	Eastern white pine	90	12	Eastern white pine, black walnut, northern red oak, yellow-poplar, American sycamore, white ash.
					Black walnut	---	---	
					Northern red oak	80	4	
					Yellow-poplar	100	8	
					American sycamore	---	---	
Toxaway	6W	Slight	Severe	Severe	Yellow-poplar	85	6	Yellow-poplar, eastern white pine, northern red oak, American sycamore.
					Eastern white pine	94	12	
					Virginia pine	---	---	
					Northern red oak	---	---	
					Shortleaf pine	---	---	
					American sycamore	---	---	
					Red maple	---	---	
					Yellow birch	---	---	

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Aa: Arkaqua	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.
BrC: Bradson	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
BrE: Bradson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Ca: Chatuge	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
CeE: Chestnut	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
ChF, ChG: Chestnut	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ClC:				
Clifton	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Evard	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
ClE:				
Clifton	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Cr: Colvard	Severe: flooding.	Slight	Moderate: slope, small stones, flooding.	Slight.
CwH: Cowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CxE:				
Cowee	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
CxF, CxG:				
Cowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
DaB: Dillard	Moderate: wetness.	Slight	Moderate: slope, wetness, percs slowly.	Slight.
Fr: French	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.
HaC: Hayesville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
HaE: Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
HaF: Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
JcE:				
Junaluska	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
Cataska	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
JcF, JcG:				
Junaluska	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Cataska	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
JtC:				
Junaluska	Moderate: slope.	Moderate: slope.	Severe: slope, small stones.	Slight.
Tsali	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight.
JtE:				
Junaluska	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
Tsali	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.
JtF, JtG:				
Junaluska	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
JtF, JtG:				
Tsali	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.
Pa. Pits, quarries				
PsF, PsG Porters	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PxH:				
Porters	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.				
Ro. Rock outcrop				
SaE:				
Saunook	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
SnF:				
Saunook	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
SpG:				
Saunook	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Porters	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Su Suches	Severe: flooding.	Slight	Moderate: flooding.	Slight.
ThB Thurmont	Slight	Slight	Moderate: slope, small stones.	Slight.
ThC Thurmont	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
ThE Thurmont	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Tt:				
Transylvania	Severe: flooding.	Slight	Moderate: flooding.	Slight.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Tt:				
Toxaway	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
UeE:				
Urban land.				
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Clifton	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
UtE:				
Urban land.				
Junaluska	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
Tsali	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.

TABLE 10.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Aa-----Arkaqua	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
BrC-----Bradson	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BrE-----Bradson	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ca-----Chatuge	Poor	Fair	Fair	Good	Good	Good	Fair	Fair	Good	Fair.
CeE-----Chestnut	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
ChF, ChG-----Chestnut	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
ClC:										
Clifton-----	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Evard-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ClE:										
Clifton-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Evard-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Cr-----Colvard	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Poor.
CwH-----Cowee	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
CxE:										
Cowee-----	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Evard-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CxF, CxG:										
Cowee-----	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Evard-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
DaB-----Dillard	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Fr: French	Poor	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
HaC: Hayesville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HaE: Hayesville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
HaF: Hayesville	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
JcE:										
Junaluska	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Cataska	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
JcF, JcG:										
Junaluska	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Cataska	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
JtC:										
Junaluska	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Tsali	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.
JtE:										
Junaluska	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Tsali	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.
JtF, JtG:										
Junaluska	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Tsali	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.
Pa. Pits, quarries										
PsF, PsG: Porters	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
PxH:										
Porters	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop.										

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Ro. Rock outcrop										
SaE:										
Saunook	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
Evard	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
SnF:										
Saunook	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Evard	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
SpG:										
Saunook	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Porters	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Su Suches	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
ThB Thurmont	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ThC Thurmont	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ThE Thurmont	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Tt:										
Transylvania	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Toxaway	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
UeE:										
Urban land.										
Evard	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Clifton	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
UtE:										
Urban land.										
Junaluska	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Tsali	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.

TABLE 11.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Aa---------------- Arkaqua	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding.	Severe: flooding.
BrC--------------- Bradson	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
BrE--------------- Bradson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Ca---------------- Chatuge	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.
CeE, ChF, ChG----- Chestnut	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ClC:						
Clifton----------	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
Evard------------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
ClE:						
Clifton----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Evard------------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cr---------------- Colvard	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.
CwH--------------- Cowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CxE, CxF, CxG:						
Cowee------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Evard------------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
DaB--------------- Dillard	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: low strength, wetness.	Slight.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Fr-----------------French	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.
HaC---------------Hayesville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
HaE, HaF----------Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
JcE, JcF, JcG:						
Junaluska---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cataska----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
JtC:						
Junaluska---------	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: small stones, slope, depth to rock.
Tsali------------	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, low strength, slope.	Severe: depth to rock.
JtE, JtF, JtG:						
Junaluska---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Tsali------------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
Pa. Pits, quarries						
PsF, PsG----------Porters	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PxH:						
Porters----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.						
Ro. Rock outcrop						
SaE, SnF:						
Saunook----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Evard------------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
SpG:						
Saunook	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Porters	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Su Suches	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
ThB Thurmont	Moderate: wetness.	Slight	Moderate: wetness.	Moderate: slope.	Moderate: frost action.	Slight.
ThC Thurmont	Moderate: wetness, slope.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
ThE Thurmont	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Tt:						
Transylvania	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
Toxaway	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
UeE:						
Urban land.						
Evard	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Clifton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
UtE:						
Urban land.						
Junaluska	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Tsali	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "moderate," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Aa------------------ Arkaqua	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
BrC----------------- Bradson	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
BrE----------------- Bradson	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Ca------------------ Chatuge	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: wetness.
CeE, ChF, ChG------- Chestnut	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
ClC:					
Clifton------------	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Evard--------------	Moderate: slope.	Severe: slope.	Moderate: slope, too sandy.	Moderate: slope.	Fair: too sandy, small stones, slope.
ClE:					
Clifton------------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Evard--------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Cr------------------ Colvard	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Good.
CwH----------------- Cowee	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
CxE, CxF, CxG:					
Cowee--------------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CxE, CxF, CxG:					
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
DaB: Dillard	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Fair: too clayey.
Fr: French	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
HaC: Hayesville	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
HaE, HaF: Hayesville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
JcE, JcF, JcG:					
Junaluska	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Cataska	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
JtC:					
Junaluska	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
Tsali	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
JtE, JtF, JtG:					
Junaluska	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Tsali	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Pa. Pits, quarries					
PsF, PsG: Porters	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
PxH:					
Porters	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
Rock outcrop.					
Ro. Rock outcrop					
SaE, SnF:					
Saunook	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
SpG:					
Saunook	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Porters	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
Su Suches	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness, thin layer.
ThB Thurmont	Moderate: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: small stones.
ThC Thurmont	Moderate: wetness, percs slowly, slope.	Severe: slope.	Severe: wetness.	Moderate: slope, wetness.	Fair: small stones, slope.
ThE Thurmont	Severe: slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Poor: slope.
Tt:					
Transylvania	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack.
Toxaway	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: hard to pack, wetness.
UeE: Urban land.					

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
UeE:					
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Clifton	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
UtE:					
Urban land.					
Junaluska	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Tsali	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.

TABLE 13.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Aa: Arkaqua	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
BrC: Bradson	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
BrE: Bradson	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Ca: Chatuge	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, area reclaim.
CeE: Chestnut	Poor: depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: small stones, slope.
ChF, ChG: Chestnut	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: small stones, slope.
ClC:				
Clifton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Evard	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
ClE:				
Clifton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Evard	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Cr: Colvard	Good	Probable	Probable	Poor: area reclaim.
CwH: Cowee	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
CxE:				
Cowee	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Evard	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CxF, CxG:				
Cowee	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Evard	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
DaB Dillard	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Fr French	Fair: wetness.	Probable	Probable	Poor: small stones, area reclaim.
HaC Hayesville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
HaE Hayesville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
HaF Hayesville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
JcE:				
Junaluska	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Cataska	Poor: depth to rock.	Improbable: small stones, thin layer.	Improbable: thin layer.	Poor: small stones, slope.
JcF, JcG:				
Junaluska	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Cataska	Poor: depth to rock, slope.	Improbable: small stones, thin layer.	Improbable: thin layer.	Poor: small stones, slope.
JtC:				
Junaluska	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Tsali	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
JtE:				
Junaluska	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Tsali	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
JtF, JtG:				
Junaluska	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Tsali	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Pa. Pits, quarries				
PsF, PsG Porters	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
PxH:				
Porters	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop.				
Ro. Rock outcrop				
SaE:				
Saunook	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Evard	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
SnF:				
Saunook	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Evard	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
SpG:				
Saunook	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Porters	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Su Suches	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
ThB: Thurmont	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
ThC: Thurmont	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
ThE: Thurmont	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Tt:				
Transylvania	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Toxaway	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
UeE: Urban land.				
Evard	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Clifton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
UtE: Urban land.				
Junaluska	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Tsali	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.

TABLE 14.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Aa: Arkaqua	Moderate: seepage.	Severe: wetness.	Flooding	Wetness, flooding.	Wetness	Favorable.
BrC, BrE: Bradson	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
Ca: Chatuge	Severe: seepage.	Severe: wetness.	Flooding	Wetness, flooding.	Wetness	Wetness.
CeE, ChF, ChG: Chestnut	Severe: seepage, slope.	Severe: piping, thin layer.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
ClC, ClE:						
Clifton	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
Evard	Severe: slope.	Severe: seepage, piping.	Deep to water	Slope, soil blowing.	Slope, too sandy, soil blowing.	Slope.
Cr: Colvard	Severe: seepage.	Severe: piping.	Deep to water	Droughty, soil blowing, flooding.	Soil blowing	Droughty.
CwH: Cowee	Severe: slope.	Severe: thin layer, piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
CxE, CxF, CxG:						
Cowee	Severe: slope.	Severe: thin layer, piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Evard	Severe: slope.	Severe: seepage, piping.	Deep to water	Slope, soil blowing.	Slope, too sandy, soil blowing.	Slope.
DaB: Dillard	Slight	Moderate: thin layer.	Slope	Slope, wetness.	Wetness	Favorable.
Fr: French	Severe: seepage.	Severe: seepage, wetness.	Flooding, large stones.	Wetness, flooding.	Large stones, wetness, too sandy.	Large stones, wetness, droughty.
HaC, HaE, HaF: Hayesville	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
JcE, JcF, JcG:						
Junaluska	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
JcE, JcF, JcG:						
Cataska	Severe: depth to rock, slope.	Severe: seepage, thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
JtC, JtE, JtF, JtG:						
Junaluska	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Tsali	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Pa. Pits, quarries						
PsF, PsG Porters	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
PxH:						
Porters	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Rock outcrop.						
Ro. Rock outcrop						
SaE, SnF:						
Saunook	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Evard	Severe: slope.	Severe: seepage, piping.	Deep to water	Slope, soil blowing.	Slope, too sandy, soil blowing.	Slope.
SpG:						
Saunook	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Porters	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Su Suches	Moderate: seepage.	Moderate: piping.	Flooding	Wetness, flooding.	Wetness, soil blowing.	Favorable.
ThB Thurmont	Moderate: seepage, slope.	Moderate: thin layer, piping.	Deep to water	Slope	Favorable	Favorable.
ThC, ThE Thurmont	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Slope	Slope	Slope.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Tt:						
Transylvania	Moderate: seepage.	Severe: piping, hard to pack.	Flooding	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Erodes easily.
Toxaway	Severe: seepage.	Severe: piping, hard to pack, wetness.	Flooding, frost action.	Wetness, flooding.	Wetness	Wetness.
UeE: Urban land.						
Evard	Severe: slope.	Severe: seepage, piping.	Deep to water	Slope, soil blowing.	Slope, too sandy, soil blowing.	Slope.
Clifton	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
UtE: Urban land.						
Junaluska	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Tsali	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.

TABLE 15.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Aa-------------- Arkaqua	0-9	Loam-------------	SM	A-2, A-4	0	98-100	95-100	60-90	30-50	<35	NP-7
	9-30	Clay loam, silt loam, fine sandy loam.	ML, MH	A-4, A-5, A-6, A-7	0	96-100	95-100	80-100	51-90	35-55	4-20
	30-46	Silt loam, sandy clay loam, loam.	ML, SM, CL-ML	A-4	0	96-100	95-100	60-100	36-70	<35	NP-7
	46-72	Variable---------	---	---	---	---	---	---	---	---	---
BrC, BrE--------- Bradson	0-8	Loam-------------	SC, SM, ML	A-4, A-6	0-15	80-100	75-96	60-85	40-65	<40	NP-15
	8-52	Clay loam, sandy clay, clay.	ML, MH	A-7	0-15	85-100	85-100	80-99	60-85	41-65	11-25
	52-66	Loam, sandy clay loam, sandy loam.	ML, CL-ML, CL	A-4	0-15	85-100	80-100	80-98	60-85	<25	NP-10
Ca--------------- Chatuge	0-9	Loam-------------	ML, SM, SC, CL	A-4	0	100	95-100	70-95	40-70	<30	NP-10
	9-45	Loam, clay loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0	100	97-100	75-96	43-75	15-40	4-20
	45-60	Gravelly loamy sand, fine sandy loam, sandy clay loam.	SM	A-1	0-15	75-100	60-90	50-80	40-70	<30	NP-10
CeE, ChF, ChG---- Chestnut	0-6	Loam-------------	SM, SC-SM, ML, CL-ML	A-4, A-2, A-5	0-5	85-100	80-95	60-95	30-55	<50	NP-9
	6-33	Gravelly loam, gravelly sandy loam, sandy loam.	SM, SC-SM	A-4, A-2, A-5	0-25	75-98	65-97	60-85	34-49	<45	NP-10
	33-50	Weathered bedrock	---	---	---	---	---	---	---	---	---
ClC, ClE: Clifton---------	0-4	Fine sandy loam	ML, CL, CL-ML	A-4	0-5	95-100	80-100	75-95	60-75	15-40	NP-10
	4-8	Loam, clay loam, sandy clay loam.	CL	A-6, A-7	0-5	95-100	85-100	65-85	60-80	30-45	12-20
	8-27	Clay, clay loam	ML, MH	A-7	0-5	95-100	85-100	75-100	60-85	41-65	12-30
	27-60	Fine sandy loam, loam.	SM, ML, CL, SC	A-4, A-6, A-5	0-15	90-100	85-100	70-100	45-65	15-55	NP-18
Evard-----------	0-6	Fine sandy loam	SM, ML	A-2, A-4	0-5	80-100	75-100	65-90	20-60	<35	NP-9
	6-20	Sandy clay loam, clay loam, loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7-6	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	20-40	Sandy loam, loam, sandy clay loam.	SM, SC, ML, CL	A-2, A-4	0-5	80-100	75-100	60-95	20-55	<25	NP-9
	40-60	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0-15	75-100	70-100	60-90	15-50	---	NP
Cr--------------- Colvard	0-12	Fine sandy loam	SM, SC, SC-SM	A-2, A-4	0-5	98-100	85-100	60-85	25-49	<30	NP-10
	12-60	Fine sandy loam, sandy loam, loam.	SM, SC, SC-SM	A-2, A-4	0-5	98-100	85-100	60-85	25-49	<30	NP-10
	60-70	Loamy sand, sand, sandy loam.	SM, SP-SM	A-2, A-1, A-4	0-20	70-100	60-100	50-85	25-35	<30	NP-10

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
CwH: Cowee	0-7	Fine sandy loam	SM, SC-SM, ML	A-2-4, A-4, A-5, A-2	0-5	90-100	85-100	60-85	30-55	26-41	NP-12
	7-26	Sandy clay loam, gravelly sandy clay loam, clay loam.	SC, CL, ML, SM	A-4, A-6, A-7, A-2	0-10	47-99	45-90	32-85	17-60	26-56	5-22
	26-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
CxE, CxF, CxG: Cowee	0-7	Fine sandy loam	SM, SC-SM, ML	A-2-4, A-4, A-5, A-2	0-5	90-100	85-100	60-85	30-55	26-41	NP-12
	7-26	Sandy clay loam, gravelly sandy clay loam, clay loam.	SC, CL, ML, SM	A-4, A-6, A-7, A-2	0-15	47-99	45-90	32-85	17-60	26-56	5-22
	26-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Evard	0-6	Fine sandy loam	SM, ML	A-2, A-4	0-5	80-100	75-100	65-90	20-60	<35	NP-9
	6-20	Sandy clay loam, clay loam, loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7-6	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	20-40	Sandy loam, loam, sandy clay loam.	SM, SC, ML, CL	A-2, A-4	0-5	80-100	75-100	60-95	20-55	<25	NP-9
	40-60	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0-15	75-100	70-100	60-90	15-50	---	NP
DaB: Dillard	0-8	Fine sandy loam	SM, SC, CL, ML	A-2, A-4	0-2	95-100	95-100	60-90	30-55	<35	NP-10
	8-37	Clay loam, sandy clay loam.	CL, ML, SC	A-4, A-6, A-7	0-2	95-100	85-100	60-95	45-70	30-45	7-22
	37-60	Variable	---	---	---	---	---	---	---	---	---
Fr: French	0-9	Fine sandy loam	SM, SC-SM	A-2, A-4	0-15	90-100	85-100	60-90	30-49	<25	NP-7
	9-33	Sandy loam, sandy clay loam, loam.	SC-SM, SC, CL	A-4, A-6, A-7	0-15	90-100	85-100	60-95	36-80	20-45	7-25
	33-60	Very gravelly loamy sand, extremely gravelly sand, very cobbly sand.	GP-GM, GM, SM, SP-SM	A-1	10-50	45-75	10-55	10-40	5-15	---	NP
HaC, HaE, HaF: Hayesville	0-8	Fine sandy loam	SM, SC, ML, CL	A-4	0-5	90-100	85-95	70-95	35-60	25-35	NP-10
	8-32	Clay loam, clay	ML, MH, CL, CH	A-6, A-7	0-5	90-100	85-100	70-100	55-80	36-66	11-35
	32-58	Sandy clay loam, clay loam, loam.	SM, ML, MH, CL	A-6, A-7	0-5	90-100	90-100	85-95	45-65	36-55	11-25
	58-72	Fine sandy loam, loam, sandy clay loam.	SM, ML, CL, SC	A-4, A-6	5-15	90-100	90-95	65-90	40-55	25-40	NP-12

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
JcE, JcF, JcG:											
Junaluska	0-2	Channery loam	SM, ML, MH, GM	A-4, A-5, A-2-4, A-7	5-15	70-96	55-91	40-80	30-55	29-56	NP-14
	2-15	Channery loam, channery clay loam, clay loam.	CL, ML, SC, SM	A-6, A-7	5-15	75-100	60-100	55-95	40-73	29-50	10-20
	15-28	Channery loam, channery clay loam, fine sandy loam.	SM, ML, GM	A-4	5-15	70-100	55-100	40-91	35-55	25-40	3-10
	28-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Cataska	0-4	Channery silt loam.	CL-ML, ML, GM, GM-GC	A-4	3-15	55-80	50-75	45-70	40-60	<30	NP-6
	4-16	Slaty silt loam, channery silt loam, very channery silt loam.	GM-GC, GM, GP-GM	A-2, A-1	10-25	15-50	10-45	10-40	10-35	<30	NP-7
	16-40	Weathered bedrock	---	---	---	---	---	---	---	---	---
JtC, JtE, JtF, JtG:											
Junaluska	0-2	Channery loam	SM, ML, MH, GM	A-4, A-5, A-2-4, A-7	5-15	70-96	55-91	40-80	30-55	29-56	NP-14
	2-15	Channery loam, channery clay loam, sandy clay loam.	CL, ML, SC, SM	A-6, A-7	5-15	75-100	60-100	55-95	40-73	29-50	10-20
	15-28	Channery loam, channery fine sandy loam, fine sandy loam.	SM, ML, GM	A-4	5-15	70-100	55-100	40-91	35-55	25-40	3-10
	28-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Tsali	0-2	Channery loam	SM, ML	A-4, A-5	5-15	70-95	55-90	40-80	35-55	30-50	NP-10
	2-16	Channery sandy clay loam, channery loam, channery clay loam.	CL, ML, SC, SM	A-6, A-7	5-15	75-95	60-90	55-80	40-70	30-50	11-20
	16-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Pa. Pits, quarries											
PsF, PsG Porters	0-9	Loam	ML, CL, CL-ML	A-4	0-5	85-100	80-100	70-80	51-65	<35	NP-10
	9-52	Loam, sandy loam, fine sandy loam.	SM, SC-SM, ML, CL-ML	A-2, A-4	5-25	75-99	60-99	50-90	30-70	<25	NP-7
	52	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
PxH:											
Porters	0-9	Loam	ML, CL, CL-ML	A-4	0-5	85-100	80-100	70-80	51-65	<35	NP-10
	9-52	Loam, sandy loam, fine sandy loam.	SM, SC-SM, ML, CL-ML	A-2, A-4	5-25	75-99	60-99	50-90	30-70	<25	NP-7
	52	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
PxH:											
Rock outcrop.											
Ro.											
Rock outcrop											
SaE, SnF:											
Saunook---------	0-9	Loam-------------	SM, ML, MH	A-2, A-4, A-5, A-7-5	0-5	90-100	85-100	60-90	25-65	30-59	NP-14
	9-22	Loam, clay loam, sandy clay loam.	SC, CL, ML, SM	A-4, A-6, A-7-5, A-7-6	0-5	90-100	85-100	75-95	35-75	25-55	7-20
	22-55	Cobbly sandy clay loam, gravelly loam, clay loam.	SC, CL, ML, GM	A-4, A-6, A-2-4, A-2-6	5-25	55-99	55-97	45-83	30-55	25-45	7-17
	55-60	Very cobbly sandy loam, cobbly fine sandy loam, sandy clay loam.	SM, GM	A-4, A-1-b, A-2-4	15-35	55-80	55-80	30-75	20-50	25-40	NP-10
Evard-----------	0-6	Fine sandy loam	SM, ML	A-2, A-4	0-5	80-100	75-100	65-90	20-60	<35	NP-9
	6-20	Sandy clay loam, clay loam, loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7-6	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	20-40	Sandy loam, loam, sandy clay loam.	SM, SC, ML, CL	A-2, A-4	0-5	80-100	75-100	60-95	20-55	<25	NP-9
	40-60	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0-15	75-100	70-100	60-90	15-50	---	NP
SpG:											
Saunook---------	0-9	Loam-------------	SM, ML, MH	A-2, A-4, A-5, A-7-5	0-5	90-100	85-100	60-90	25-65	30-59	NP-14
	9-22	Loam, clay loam, sandy clay loam.	SC, CL, ML, SM	A-4, A-6, A-7-5, A-7-6	0-5	90-100	85-100	75-95	35-75	25-55	7-20
	22-55	Cobbly sandy clay loam, gravelly loam, clay loam.	SC, CL, ML, GM	A-4, A-6, A-2-4, A-2-6	5-25	55-99	55-97	45-83	30-55	25-45	7-17
	55-60	Very cobbly sandy loam, cobbly fine sandy loam, sandy clay loam.	SM, GM	A-4, A-1-b, A-2-4	15-35	55-80	55-80	30-75	20-50	25-40	NP-10
Porters---------	0-9	Loam-------------	ML, CL, CL-ML	A-4	0-5	85-100	80-100	70-80	51-65	<35	NP-10
	9-52	Loam, sandy loam, fine sandy loam.	SM, SC-SM, ML, CL-ML	A-2, A-4	5-25	75-99	60-99	50-90	30-70	<25	NP-7
	52	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Su--------------- Suches	0-10	Loam-------------	SM, CL-ML	A-4	0	95-100	95-100	70-100	40-70	<30	NP-7
	10-36	Loam, sandy clay loam, clay loam.	CL-ML, CL	A-4, A-6, A-7	0	95-100	95-100	70-100	55-85	25-50	4-22
	36-44	Fine sandy loam, loam, sandy clay loam.	SM, CL-ML, SC, CL	A-4, A-6, A-7	0	95-100	95-100	70-100	40-70	25-50	4-22
	44-60	Variable---------	---	---	---	---	---	---	---	---	---
ThB, ThC, ThE---- Thurmont	0-6	Fine sandy loam	SM, ML, CL, SC-SM	A-2, A-4	0-3	80-100	75-100	55-70	25-65	<30	NP-10
	6-29	Sandy clay loam, loam, gravelly sandy clay loam, gravelly clay loam.	SC, CL	A-2, A-6, A-7	0-5	80-100	70-90	65-80	30-60	30-45	12-20
	29-42	Sandy loam, sandy clay loam, gravelly sandy clay loam.	SC	A-2, A-6, A-7	0-5	75-90	70-90	45-75	30-45	30-45	12-25
	42-60	Cobbly sandy loam, gravelly sandy clay loam, sandy loam.	SM, SC-SM	A-1, A-2	0-30	70-85	50-75	30-50	15-35	<20	NP-7
Tt: Transylvania----	0-24	Loam-------------	ML, MH	A-4, A-6, A-7-5, A-7-6	0	100	90-100	80-100	60-95	30-55	7-20
	24-40	Silty clay loam, clay loam, loam.	ML, MH	A-4, A-6, A-7	0	100	90-100	85-100	60-95	30-55	7-20
	40-60	Variable---------	---	---	---	---	---	---	---	---	---
Toxaway---------	0-28	Loam-------------	CL, ML, CL-ML, MH	A-4, A-6, A-7	0	98-100	95-100	85-100	51-90	25-55	6-22
	28-60	Stratified sandy clay loam to sand.	CL, ML, SM, SC	A-2, A-4, A-6	5-15	95-100	85-100	60-95	25-90	20-40	NP-15
UeE: Urban land.											
Evard-----------	0-6	Fine sandy loam	SM, ML	A-2, A-4	0-5	80-100	75-100	65-90	20-60	<35	NP-9
	6-20	Sandy clay loam, clay loam, loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7-6	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	20-40	Sandy loam, loam, sandy clay loam.	SM, SC, ML, CL	A-2, A-4	0-5	80-100	75-100	60-95	20-55	<25	NP-9
	40-60	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0-15	75-100	70-100	60-90	15-50	---	NP
Clifton---------	0-4	Fine sandy loam	ML, CL, CL-ML	A-4	0-5	95-100	80-100	75-95	60-75	15-40	NP-10
	4-8	Loam, clay loam, sandy clay loam.	CL	A-6, A-7	0-5	95-100	85-100	65-85	60-80	30-45	12-20
	8-27	Clay, clay loam	ML, MH	A-7	0-5	95-100	85-100	75-100	60-85	41-65	12-30
	27-60	Fine sandy loam, loam.	SM, ML, CL, SC	A-4, A-6, A-5	0-15	90-100	85-100	70-100	45-65	15-55	NP-18
UtE: Urban land.											

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
UtE:											
Junaluska-------	0-2	Channery loam----	SM, ML, MH, GM	A-4, A-5, A-2-4, A-7	5-15	70-96	55-91	40-80	30-55	29-56	NP-14
	2-15	Channery loam, channery clay loam, sandy clay loam.	CL, ML, SC, SM	A-6, A-7	5-15	75-100	60-100	55-95	40-73	29-50	10-20
	15-28	Channery loam, channery fine sandy loam, fine sandy loam.	SM, ML, GM	A-4	5-15	70-100	55-100	40-91	35-55	25-40	3-10
	28-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Tsali-----------	0-2	Channery loam----	SM, ML	A-4, A-5	5-15	70-95	55-90	40-80	35-55	30-50	NP-10
	2-16	Channery sandy clay loam, channery loam, channery clay loam.	CL, ML, SC, SM	A-6, A-7	5-15	75-95	60-90	55-80	40-70	30-50	11-20
	16-60	Weathered bedrock	---	---	---	---	---	---	---	---	---

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
Aa--------------- Arkaqua	0-9	10-20	1.20-1.50	0.6-2.0	0.12-0.20	4.5-6.5	Low-----------	0.24	4	2-4
	9-30	15-34	1.20-1.55	0.6-2.0	0.12-0.20	4.5-6.5	Low-----------	0.28		
	30-46	10-30	1.30-1.60	0.6-2.0	0.12-0.20	4.5-6.0	Low-----------	0.28		
	46-72	---	---	---	---	---	-------------	----		
BrC, BrE--------- Bradson	0-8	7-20	1.15-1.30	0.6-2.0	0.12-0.18	4.5-6.0	Low-----------	0.24	5	1-4
	8-52	35-60	1.25-1.40	0.6-2.0	0.12-0.18	4.5-6.0	Low-----------	0.24		
	52-66	7-27	---	0.6-2.0	0.12-0.18	4.5-6.0	Low-----------	0.32		
Ca--------------- Chatuge	0-9	10-25	1.40-1.70	0.6-2.0	0.12-0.20	4.5-6.0	Low-----------	0.32	5	1-2
	9-45	20-35	1.40-1.65	0.6-2.0	0.15-0.20	4.5-6.0	Low-----------	0.32		
	45-60	2-10	1.55-1.75	6.0-20	0.03-0.08	4.5-6.0	Low-----------	0.28		
CeE, ChF, ChG---- Chestnut	0-6	5-20	1.35-1.60	2.0-6.0	0.10-0.15	4.5-5.5	Low-----------	0.24	2	1-4
	6-33	5-25	1.35-1.60	2.0-6.0	0.08-0.12	4.5-5.5	Low-----------	0.15		
	33-50	---	---	---	---	---	-------------	----		
ClC, ClE: Clifton----------	0-4	10-27	1.35-1.60	2.0-6.0	0.12-0.15	4.5-6.5	Low-----------	0.17	4	1-3
	4-8	20-35	1.20-1.60	0.6-2.0	0.15-0.20	4.5-6.5	Low-----------	0.17		
	8-27	35-55	1.20-1.60	0.6-2.0	0.15-0.20	4.5-6.5	Low-----------	0.17		
	27-60	5-27	1.20-1.35	2.0-6.0	0.11-0.15	4.5-6.5	Low-----------	0.17		
Evard-----------	0-6	5-20	1.30-1.60	2.0-6.0	0.10-0.14	4.5-6.0	Low-----------	0.24	5	1-4
	6-20	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-6.0	Low-----------	0.24		
	20-40	12-30	1.20-1.40	0.6-2.0	0.10-0.25	4.5-6.0	Low-----------	0.24		
	40-60	5-20	1.20-1.40	0.6-2.0	0.08-0.12	4.5-6.0	Low-----------	0.24		
Cr--------------- Colvard	0-12	8-18	1.45-1.65	2.0-6.0	0.09-0.12	5.1-6.0	Low-----------	0.15	5	1-2
	12-60	8-18	1.45-1.65	2.0-6.0	0.09-0.12	5.1-6.0	Low-----------	0.10		
	60-70	1-12	1.60-1.75	6.0-20	0.06-0.10	5.1-6.0	Low-----------	0.10		
CwH-------------- Cowee	0-7	8-20	1.25-1.60	2.0-6.0	0.12-0.20	3.6-6.0	Low-----------	0.28	2	1-4
	7-26	18-35	1.30-1.60	0.6-2.0	0.12-0.18	3.6-6.0	Low-----------	0.24		
	26-60	---	---	---	---	---	-------------	----		
CxE, CxF, CxG: Cowee-----------	0-7	8-20	1.25-1.60	2.0-6.0	0.12-0.20	3.6-6.0	Low-----------	0.28	2	1-4
	7-26	18-35	1.30-1.60	0.6-2.0	0.12-0.18	3.6-6.0	Low-----------	0.24		
	26-60	---	---	---	---	---	-------------	----		
Evard-----------	0-6	5-20	1.30-1.60	2.0-6.0	0.10-0.14	4.5-6.0	Low-----------	0.24	5	1-4
	6-20	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-6.0	Low-----------	0.24		
	20-40	12-30	1.20-1.40	0.6-2.0	0.10-0.25	4.5-6.0	Low-----------	0.24		
	40-60	5-20	1.20-1.40	0.6-2.0	0.08-0.12	4.5-6.0	Low-----------	0.24		
DaB-------------- Dillard	0-8	10-20	1.20-1.50	0.6-2.0	0.12-0.15	5.1-6.0	Low-----------	0.24	4	1-4
	8-37	18-35	1.40-1.60	0.6-2.0	0.12-0.16	4.5-5.5	Low-----------	0.28		
	37-60	---	---	---	---	---	-------------	----		
Fr--------------- French	0-9	5-20	1.50-1.70	0.6-2.0	0.10-0.15	5.1-6.5	Low-----------	0.24	3	1-4
	9-33	8-35	1.30-1.50	0.6-2.0	0.12-0.20	5.1-6.5	Low-----------	0.32		
	33-60	1-5	1.40-1.60	>6.0	0.02-0.05	5.1-6.5	Low-----------	0.05		

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
HaC, HaE, HaF---- Hayesville	0-8	10-25	1.35-1.60	2.0-6.0	0.12-0.20	3.6-6.5	Low----------	0.20	5	1-3
	8-32	30-50	1.20-1.35	0.6-2.0	0.15-0.20	3.6-6.0	Low----------	0.24		
	32-58	20-40	1.30-1.40	0.6-2.0	0.12-0.20	3.6-6.0	Low----------	0.20		
	58-72	5-25	1.45-1.65	2.0-6.0	0.11-0.15	3.6-6.0	Low----------	0.17		
JcE, JcF, JcG:										
Junaluska-------	0-2	5-18	1.35-1.60	2.0-6.0	0.10-0.15	3.6-6.0	Low----------	0.15	2	1-4
	2-15	18-35	1.30-1.65	0.6-2.0	0.12-0.18	3.6-6.0	Low----------	0.15		
	15-28	15-20	1.35-1.65	2.0-6.0	0.10-0.15	3.6-6.0	Low----------	0.15		
	28-60	---	---	---	---	---	-------------	----		
Cataska---------	0-4	12-22	1.30-1.40	2.0-20	0.10-0.14	3.6-5.5	Low----------	0.20	1	1-3
	4-16	12-22	1.30-1.45	2.0-20	0.04-0.09	3.6-5.5	Low----------	0.15		
	16-40	---	---	---	---	---	-------------	----		
JtC, JtE, JtF, JtG:										
Junaluska------	0-2	5-18	1.35-1.60	2.0-6.0	0.10-0.15	3.6-6.0	Low----------	0.15	2	1-4
	2-15	18-35	1.30-1.65	0.6-2.0	0.12-0.18	3.6-6.0	Low----------	0.15		
	15-28	15-20	1.35-1.65	2.0-6.0	0.10-0.15	3.6-6.0	Low----------	0.15		
	28-60	---	---	---	---	---	-------------	----		
Tsali----------	0-2	5-20	1.35-1.60	2.0-6.0	0.10-0.15	3.6-6.0	Low----------	0.15	1	1-4
	2-16	18-35	1.30-1.50	0.6-2.0	0.12-0.18	3.6-6.0	Low----------	0.15		
	16-60	---	---	---	---	---	-------------	----		
Pa. Pits, quarries										
PsF, PsG--------- Porters	0-9	10-25	1.40-1.60	2.0-6.0	0.16-0.20	4.5-6.5	Low----------	0.28	3	3-8
	9-52	7-20	1.40-1.60	2.0-6.0	0.10-0.20	4.5-6.5	Low----------	0.24		
	52	---	---	---	---	---	-------------	----		
PxH:										
Porters---------	0-9	10-25	1.40-1.60	2.0-6.0	0.16-0.20	4.5-6.5	Low----------	0.28	3	3-8
	9-52	7-20	1.40-1.60	2.0-6.0	0.10-0.20	4.5-6.5	Low----------	0.24		
	52	---	---	---	---	---	-------------	----		
Rock outcrop.										
Ro. Rock outcrop										
SaE, SnF:										
Saunook---------	0-9	7-20	1.35-1.60	2.0-6.0	0.14-0.20	3.6-6.0	Low----------	0.24	5	3-8
	9-22	18-35	1.30-1.50	0.6-2.0	0.12-0.20	4.5-6.5	Low----------	0.24		
	22-55	18-35	1.30-1.50	0.6-2.0	0.09-0.15	4.5-6.5	Low----------	0.15		
	55-60	7-20	1.35-1.60	2.0-6.0	0.07-0.12	4.5-6.5	Low----------	0.15		
Evard-----------	0-6	5-20	1.30-1.60	2.0-6.0	0.10-0.14	4.5-6.0	Low----------	0.24	5	2-4
	6-20	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-6.0	Low----------	0.24		
	20-40	12-30	1.20-1.40	0.6-2.0	0.10-0.25	4.5-6.0	Low----------	0.24		
	40-60	5-20	1.20-1.40	0.6-2.0	0.08-0.12	4.5-6.0	Low----------	0.24		
SpG:										
Saunook---------	0-9	7-20	1.35-1.60	2.0-6.0	0.14-0.20	3.6-6.0	Low----------	0.24	5	3-8
	9-22	18-35	1.30-1.50	0.6-2.0	0.12-0.20	4.5-6.5	Low----------	0.24		
	22-55	18-35	1.30-1.50	0.6-2.0	0.09-0.15	4.5-6.5	Low----------	0.15		
	55-60	7-20	1.35-1.60	2.0-6.0	0.07-0.12	4.5-6.5	Low----------	0.15		

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
SpG:										
Porters	0-9	10-25	1.40-1.60	2.0-6.0	0.16-0.20	4.5-6.5	Low	0.28	3	3-8
	9-52	7-20	1.40-1.60	2.0-6.0	0.10-0.20	4.5-6.5	Low	0.24		
	52	---	---	---	---	---	---	---		
Su: Suches	0-10	10-25	1.30-1.50	0.6-2.0	0.11-0.18	5.1-6.0	Low	0.24	5	2-4
	10-36	18-38	1.45-1.65	0.6-2.0	0.12-0.20	5.1-6.0	Low	0.28		
	36-44	8-35	1.55-1.70	0.6-2.0	0.11-0.20	4.5-6.0	Low	0.28		
	44-60	---	---	---	---	---	---	---		
ThB, ThC, ThE: Thurmont	0-6	10-25	1.20-1.40	2.0-6.0	0.10-0.15	4.5-5.5	Low	0.32	4	1-2
	6-29	18-35	1.30-1.50	0.6-2.0	0.13-0.19	4.5-5.5	Low	0.20		
	29-42	18-30	1.30-1.50	0.6-2.0	0.07-0.12	4.5-5.5	Low	0.20		
	42-60	10-20	1.20-1.40	0.6-2.0	0.04-0.08	4.5-5.5	Low	0.20		
Tt:										
Transylvania	0-24	5-25	1.30-1.50	0.6-2.0	0.16-0.24	4.5-6.0	Low	0.37	5	2-5
	24-40	10-35	1.30-1.50	0.6-2.0	0.15-0.20	4.5-6.0	Low	0.32		
	40-60	---	---	---	---	---	---	---		
Toxaway	0-28	7-27	1.30-1.50	0.6-2.0	0.15-0.20	5.1-6.5	Low	0.17	5	2-8
	28-60	5-30	1.45-1.65	2.0-20	0.05-0.15	5.1-6.5	Low	0.17		
UeE:										
Urban land.										
Evard	0-6	5-20	1.30-1.60	2.0-6.0	0.10-0.14	4.5-6.0	Low	0.24	5	1-4
	6-20	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-6.0	Low	0.24		
	20-40	12-30	1.20-1.40	0.6-2.0	0.10-0.25	4.5-6.0	Low	0.24		
	40-60	5-20	1.20-1.40	0.6-2.0	0.08-0.12	4.5-6.0	Low	0.24		
Clifton	0-4	10-27	1.35-1.60	2.0-6.0	0.12-0.15	4.5-6.5	Low	0.17	4	1-3
	4-8	20-35	1.20-1.60	0.6-2.0	0.15-0.20	4.5-6.5	Low	0.17		
	8-27	35-55	1.20-1.60	0.6-2.0	0.15-0.20	4.5-6.5	Low	0.17		
	27-60	5-27	1.20-1.35	2.0-6.0	0.11-0.15	4.5-6.5	Low	0.17		
UtE:										
Urban land.										
Junaluska	0-2	5-18	1.35-1.60	2.0-6.0	0.10-0.15	3.6-6.0	Low	0.15	2	1-4
	2-15	18-35	1.30-1.65	0.6-2.0	0.12-0.18	3.6-6.0	Low	0.15		
	15-28	15-20	1.35-1.65	2.0-6.0	0.10-0.15	3.6-6.0	Low	0.15		
	28-60	---	---	---	---	---	---	---		
Tsali	0-2	5-20	1.35-1.60	2.0-6.0	0.10-0.15	3.6-6.0	Low	0.15	1	1-4
	2-16	18-35	1.30-1.50	0.6-2.0	0.12-0.18	3.6-6.0	Low	0.15		
	16-60	---	---	---	---	---	---	---		

TABLE 17.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "occasional," "very brief," and "apparent" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
					Ft			In			
Aa---------------- Arkaqua	C	Frequent----	Very brief	Dec-May	1.5-2.0	Apparent	Dec-May	>60	---	High-----	Moderate.
BrC, BrE---------- Bradson	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
Ca---------------- Chatuge	D	Occasional	Very brief	Dec-Apr	1.0-2.0	Apparent	Dec-May	>60	---	High-----	High.
CeE, ChF, ChG----- Chestnut	B	None--------	---	---	>6.0	---	---	26-40	Soft	Low------	High.
ClC, ClE:											
Clifton----------	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
Evard------------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High.
Cr---------------- Colvard	B	Occasional	Very brief	Jan-Dec	4.0-6.0	Apparent	Dec-Apr	>60	---	Low------	Moderate.
CwH--------------- Cowee	B	None--------	---	---	>6.0	---	---	20-39	Soft	Moderate	High.
CxE, CxF, CxG:											
Cowee------------	B	None--------	---	---	>6.0	---	---	20-39	Soft	Moderate	High.
Evard------------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High.
DaB--------------- Dillard	C	None--------	---	---	2.0-3.0	Apparent	Dec-Apr	>60	---	Moderate	High.
Fr---------------- French	C	Frequent----	Very brief	Dec-Apr	1.0-2.5	Apparent	Dec-May	>60	---	Moderate	Moderate.
HaC, HaE, HaF----- Hayesville	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
JcE, JcF, JcG:											
Junaluska--------	B	None--------	---	---	>6.0	---	---	20-39	Soft	Moderate	High.
Cataska----------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Low------	Moderate.
JtC, JtE, JtF, JtG:											
Junaluska-------	B	None--------	---	---	>6.0	---	---	20-39	Soft	Moderate	High.
Tsali-----------	C	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	High.
Pa. Pits, quarries											
PsF, PsG---------- Porters	B	None--------	---	---	>6.0	---	---	40-60	Hard	Low------	High.
PxH:											
Porters----------	B	None--------	---	---	>6.0	---	---	40-60	Hard	Low------	High.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
					Ft			In			
PxH:											
Rock outcrop.											
Ro.											
Rock outcrop											
SaE, SnF:											
Saunook	B	None	---	---	>6.0	---	---	>60	---	Low	High.
Evard	B	None	---	---	>6.0	---	---	>60	---	Moderate	High.
SpG:											
Saunook	B	None	---	---	>6.0	---	---	>60	---	Low	High.
Porters	B	None	---	---	>6.0	---	---	40-60	Hard	Low	High.
Su Suches	B	Occasional	Very brief	Dec-May	2.5-4.0	Apparent	Dec-May	>60	---	High	Moderate.
ThB, ThC, ThE Thurmont	B	None	---	---	4.0-6.0	Apparent	Dec-Mar	>60	---	Moderate	High.
Tt:											
Transylvania	B	Occasional	Very brief	Jan-Dec	2.5-3.5	Apparent	Dec-Apr	>60	---	High	High.
Toxaway	B/D	Occasional	Very brief	Nov-Mar	0-1.0	Apparent	Nov-Apr	>60	---	High	Moderate.
UeE:											
Urban land.											
Evard	B	None	---	---	>6.0	---	---	>60	---	Moderate	High.
Clifton	B	None	---	---	>6.0	---	---	>60	---	Low	Moderate.
UtE:											
Urban land.											
Junaluska	B	None	---	---	>6.0	---	---	20-39	Soft	Moderate	High.
Tsali	C	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High.

TABLE 18.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Arkaqua	Fine-loamy, mixed, mesic Fluvaquentic Dystrochrepts
*Bradson	Clayey, oxidic, mesic Typic Hapludults
Cataska	Loamy-skeletal, mixed, mesic, shallow Typic Dystrochrepts
Chatuge	Fine-loamy, mixed, mesic Typic Ochraquults
Chestnut	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Clifton	Clayey, mixed, mesic Typic Hapludults
Colvard	Coarse-loamy, mixed, nonacid, mesic Typic Udifluvents
Cowee	Fine-loamy, mixed, mesic Typic Hapludults
Dillard	Fine-loamy, mixed, mesic Aquic Hapludults
Evard	Fine-loamy, oxidic, mesic Typic Hapludults
French	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Fluvaquentic Dystrochrepts
*Hayesville	Clayey, kaolinitic, mesic Typic Kanhapludults
Junaluska	Fine-loamy, mixed, mesic Typic Hapludults
Porters	Coarse-loamy, mixed, mesic Umbric Dystrochrepts
Saunook	Fine-loamy, mixed, mesic Humic Hapludults
Suches	Fine-loamy, mixed, mesic Fluventic Dystrochrepts
Thurmont	Fine-loamy, mixed, mesic Typic Hapludults
Toxaway	Fine-loamy, mixed, nonacid, mesic Cumulic Humaquepts
Transylvania	Fine-loamy, mixed, mesic Cumulic Haplumbrepts
Tsali	Loamy, mixed, mesic, shallow Typic Hapludults

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