Series 1948, No. 4

Issued October 1957

SOIL SURVEY

McMinn County Tennessee

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
TENNESSEE AGRICULTURAL EXPERIMENT STATION
TENNESSEE VALLEY AUTHORITY

How to Use THE SOIL SURVEY REPORT

FARMERS who have worked with their soils for a long time know about the soil differences on their own farms, perhaps also on the farms of their immediate neighbors. What they do not know, unless soil surveys have been made, is how nearly their soils are like those on experiment stations or on other farms, either in their State or other States, where farmers have gained experience with new or different farming practices or farm enterprises. They do not know whether higher yields obtained by farmers in other parts of their county and State are from soils like theirs or from soils so different that they could not hope to get yields as high, even if they followed the same practices. There is no way to find out these things unless a soil survey has been made for the purpose of mapping the soils and showing their similarities and differences. One way for farmers to avoid some of the risk and uncertainty involved in trying new production methods and new varieties is to learn what kinds of soils they have so that they can compare them with those on which new developments have proved successful.

Soils of a particular farm

All the soils in McMinn County are shown on the soil map at the back of this report. To learn what soils are on any farm or tract of land, it is necessary first to locate this land on the map. This is easily done by using landmarks such as roads, streams, villages, and dwellings.

Each kind of soil mapped within the farm or tract is marked on the map with a symbol. For example, all the areas marked Du are the same kind of soil. To find what soil this symbol represents, look in the soil legend. The color in which the soil area is shown on the map will be the same as the color indicated in the legend for the particular type of soil. It will be found that Du means Dewey silty clay loam, eroded rolling phase.

If you want information on the Dewey soil, turn to the section on Descriptions of the Soils and find Dewey silty clay loam, eroded rolling phase. There, following the name of the soil, you will find a statement of what the characteristics of this soil are, what the soil is mainly used for, and some of the uses to which it is suited.

Suppose, for instance, you wish to know how productive Dewey silty clay loam, eroded rolling phase is. Look at table 14. Find Dewey silty clay loam, eroded rolling phase, in the left-hand column and read in columns A the crop yields expected under present management, and in columns B the yields expected under suggested management.

If, in addition, you wish to know what uses and management practices are recommended for Dewey silty clay loam, eroded rolling phase, read what is said about this soil in the section, Descriptions of the Soils. Refer also to the section, Use and Management of Soils, where the soils suited to the same uses and management practices are grouped together.

Soils of the county as a whole

You can get a general idea of the soils of the county in the sections, Soil Series and Their Relations, and Soil Associations, which tell about the principal kinds of soils, where they are found, and how they are related to one another. Study the soil association map (fig. 7) along with the detailed soil map for a better understanding of the soil pattern of each association area.

A newcomer to the county, especially if he considers purchasing a farm, will want to know about the climate; the types and sizes of farms; the principal farm products and how they are marketed; the kind and conditions of farm tenure, including tenancy; kinds of farm buildings, equipment, and machinery; churches, hospitals, roads, schools, and railroads; the availability of telephone and electric services and water supplies; the industries of the county; cities, villages, and population characteristics. Information about all these will be found in the sections on General Nature of the Area.

Those interested in how the soils of the county were formed and how they are related to the great soil groups of the world should read the section on Morphology and Genesis of Soils.

This publication of the soil survey of McMinn County, Tenn., is a cooperative contribution from the—

SOIL CONSERVATION SERVICE
TENNESSEE AGRICULTURAL EXPERIMENT STATION
TENNESSEE VALLEY AUTHORITY

Series 1948, No. 4

Issued October, 1957

SOIL SURVEY OF McMINN COUNTY, TENNESSEE

By S. R. BACON, in Charge, E. W. KNOBEL, and T. E. BEESLEY, Soil Survey,[1] United States Department of Agriculture, and B. L. MATZEK, FRANKLIN AUSTIN, CLIFTON JENKINS, BERYL NICHOLS, E. K. YATES, and A. B. HARMON, Tennessee Agricultural Experiment Station

Correlation by M. J. EDWARDS, Soil Scientist, Soil Survey

United States Department of Agriculture in Cooperation With the Tennessee Agricultural Experiment Station and the Tennessee Valley Authority

Contents

[1] Fieldwork was done while Soil Survey was part of the Bureau of Plant Industry, Soils, and Agricultural Engineering. Soil Survey was transferred to the Soil Conservation Service November 15, 1952.

AGRICULTURE is the chief occupation in McMinn County, but many people are employed in related services and in industries. Agricultural production varies greatly over the county according to the soil resources and level of management. Dairy and poultry products, beef, tobacco, and cotton are the chief sources of farm income. Many rural families in some sections of the county are partly dependent on industry for their livelihood. Implement factories and textile mills are located in Athens. Other small plants are in Etowah, Englewood, and Niota. The Louisville and Nashville Railroad has shops at Etowah. There are some small gristmills and sawmills in rural areas. To provide a basis for the best agricultural uses of the land, this cooperative survey was made by the United States Department of Agriculture, the Tennessee Agricultural Experiment Station, and the Tennessee Valley Authority. Fieldwork was completed in 1948, and unless otherwise specifically mentioned, all statements in this report refer to conditions in the county at that time.

General Nature of the Area

Location and Extent

McMinn County is in the southeastern part of Tennessee in the Great Valley of East Tennessee (fig. 1). The area is 435 square miles, or 278,400 acres, of which 1,585 acres is water. Athens, the county seat, is about midway between Knoxville and Chattanooga. The Hiwassee River forms a large part of the southern boundary, and Starr Mountain forms the southeastern.

Settlement and Population

McMinn County was formed in 1819 from lands ceded by the Cherokee Indians to the United States in that year. It was named for Joseph McMinn, who was governor at that time. The early settlers were principally of English, Scotch, and Irish descent. Most of them came from North Carolina.

In 1950 the rural population was 20,145 and the urban population was 11,879. Of the rural population, 12,096 was classed as rural farm. Calhoun was the first town established. Athens is the largest town and has a population of 8,618 according to the 1950 census. Etowah had a population of 3,261 in 1950. Smaller towns are Englewood, Niota, Riceville, and Calhoun.

Physiography, Relief, and Drainage

A great part of McMinn County lies in the Appalachian Valley or Ridge and Valley physiographic province. The small part on Starr Mountain is in the Blue Ridge physiographic province, which extends from northern Georgia to southern Pennsylvania (*3*).[2] That part of the Valley included in Tennessee is known as the Great Valley of East Tennessee. It crosses the eastern part of the State in a northeast-southwest direction and is about 40 miles wide. Parallel highland belts, the Cumberland Plateau on the west and the Blue Ridge on the east, extend along both sides of the Great Valley.

Nearly all of this valley and all of McMinn County, except about 15 square miles on Starr Mountain, is underlain by sedimentary rocks consisting of limestone, shale, and sandstone of the Paleozoic era. That part of the county on Starr mountain is underlain chiefly by quartzite of the Proterozoic era. As a group, the rocks of the valley part are less resistant to weathering than the quartzite of Starr Mountain. The rocks in McMinn County, however, differ greatly from one another in resistance to weathering. Partly because of these differences, but also because of the intense folding and faulting of the rocks in almost all parts, McMinn County is characterized by numerous parallel ridges and valleys. The most resistant rocks form the ridges and the less resistant rocks the valleys.

[2] Italic numbers in parentheses refer to Literature Cited, p. 96.

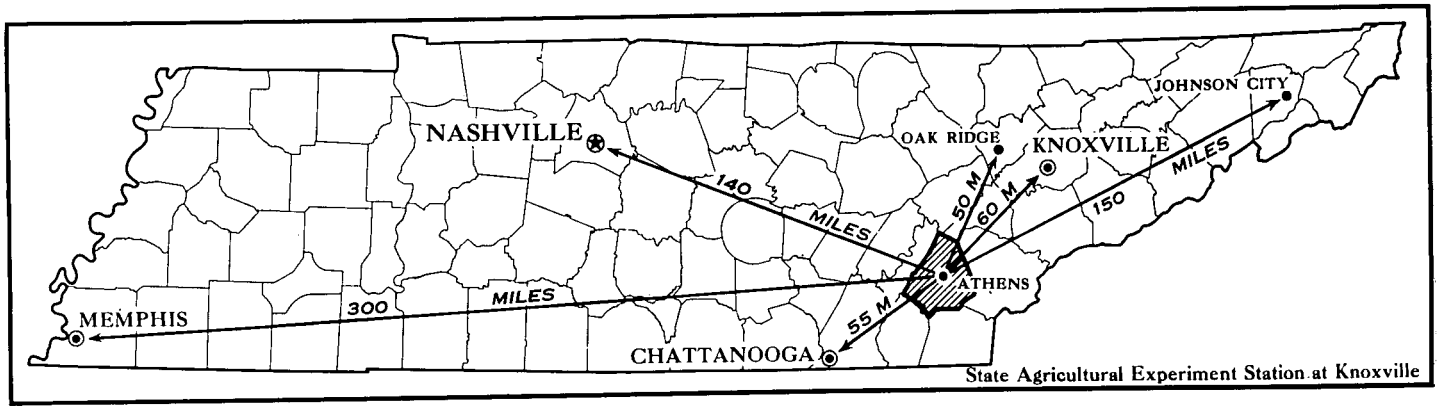


Figure 1.—Location of McMinn County in Tennessee.

Limestones are the predominant rocks in McMinn County and shale is second in extent. More than 50 square miles are underlain by sandstones. Some areas are high in lime; others are acid. The soils from calcareous sandstone, however, have been leached of most of their lime and are largely strongly acid. Both the limestones and shales vary a great deal from place to place. In greater part, the limestones are dolomitic. In many places these dolomitic limestones contain considerable chert, in some places sand, and in other places both chert and sand. Some limestones also contain clay. Some of the shales are high in lime (calcium carbonate) and others are acid. In some places, also, layers of shale are interbedded with limestone.

The relief of the county is prevailingly undulating, rolling, and hilly, although it ranges from nearly level to very steep. The part of the county located in the Great Valley is predominantly rolling to hilly. In most places the difference in elevation between the valleys and the adjacent hills and ridges ranges from 100 to 200 feet. The bulk of the county lies between 800 and 1,100 feet above sea level. The lowest part along the Hiwassee River is approximately 700 feet. Chickamauga Reservoir on this river is about 683 feet. Some of the highest ridges in the valley part reach 1,300 feet. Starr Mountain has an elevation of about 2,200 feet in this county.[3]

In McMinn County surface drainage of the upland is well developed. Slow surface drainage is confined almost wholly to bottom lands. Drainage is largely southwestward into the Hiwassee River. A small area in the northern part of the county is drained by small streams flowing north and west. Many of these small streams cease to flow during the driest part of the year. A considerable part of the limestone areas is drained through underground channels from sinkholes. In the shale areas the drainage pattern is mildly dendritic, but in the limestone areas the pattern is less uniform. There are no large natural lakes in the county, although some sinkholes retain water part or all of the time.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation*

Month	Average temperature [1]	Precipitation [2]		
		Average	Driest year (1904)	Wettest year (1909)
	F.	*Inches*	*Inches*	*Inches*
December	42. 7	5. 13	4. 49	4. 89
January	42. 5	5. 19	2. 34	4. 06
February	45. 4	4. 83	3. 02	8. 50
Winter	43. 5	15. 15	9. 85	17. 45
March	51. 0	5. 68	6. 28	7. 54
April	60. 1	4. 49	1. 60	5. 09
May	68. 9	3. 86	3. 40	10. 53
Spring	60. 0	14. 03	11. 28	23. 16
June	76. 3	4. 07	3. 78	13. 83
July	79. 6	4. 50	2. 84	6. 29
August	79. 1	3. 75	4. 96	2. 58
Summer	78. 3	12. 32	11. 58	22. 70
September	74. 6	2. 64	1. 08	2. 49
October	61. 8	3. 10	. 06	3. 73
November	50. 3	3. 88	3. 04	. 70
Fall	62. 3	9. 62	4. 18	6. 92
Year	61. 0	51. 12	36. 89	70. 23

[1] Temperature based on a 10-year record, 1936–1945, at Etowah, McMinn County, Tenn.

[2] Precipitation based on a 72-year record, through 1955, at Charleston, Bradley County, Tenn.; wettest and driest years based on a 57-year record, in the period 1889–1955, at Charleston.

Climate

The climate of McMinn County is of the humid continental type. The winters are not long and have frequent rainy periods and short cold spells. The moderate winter and summer temperatures make outdoor farm work possible much of the time. Data on the normal monthly, seasonal, and annual temperature and precipitation compiled from records of the United States Weather Bureau Stations at Etowah, McMinn County, and Charleston, Bradley County, Tenn., are given in table 1.

The average frost-free season is 195 days, from April 11 to October 23. A large proportion of the peach buds are killed about every 2 out of 3 years by the frosts, and the apple and berry buds are severely damaged about half of the time. Yields of late-maturing cotton are sometimes reduced by early frosts. The grazing period extends from about April 1 to the latter part of November.

As shown by table 1, the wettest period is during the winter and early spring months, and the driest is during the late summer and early fall months. Danger from flooding is greatest during the late winter and early spring and least during the late summer and early fall. Local flash floods, however, may be expected throughout the growing season. Damage of crops by hailstorms and strong winds is infrequent. Occasional light snowfalls occur during the winter but melt within a day or two. The ground is seldom frozen to a depth of more than 2 or 3 inches or for more than 3 or 4 days at a time. Such hardy vegetables as turnip greens, mustard, and onions persist throughout the winter.

In general, the climate is particularly favorable for early maturing crops and for those crops that require a long growing season and can withstand dry weather during their later growth and maturing periods. Fall-sown small grains are an example of the early maturing crops that are well suited. The winters are sufficiently mild for good stands throughout the winter season, and the spring temperature and moisture supply are exceptionally favorable for early maturity. Cotton, corn, lespedeza, and tobacco are examples of the long-season crops that can persist throughout dry periods during the late-development and maturity period. On the other hand, potatoes, especially late potatoes, are an example of a crop that apparently is not as well suited to the prevailing climate in McMinn County as to that in certain other sections. In many areas there is enough moisture to produce large yields of strawberries, but in others dry weather early in the growing season prevents proper development.

[3] Elevation data from United States Geodetic Survey-Tennessee Valley Authority topographic maps.

Vegetation [4]

Previous to settlement by white men, forest doubtless covered all of McMinn County. At present about three-fifths (61 percent) of the area is cleared. The rest is in forest. Two forest types prevail: Yellow pine-hardwoods (about 67 percent of the total forest acreage) and upland hardwoods (about 27 percent). Other types are yellow pine (about 4 percent of the forest acreage), cedar-hardwoods (about 1 percent), and loblolly (about 1 percent) (*6*). Pines make up from 25 to 75 percent of the dominant and codominant stems in the yellow pine-hardwoods type and less than 25 percent in the upland hardwoods type.

Practically all of the Ramsey-Jefferson soil association, which occupies Starr Mountain, is covered by yellow pine-hardwoods forest that merges into the upland hardwoods type. (For descriptions and map of soil associations, see section, Soil Associations.) The more conspicuous deciduous hardwood species are chestnut oak, scalybark hickory, sourwood, scarlet oak, black oak, dogwood, blackgum, yellow locust, red maple, white hickory, and southern red oak. Such species as buckeye, yellow-poplar, black walnut, eastern red oak, and basswood occur in cool moist hollows that have protected north and east exposures. Virginia pine is the chief pine and is intermixed with lesser amounts of shortleaf pine.

A great part of the Tellico-Neubert association is under native forest. The yellow pine-hardwoods forest type, changing to the upland hardwoods forest type, is typical in areas cut over but not cleared. Chestnut was an important species throughout most of the native forest but was exterminated by the fungus bark disease. Many cleared slopes are now abandoned and support a dense growth of black locust. Other abandoned areas have pure pine stands in which Virginia pine is much more conspicuous than shortleaf pine. On these areas, yellow pines comprise practically the total of dominant and codominant stems.

Much of the acreage in the Dandridge-Needmore and Needmore-Dandridge soil associations has been cleared. A notable acreage has reverted to broomsedge, blackberries, dewberries, and greenbrier intermixed with a scattered growth of sassafras, persimmon, dogwood, redcedar, blackgum, and red maple. Willow, sycamore, and sweetgum are along the draws. Many of these poorly managed areas could well be reforested.

Both the yellow pine-hardwoods and the upland hardwoods types are common on the Clarksville-Fullerton association. Shortleaf is more common than Virginia pine. Areas of Fullerton and Clarksville soils in the Dewey–Fullerton–Emory and the Fullerton–Clarksville–Greendale association areas under cutover forest are made up chiefly of the common hardwoods. From the top of a typical cherty ridge down the slope to the floor of a ravine, the common species are sourwood, post oak, southern red oak, scarlet oak, white hickory, chestnut oak, white oak, scalybark hickory, yellow-poplar, beech, and elm. Shortleaf is the predominant pine.

Except on the few stony areas, very little forest occupies the soils of the Decatur–Dewey–Emory soil association. Many areas of the stony land types, Talbott soil material, and most areas of Rockland, limestone material, have a forest cover of the cedar-hardwoods forest type. These areas have a small total acreage and are widely distributed in the Decatur–Dewey–Emory, the Dewey–Fullerton–Emory, and the Sequoia–Litz–Cotaco soil associations.

The Litz–Cotaco and the Sequoia–Litz–Cotaco soil associations, especially the former, have a large amount of idle or abandoned land. Some of this is under reestablished forest consisting in many places of pure stands of yellow pine. In other places the yellow pine-hardwoods type of forest prevails. Virginia pine is more common than shortleaf, and there are a few loblolly pines. There is some pure loblolly pine forest in the southwestern tip of the county adjoining the Chickamauga Reservoir backwater of Rogers Creek.

A great part of the Lehew–Montevallo association is under forest, and much of the acreage is limited to this use. The upland hardwoods forest type predominates. Many different species make up this forest type. They range from those common to dry sites on the narrow ridge tops and south-facing slopes to those common to the moist sites along the draws and on bottom lands. There are some pure stands of yellow pine on areas that have been abandoned as cropland.

About 39 percent of the land area of McMinn County is still in forest. Of this total about 68 percent is farm woodland, 29 percent private nonfarm forest, and 3 percent public forest (*7*). About 18 percent of the total area in forest is classified as sawtimber, 73 percent as cordwood, and 9 percent below cordwood size (*6*). Based on the number of farms reporting woodland in the 1950 U. S. Census, the average acreage of woodland per farm is 39.5 acres.

Water Supply

Perennial streams provide water for livestock in many permanent pastures. Intermittent streams furnish considerable water except during the driest months. Springs are common in the limestone areas, but less so in the shale and sandstone areas. Springs, cisterns, and drilled wells provide water for farm and family use. Cisterns are more common on the ridges, and most springs and drilled wells are in the valleys. In the cherty ridge sections, farmers depend considerably on sinkholes and dug ponds as sources of water for livestock. The water supply of Athens comes from large springs. Etowah also obtains its water from springs.

Transportation and Markets

Two railroads serve the county. A main line of the Southern Railway from Washington, D. C., to New Orleans, La., connects Athens directly with Knoxville and Chattanooga, Tenn., and a main line of the Louisville and Nashville from Cincinnati, Ohio, connects Etowah directly with Knoxville and Atlanta, Ga. Two Federal highways cross the county from north to south, and two State highways cross the county from east to west. Communities not on these highways are served by graded county roads, some of which are gravelled. In general, the roads in the better agricultural sections are improved more than those in the less productive areas.

[4] This section was prepared by G. B. Shivery, Extension Forester, College of Agriculture, University of Tennessee.

Farm products such as milk and livestock are brought to Athens. A large amount of the milk is handled by a local dairy, and about 50 percent is marketed in Chattanooga and Knoxville. Most of the livestock is auctioned in Athens. Surplus poultry, poultry products, and vegetables are sold largely in local towns. Most of the tobacco is sold in Knoxville. Cotton is ginned in the county and then shipped.

Social Facilities

All sections of the county are provided with grade schools, most of which are consolidated. School-bus services extend to all parts of the county. High schools are at Athens, Etowah, Niota, Riceville, Calhoun, Hillsview, Englewood, Idlewild, and Claxton. Churches are throughout the county. Athens has two hospitals. Telephones connect all of the towns; and, according to the 1950 census, 470 farm dwellings had telephones and 2,081 were served by electricity.

Agriculture

According to the United States census, there were 2,570 farms in McMinn County in 1950. Their aggregate area in 1950 was 230,258 acres, or 82.7 percent of the county. Of this total, 127,751 acres was classed as improved land. The remaining 17.3 percent of the county area included urban areas, railway and highway rights-of-way, public properties, and private nonfarm forest. Cherokee National Forest on Starr Mountain and Chickamauga Reservation along the Hiwassee River are the largest publicly owned areas.

The 1950 census classifies the farms of McMinn County by size and acreage as follows:

Size of farm (acres):	*Number*	*Acreage*
Under 10	253	1, 218
10 to 29	415	7, 673
30 to 49	363	13, 981
50 to 69	296	17, 396
70 to 99	382	31, 463
100 to 139	352	40, 234
140 to 179	223	34, 677
180 to 219	104	20, 382
220 to 259	56	13, 329
260 to 499	98	32, 396
500 to 999	27	16, 509
1,000 and over	1	1, 000

Farms in general are small and diversified. According to the 1950 census, their average size was 89.6 acres. Improved land averaged 49.7 acres per farm, or 55.5 percent of the total acreage on the average-sized farm. Most farms raise some kind of a cash crop, chiefly tobacco or cotton, and produce either milk or meat animals or both. There are many small farms classified as subsistence farms because of their low income from sale of farm products.

In the 1950 census the farms are classified as follows:

Type of farm:	*Number*
Field-crop farms other than vegetable and fruit-and-nut	473
Fruit-and-nut farms	5
Dairy farms	238
Poultry farms	10
Livestock farms other than dairy and poultry	155
General farms	318
Miscellaneous and unclassified farms	1, 371

The amount of improved land per farm varies according to the nature of the landscape or soil association area in which each farm exists. The farms having a high percentage of soils poorly suited to crops have the smaller percentage of improved land. In general the farms of less than 100 acres have a higher percentage of cropland harvested than the larger farms. As reported in the census for all farms of the county in 1949, there were 61,012 acres of cropland harvested, 44,149 acres of cropland used for pasture, 12,037 acres of other pasture, 22,590 acres of cropland not harvested and not pastured, 78,099 acres of woodland (19,455 acres of which were pastured), and 12,371 acres classified as other land. Corn and hay occupied about 80 percent of the land used for crops. A large part of the woodland is on the steeper Clarksville, Tellico, Ramsey, and Lehew-Montevallo soils. Much unimproved pasture is on Clarksville, Fullerton, Tellico, Litz, Dandridge, Hamblen, and Prader soils. The more fertile soils over limestones, the soils on stream terraces, much of the acreage of soils on local alluvium, and the better drained soils on bottom lands are used for crops and improved pasture or for pasture grown in rotations with cultivated crops.

Agricultural Practices

Agricultural practices in the county vary according to the size of farms, differences in soil types, patterns of soil distribution, and lay of the land. Modern machinery is generally used on the larger farms of the smooth and rolling areas and also on many smaller farms on a cooperative basis. Much of the tillage in the hilly or steep areas is done by light implements. Small grains are harvested mainly by grain binders, although combines are increasing in number. Nearly all of the corn is harvested by hand. Most of it is cut and shocked in the fall and husked during the winter. Small grains are planted in the fall and harvested in June and the first part of July. Alfalfa is sown in August. Grasses and legumes are sown both in the fall and early in spring. Lespedeza is sown in March and April.

Systematic crop rotation is generally practiced on the smoother and rolling areas. A common 3-year rotation consists of corn, a small grain, and lespedeza. A popular 5-year rotation on the better soils consists of corn, a small grain, and alfalfa for 2 or 3 years. Corn and hay are rotated on many bottom soils and hilly areas. Tobacco and cotton are planted on the same land year after year on some farms. A cover crop is frequently turned under for these crops.

The use of lime and fertilizer has increased during the last decade. Most of the fertilizer is purchased ready mixed. Some manure is applied to vegetables and land to be planted to corn and small grains. On the less fertile soils, such as the Litz, Apison, and Clarksville soils and the hilly and steep areas of other soils, less fertilizer and lime are used. Only 50 to 75 percent of the farmers fertilize corn and small grains on the poorer soils and on the hilly and steep areas.

Farm Tenure

According to the 1950 census, owners operated 82.8 percent of the farms, tenants 17 percent, and managers 0.2

percent. Nearly all the tenants are share tenants, and only a few rent on a cash basis. The most common landlord-tenant agreement is as follows. The landlord furnishes the tenant with a house, all of the work animals, and the seed, and the tenant furnishes the labor. Fertilizer costs are usually divided according to the sharing of the crop. The landlord receives two-thirds of the corn, small grain, and hay, and the tenant one-third. The tobacco crop is commonly shared equally. The tenants that furnish labor, work animals, implements, and seed receive two-thirds of the crops, and the landlord one-third. The tenants who rent land for cotton and furnish everything receive three-fourths of the cotton, and the owner one-fourth.

Farm Power and Mechanical Equipment

The number of work animals on farms has decreased considerably since 1920 and probably is decreasing further as tractors are becoming more plentiful. According to the 1950 census, there were 2,103 mules and 1,791 horses in the county. Most of the horses are raised in the county, but the mules are largely shipped in. Percherons and Belgians are the most popular breeds of horses. The average number of work animals per farm in 1950 was 1.5.

According to the 1950 census, there were 772 tractors, 630 motortrucks, and 1,247 automobiles on farms. In 1940, there were 93 tractors, 209 motortrucks, and 1,015 automobiles. The use of modern farm machinery is increasing at the present time, although there are many farmers who use one-row cultivators, small wagons, and hand-operated seed sowers.

Crops

The acreage of the principal crops and the number of fruit trees and grapevines in McMinn County, as reported by the United States Census for stated years, are given in table 2.

As shown in table 2, corn has been and is yet the most important crop in acreage, although its acreage has decreased considerably. Because the increased number of cattle requires more pasture and hay, hay has increased in acreage and alfalfa is still increasing. Wheat occupies less than one-third its acreage of 30 and 40 years ago. Average yields of most crops have increased, even though much of the soil is more eroded. Average corn yields are 10 to 12 bushels higher than 30 or 40 years ago. In 1929 corn averaged 17.5 bushels per acre, and in 1949, 29.6 bushels. Wheat averaged 8.1 and 12.7 bushels per acre, respectively, in 1929 and 1949. Timothy and clover averaged 1.1 tons per acre in both 1929 and 1949, respectively. Cotton averaged 0.37 and 0.49 of a bale per acre in 1929 and 1949, respectively. Although the comparative yields cited do not necessarily prove a consistent trend toward higher yields, other evidence clearly indicates such a trend in recent years.

Corn.—Corn is grown on practically all of the farms. This crop is grown on nearly all the tilled soils, but mostly on the soils of the bottom lands. Practically all of it is drilled in rows, and most farmers fertilize with 200 to 300 pounds of superphosphate, 0–14–7, 4–12–4, or a similar fertilizer. Nearly all of the corn is fed on the farms where it is grown. Very little is used for silage.

TABLE 2.—*Acreage of the principal crops and number of fruit trees and grapevines in McMinn County, Tenn., in stated years*

Crop	1929	1939	1949
	Acres	*Acres*	*Acres*
Grain crops:			
Corn	28, 312	25, 146	17, 647
Oats	376	1, 230	7, 144
Wheat	6, 337	4, 940	1, 978
Rye	562	844	37
Barley	394	508	282
All hay	11, 800	24, 212	32, 319
Lespedeza	(1)	16, 525	21, 753
Timothy and clover	1, 323	1, 425	1, 398
Alfalfa	249	1, 518	3, 941
Small grain cut for hay	275	753	2, 684
Other hay cut	9, 953	3, 991	2, 543
Cotton	2, 983	3, 927	2, 040
Potatoes	337	244	74
Sweetpotatoes	268	230	75
Tobacco	251	611	1, 213
	Number	*Number*	*Number*
Apple trees	33, 945	26, 880	11, 141
Peach trees	33, 534	25, 604	5, 955
Grapevines	3, 696	4, 299	4, 830

[1] Data not available.

Wheat.—The acreage of wheat has steadily decreased. The average yield, however, has increased as a result of the more extensive use of commercial fertilizer and other improved management practices. At present most of the wheatland is fertilized with 200 to 300 pounds of 20-percent superphosphate or a mixed fertilizer with a formula of approximately 4–12–4. All the wheat is fall sown, and it is produced on most of the tilled soils in the county. However, it is seldom grown on poorly drained soils and soils of the bottom lands. Part of the wheat is used on the farm and part is sold outside of the county.

Other grains.—Rye and barley are less important crops than corn and wheat, and they have also decreased in acreage. However, there has been some increase since 1939 in oats for early spring pastures. All of these crops are fall sown.

Hay and forage crops.—Hay and forage crops are becoming increasingly important. Clover and timothy have decreased slightly in acreage, but alfalfa, lespedeza, and small grains cut for hay have increased. Alfalfa is grown on the more productive well-drained soils, whereas lespedeza is grown on a variety of soils. Redtop is grown on some of the less fertile soils more extensively than lespedeza. Lespedeza is not commonly fertilized. Lime, phosphate, potash, and borax are used for alfalfa. Cowpeas and soybeans and vetch are less important crops grown for hay. Practically all of the hay and forage crops are fed on the farm where grown.

Tobacco.—Before 1919 only a few patches of tobacco were grown. Since then burley tobacco has become the most important cash crop. In 1949 the average yield was about 1,271 pounds per acre. Small patches of less than 1 acre are grown on most farms. Farmers prefer the productive well-drained local alluvial soils for this crop. From 1,000 to 2,000 pounds of 3–9–6 or 3–12–6 fertilizer, 100 pounds of nitrate of soda or ammonium nitrate, and

5 to 10 tons of manure are applied per acre of tobacco. The tobacco is sold at auction during December and January, chiefly at Knoxville.

Cotton.—Cotton is also an important cash crop. It is produced largely on the lighter textured well-drained soils. Applications of 300 to 400 pounds of 3–9–6 or of a somewhat similar fertilizer are used. Much of the cotton is ginned in the southeastern part of the county.

Fruits and vegetables.—Fruits and vegetables are produced chiefly for home use, although some are sold on the local markets. Potatoes, sweetpotatoes, watermelons, and strawberries are important, although practically all other vegetables common to the State are produced. There are no large commercial fruit orchards in the county. On most farms there are a few apple, peach, and pear trees. Grapes, plums, and cherries are less common. The management of the fruit crops generally is not at a high level, and yields are low.

Pasture.—Most of the permanent pastures are on the hilly and steep areas and along streams. The pastures in the better limestone valleys have a larger proportion of bluegrass and whiteclover. Some contain mixtures of these grasses and bermudagrass. Permanent pastures on the poorer light-colored soils are composed mostly of redtop, lespedeza, and broomsedge. The quality of pasture varies according to management as well as to the type of soil. Where soil amendments are used regularly, bluegrass and whiteclover thrive on the better soils, whereas broomsedge is the dominant plant on many untreated pastures. There is a trend toward better pasture management, and many farmers are now using lime and phosphate on their pastures. A few use complete fertilizers.

Livestock and Livestock Products

Dairying is the most important livestock enterprise on farms in McMinn County. The number of dairy cattle has increased, and the average production per cow has gradually increased in the past several decades. Beef cattle rank second, and poultry third, as a source of income from livestock or livestock products.

The number of livestock on farms in McMinn County, Tenn., in stated years is shown in table 3.

Cattle.—Although dairying is a countywide enterprise, most of the larger dairy herds are in the valleys where the soils are more productive. On the other hand, a large proportion of beef cattle are on the poorer soils that are too hilly or too low in fertility to cultivate profitably. Most of the dairy cattle are grade Jerseys. It is estimated that Holstein and Guernseys now make up about 10 percent of the dairy cattle, but they are gradually increasing in number. Herefords are the most popular beef cattle. Aberdeen Angus and Durham make up 15 to 20 percent of the beef herds in the county. Most of the beef cattle are sold in Athens and shipped to outside markets.

In 1940, according to the census, 1,186,829 gallons of whole milk were sold. The amount has increased since, and in 1949, 2,832,654 gallons of whole milk were sold.

Poultry.—Most farms derive some income from poultry, chiefly chickens. The number of chickens raised has varied but little in the past 30 years. Only a few farmers raise turkeys, geese, ducks, or guineas.

Hogs.—The number of hogs raised on farms has decreased by nearly 50 percent since 1920. The decrease in corn acreage has been reflected in the decline in the production of pork. Most of the hogs are raised for home use, although a considerable number are bought by local buyers and shipped to outside markets. Poland China is the most popular breed.

Sheep and goats.—Sheep and goats are not an important source of income. Probably 50 percent of the sheep are purebred. Hampshire is the most popular breed. Lambs are shipped from the county three times each year and are handled by farmer cooperatives.

TABLE 3.—*Number of livestock on farms in McMinn County, Tenn., in stated years*

Livestock	1930	1940	1950
Cattle	13, 254	[1] 14, 607	21, 937
Horses	1, 796	[1] 2, 145	1, 791
Sheep	2, 492	[2] 1, 152	1, 205
Goats	36	[3] 7	[4]
Swine	5, 359	[3] 5, 599	5, 941
Chickens	[1] 88, 579	[3] 99, 000	[3] 88, 181

[1] Over 3 months old.
[2] Over 6 months old.
[3] Over 4 months old.
[4] Not reported.

The Soils of McMinn County

The soils of McMinn County have developed under a moderately high temperature, moderately heavy rainfall, and a deciduous hardwood forest. In the county there are great differences in slope, the kind of parent material, and the length of time the material has been in place. Accordingly, there are great differences among the soils.

In general, all the soils are moderately to strongly acid, although some on first bottoms are alkaline to slightly acid. The Dandridge soils, which are shallow to calcareous shale, are alkaline in much of their surface soil. To a large extent the soils of the county are low in fertility and organic matter. However, a fairly large acreage of soils over high-grade limestone and on the first bottoms is relatively high in fertility, and some of the soils have a moderate organic matter content.

The surface layers of the soils are predominantly loam to silt loam. A few areas on the bottom land are very sandy. The moderately eroded soils range in surface texture from silty clay loam to loam, and most of the severely eroded acreage has a silty clay plow layer.

Some of the land is practically free from stones, but some is so stony as to prohibit cultivation and, in places, to make the soil unsuitable for pasture. The stones consist of shale, chert, gravel, cobbles, and angular limestone and quartzite fragments and outcrops.

The soils range from loose to very plastic in consistence. In part, the soils are moderately friable to firm. Only very small acreages are either loose or very plastic. Depth to bedrock ranges from practically nothing, where there are rock outcrops, to 30 or 40 feet. Most of the soils that are deep to bedrock are either on cherty dolomitic limestone or on alluvial deposits, stream terraces, or first bottoms.

Slope of the soils ranges from nearly level to very steep. Practically all of the nearly level areas are on first bot-

toms, and all of the very steep areas are in the Tellico-Neubert soil association and on the slope of Starr Mountain. A great part of the limestone and shale valley areas are undulating to rolling, whereas most of the cherty ridges have a slope range from rolling to hilly. Some steep areas, however, are intermixed. The areas where Tellico soils predominate are dominantly steep, but some smaller parts have a hilly or rolling surface.

In the agriculture as now practiced, about 67 percent of the acreage of the county is suitable for crops requiring tillage; about 15 percent is not suited to crops requiring tillage but is sufficiently productive to be useful as pasture; and the rest is not well suited either to crops or to pasture and is, therefore, limited to forest. Of the acreage suited to crops requiring tillage, about 11 percent is exceptionally favorable, about 34 percent is moderately well suited, and about 55 percent is suited but requires relatively intensive management in order to maintain productivity.

Soil Series and Their Relations

As shown in table 4, the soil series of McMinn County are placed in four groups according to topographic position: (1) Soils of the uplands, (2) soils of the terrace lands, (3) soils of the colluvial lands, and (4) soils of the bottom lands.

Soils of the uplands

Soils of the uplands, the dominant soils of the county, occupy about 76 percent of the total area. They have developed in place from material weathered from the parent rock, and their properties are generally closely related to the character of the parent rock. In McMinn County there are four main kinds of rocks: (1) Limestone, (2) shale, (3) sandstone, and (4) quartzite. These different kinds of parent rocks, as well as variations within the limestones and shales, give rise to different soil series.

On the basis of differences in parent rock, the upland soils may be divided into four subgroups: (1) Soils derived from limestone, (2) soils derived chiefly from shale, (3) soils derived chiefly from a mixture of limestone and shale, and (4) soils derived chiefly from sandstone, sandy shale, or interbedded sandstone and shale.

Soils derived from limestone.—This subgroup consists of soils of the Decatur, Dewey, Fullerton, Clarksville, Bolton, and Talbott series. The parent rock varies from the high-grade limestone under the Decatur soils to the cherty dolomitic limestone under the Fullerton and Clarksville soils. The Bolton soils are underlain by sandy dolomitic limestone similar to that underlying the Fullerton loam soils. The limestone parent to the Talbott soils is relatively free from chert or sand. Its residuum is high in clay.

The subsoils are red or dark red in the Decatur soils, moderate red in the Dewey, yellowish red in the Fullerton, and yellow or yellowish brown in the Clarksville. In the same order, from the Decatur to the Clarksville soils, the color of the surface soils grades from dark to light, and natural fertility decreases. In this order also, the amount of chert and the resistance to erosion increase. The Bolton soils are similar to the Dewey soils in color, but they occupy higher elevations and in general have a fluffy or resilient dark-brown surface soil. The principal distinguishing characteristic of the soils of the Talbott series is the tough, plastic nature of the subsoil.

Soils derived chiefly from shale.—This group consists of soils of the Litz, Dandridge, and Needmore series. The Dandridge and Needmore soils were derived from calcareous shale, whereas the Litz were derived from acid shale with a few limestone lenses. The loam type of the Litz soils was derived from a sandy shale that contains some calcareous material.

The Litz soils have grayish-brown to yellowish-brown shaly surface soils underlain by a mixture of gray and brown shale fragments and some silty soil material.

The Dandridge soils have dark-grayish brown, light brownish-yellow, or yellowish-gray shaly surface soils underlain by yellow, gray, brown, or black shale fragments and yellowish-brown soil material.

The Needmore soils are interassociated with the Dandridge soils. They occupy the smoother areas and have a more definite subsoil.

Soils derived chiefly from a mixture of limestone and shale.—This group consists of soils of the Farragut and Sequoia series. These soils are underlain by shale, but they contain some material from limestone—the Farragut more than the Sequoia.

The uneroded Farragut soils have dark-brown surface soils and red to reddish-yellow firm upper subsoils. At depths of 20 to 30 inches the material changes to yellowish-red tough plastic silty clay.

The Sequoia soils are lighter in color than the Farragut soils and less fertile. They have light yellowish-brown surface soils and yellowish-red or yellowish-brown plastic subsoils that vary in texture and degree of plasticity.

Soils derived chiefly from sandstone, sandy shale, or interbedded sandstone and shale.—This group consists of soils of the Tellico, Apison, Lehew, Montevallo, and Ramsey series. The rocks underlying the Tellico soils are calcareous sandy rocks, whereas those underlying the Apison, Lehew, Montevallo, and Ramsey soils are acid sandy shale, shale, or quartzite.

The Tellico soils are characterized by their dark-red subsoil and steep slope. The Apison soil has a grayish loamy surface soil and yellowish brown friable subsoil. The parent rock is acid sandy shale. The Lehew soils are conspicuous because of their purplish cast, steep slope, and shallow depth to bedrock. They occur only in complex with the Montevallo soils. The Montevallo soils are light colored and very shallow to bedrock acid shale. The Ramsey soils are confined to Starr Mountain in this county. They are light colored, sandy, stony, and shallow to bedrock.

Soils of the terrace lands

In the geologic past, the Hiwassee River and streams of the county flowed at higher levels. At these levels, they deposited gravel, sand, silt, and clay on their flood plains. During the progress of stream cutting over a great number of years, the channels were gradually deepened and new flood plains were formed at the lower levels. But areas of the older higher lying flood plains were left above the overflow of the present streams and are now the stream

409049—57——2

TABLE 4.—*Soil series of McMinn County, Tenn. grouped according to topographic position, parent material, drainage, and relief*

Parent rock	Excessively drained [1] (undulating to very steep)	Well drained [2] (undulating to steep)	Imperfectly drained [3] (nearly level to rolling)	Poorly drained [4] (nearly level)
SOILS OF THE UPLANDS				
Sedimentary rocks:				
High-grade limestone		Decatur [5]		
High-grade limestone and high-grade sandy dolomitic limestone.		Dewey [5]		
Moderately cherty dolomitic limestone; some sandy.		Fullerton [5]		
Cherty to very cherty dolomitic limestone; some sandy.		Clarksville [5]		
Sandy dolomitic limestone		Bolton		
Clayey or argillaceous limestone		Talbott [6]		
Acid shale with a few limestone lenses and variable calcareous sandstone and shale.	Litz [5]			
Calcareous shale	Dandridge	Needmore [6]		
Shale and limestone		Farragut		
Interbedded shale and limestone		Sequoia [5]		
Calcareous sandstone; shale intermixed in places.		Tellico [5]		
Acid sandy shale		Apison		
Purplish or weak-red sandy shale	Lehew			
Acid shale	Montevallo			
Metamorphosed rocks:				
Quartzite and sandstone	Ramsey			
SOILS OF THE TERRACE LANDS				
Chiefly limestone; some shale and sandstone in places; some metamorphosed micaceous rocks.		Cumberland		
Chiefly limestone; some shale and sandstone		Etowah		
Sandstone, shale, and limestone; in places, some metamorphosed micaceous rock.		Waynesboro		
Shale and sandy rock; some limestone in places		Holston [6]	Monongahela	Tyler.
Shale and sandy rock; some limestone in places				Purdy.
Sandstone, quartzite, and shale; some limestone in places.		Sequatchie [5]		
Limestone, shale, little sandstone		Wolftever [6]		
SOILS OF THE COLLUVIAL LANDS				
Old deposits:				
High-grade limestone		Hermitage		
Cherty limestone		Pace [6]		
Shale		Leadvale [6]		
Calcareous sandstone; some shale intermixed in places.		Alcoa [7]		
Young deposits: [8]				
High-grade limestone		Emory [6] and Abernathy [6]	Ooltewah	Guthrie.
Cherty limestone		Greendale [6]	Ooltewah	Guthrie.
Shale or sandstone, or both		Barbourville	Cotaco	
Calcareous sandstone; shale intermixed in places.		Neubert [6]		
Mixture of sandstone, quartzite, slate, and shale; in places some limestone influence.		Hayter		
Quartzite and sandstone; slaty material in places.		Jefferson		
Calcareous shale			Whitesburg [6]	
SOILS OF THE BOTTOM LANDS [8]				
Mixture of shale, limestone, and sandy rocks		Staser [6]	Hamblen	Prader.
Chiefly limestone		Huntington [6]	Lindside	Melvin.
Sandy component of various rocks	Bruno			

[1] These soils have indistinct profiles because of rapid geologic erosion; surface drainage is rapid to very rapid; internal drainage is slow to very rapid; color varies with parent material.

[2] Brown or reddish-brown to yellowish-brown soils, free of mottlings to a depth of about 30 inches.

[3] Pale yellow soils (grayish-brown or yellowish-gray) mottled below about 12 inches.

[4] Light brownish-gray to light-gray soils, mottled below 6 to 8 inches.

[5] Ranges from excessively drained to well drained.

[6] Ranges from well drained to moderately well drained.

[7] Steeper slopes excessively drained.

[8] Do not have distinct textural horizons because of the short time parent materials have been in place.

terraces or bench lands. Geologically, they consist of old general stream alluvium that lies above the overflow stage of the present streams.

The soils of the terrace lands occupy about 2.5 percent of the total area of the county. They differ from each other chiefly in the degree of internal drainage and in the source of parent material. The Sequatchie and Wolftever soils are apparently younger than the soils of the other series that occur on stream terraces.

Soils of the colluvial lands

The soils of the colluvial lands occur on gently sloping to hilly colluvium or local alluvium that has been deposited at the base of higher lying upland soils or at the heads of drainageways in the uplands or on the stream terraces. Their parent materials were derived from soil and fragments of rock washed and rolled from the higher lying slopes.

Some of the soils of this subgroup consist of material that has been in place for a long time (old deposits), and these have well-defined surface soils and subsoils. They are on the higher lying colluvial areas and occupy about 6 percent of the county. Others consist of material that has been in place for a short time (young deposits), and these have little or weak distinction between the surface soils and subsoils. The young soils are on lower lying positions and most areas have a gentle relief. They occupy about 9.5 percent of the county. A great part of their acreage is directly adjacent to the drainageways. Much of it has drainage that is decidedly impaired, whereas much of the acreage on the old deposits has good drainage.

Soils of the bottom lands

The soils on the bottom lands occur on nearly level areas along the streams that are subject to flooding.

The soils in these bottom lands occupy about 6 percent of the total area of the county. They are young soils developing from material that has not lain in place long enough to have the well-defined surface soils and subsoil layers that occur in soils of the uplands and terraces and in the older soils of the colluvial lands.

The soils of the bottom lands were derived from material carried there by the streams. Their distinguishing features therefore depend largely upon the source of the material and the mixing and sorting action of the streams. The soils of the Staser, Hamblen, and Prader series comprise much of the acreage. They consist of a mixture of material from shale, limestone, and sandstone. These three series differ from each other in characteristics related to differences in drainage. The Huntington, Lindside, and Melvin series comprise other parts of the bottom lands and consist of material originating largely from limestone. These series also differ from each other in characteristics related to differences in drainage. Inasmuch as it was difficult to delineate the areas according to differences in origin, series of these two groups were mapped together as undifferentiated mapping units. Thus, the two well-drained series were mapped together as Staser and Huntington silt loams; the two imperfectly drained series were mapped together as Hamblen and Lindside silt loams, and Hamblen and Lindside silty clay loams; and the two poorly drained series were mapped together as Prader and Melvin silty clay loams.

Descriptions of the Soils

In the following pages the soils of McMinn County are described in detail and their relation to agriculture is stated. The acreage and proportionate extent of these soils are listed in table 5, and their location and distribution are shown on the accompanying map.

TABLE 5.—*Approximate acreage and proportionate extent of the soils mapped in McMinn County, Tenn.*

Soil	Area	Extent
	Acres	*Percent*
Alcoa clay loam, severely eroded hilly phase	258	0. 1
Alcoa clay loam, severely eroded rolling phase	195	. 1
Alcoa loam, eroded hilly phase	148	. 1
Alcoa loam, eroded rolling phase	1, 296	. 5
Alcoa loam, eroded undulating phase	216	. 1
Apison loam, eroded rolling phase	644	. 2
Barbourville loam	825	. 3
Bolton silt loam, eroded hilly phase	1, 148	. 4
Bolton silt loam, eroded rolling phase	1, 280	. 5
Bolton silt loam, eroded steep phase	104	(1)
Bruno loamy fine sand	785	. 3
Clarksville cherty silt loam, eroded hilly phase	5, 055	1. 7
Clarksville cherty silt loam, eroded rolling phase	6, 272	2. 2
Clarksville cherty silt loam, eroded steep phase	541	. 2
Clarksville cherty silt loam, hilly phase	4, 978	1. 7
Clarksville cherty silt loam, rolling phase	3, 568	1. 3
Clarksville cherty silt loam, steep phase	1, 909	. 7
Cotaco loam	985	. 4
Cotaco silt loam	5, 385	1. 8
Cumberland silt loam, undulating phase	251	. 1
Cumberland silty clay loam, eroded rolling phase	313	. 1
Cumberland silty clay loam, eroded undulating phase	172	. 1
Dandridge shaly silt loam, eroded hilly phase	3, 346	1. 2
Dandridge shaly silt loam, eroded rolling phase	2, 178	. 8
Dandridge shaly silt loam, eroded steep phase	1, 148	. 4
Dandridge silt loam, hilly phase	521	. 2
Dandridge silt loam, rolling phase	263	. 1
Dandridge silt loam, steep phase	378	. 1
Decatur silty clay, severely eroded hilly phase	249	. 1
Decatur silty clay, severely eroded rolling phase	260	. 1
Decatur silty clay loam, eroded hilly phase	296	. 1
Decatur silty clay loam, eroded rolling phase	2, 178	. 8
Decatur silty clay loam, eroded undulating phase	1, 657	. 6
Dewey clay loam, eroded hilly phase	90	(1)
Dewey clay loam, eroded rolling phase	791	. 3
Dewey clay loam, eroded undulating phase	255	. 1
Dewey silty clay, severely eroded hilly phase	1, 826	. 7
Dewey silty clay, severely eroded rolling phase	1, 267	. 5
Dewey silty clay loam, eroded hilly phase	1, 306	. 5
Dewey silty clay loam, eroded rolling phase	6, 148	2. 2
Dewey silty clay loam, eroded undulating phase	1, 321	. 5
Emory and Abernathy silt loams	689	. 2
Emory silt loam	6, 493	2. 3
Etowah silty clay loam, eroded rolling phase	464	. 2
Etowah silt loam, undulating phase	1, 285	. 5
Farragut silty clay loam, eroded rolling phase	635	. 2

TABLE 5.—*Approximate acreage and proportionate extent of the soils mapped in McMinn County, Tenn.*—Con.

Soil	Area	Extent
	Acres	*Percent*
Farragut silty clay loam, eroded undulating phase	815	0. 3
Fullerton cherty silt loam, eroded hilly phase	12, 300	4. 3
Fullerton cherty silt loam, eroded rolling phase	11, 537	4. 1
Fullerton cherty silt loam, eroded steep phase	2, 097	. 8
Fullerton cherty silt loam, hilly phase	7, 654	2. 6
Fullerton cherty silt loam, rolling phase	4, 179	1. 4
Fullerton cherty silt loam, steep phase	5, 793	2. 1
Fullerton cherty silty clay loam, severely eroded hilly phase	2, 679	1. 0
Fullerton cherty silty clay loam, severely eroded rolling phase	758	. 3
Fullerton cherty silty clay loam, severely eroded steep phase	342	. 1
Fullerton loam, eroded hilly phase	720	. 3
Fullerton loam, eroded rolling phase	2, 927	1. 1
Fullerton loam, eroded undulating phase	448	. 2
Fullerton loam, hilly phase	303	. 1
Fullerton loam, rolling phase	464	. 2
Fullerton silt loam, eroded hilly phase	2, 856	1. 0
Fullerton silt loam, eroded rolling phase	8, 387	3. 0
Fullerton silt loam, eroded undulating phase	569	. 2
Fullerton silt loam, hilly phase	326	. 1
Fullerton silt loam, rolling phase	533	. 2
Fullerton silty clay loam, severely eroded hilly phase	1, 157	. 4
Fullerton silty clay loam, severely eroded rolling phase	243	. 1
Greendale cherty silt loam	2, 781	1. 0
Greendale silt loam	6, 702	2. 3
Gullied land, acid shale material	2, 673	1. 0
Gullied land, calcareous shale and sandstone materials	2, 089	. 8
Gullied land, limestone material	1, 768	. 6
Guthrie silt loam	598	. 2
Hamblen and Lindside silt loams	8, 418	3. 0
Hamblen and Lindside silty clay loams	362	. 1
Hamblen fine sandy loam	790	. 3
Hayter loam, undulating phase	175	. 1
Hermitage silt loam, eroded rolling phase	2, 422	. 9
Hermitage silt loam, undulating phase	2, 396	. 9
Holston loam, eroded rolling phase	128	(1)
Holston loam, eroded undulating phase	193	. 1
Holston loam, undulating phase	270	. 1
Jefferson fine sandy loam, rolling phase	338	. 1
Jefferson loam, eroded rolling phase	805	. 3
Jefferson loam, rolling phase	194	. 1
Jefferson loam, undulating phase	334	. 1
Jefferson stony fine sandy loam, hilly phase	1, 402	. 5
Jefferson stony fine sandy loam, rolling phase	346	. 1
Leadvale silt loam, eroded rolling phase	440	. 2
Leadvale silt loam, undulating phase	1, 320	. 5
Lehew-Montevallo loams, hilly phases	662	. 2
Lehew-Montevallo loams, rolling phases	944	. 3
Lehew-Montevallo shaly loams, eroded hilly phases	1, 691	. 6
Lehew-Montevallo shaly loams, eroded rolling phases	667	. 2
Lehew-Montevallo shaly loams, eroded steep phases	1, 714	. 6
Lehew-Montevallo shaly loams, steep phases	5, 177	1. 9
Litz loam, eroded hilly phase	1, 017	. 4
Litz loam, eroded rolling phase	1, 670	. 6
Litz loam, eroded steep phase	839	. 3
Litz loam, rolling phase	157	. 1
Litz loam, steep phase	321	. 1
Litz shaly silt loam, eroded hilly phase	6, 925	2. 4
Litz shaly silt loam, eroded rolling phase	11, 190	4. 0
Litz shaly silt loam, eroded steep phase	311	. 1
Litz shaly silt loam, eroded undulating phase	2, 887	1. 0
Litz silt loam, hilly phase	1, 609	. 6
Litz silt loam, rolling phase	861	. 3
Litz silt loam, steep phase	803	0. 3
Litz stony loam, very steep phase	728	. 3
Monongahela silt loam	953	. 3
Needmore silty clay loam, eroded rolling phase	2, 076	. 7
Needmore silty clay loam, eroded undulating phase	757	. 3
Needmore silty clay loam, severely eroded rolling phase	450	. 2
Neubert loam	1, 916	. 7
Ooltewah silt loam	630	. 2
Pace silt loam, eroded rolling phase	2, 926	1. 1
Pace silt loam, rolling phase	210	. 1
Pace silt loam, undulating phase	2, 329	. 8
Prader and Melvin silty clay loams	4, 078	1. 5
Purdy and Tyler silt loams	570	. 2
Ramsey stony fine sandy loam, hilly phase	370	. 1
Ramsey stony fine sandy loam, steep phase	2, 879	1. 0
Rockland, limestone material	429	. 2
Sequatchie fine sandy loam, eroded rolling phase	237	. 1
Sequatchie fine sandy loam, undulating phase	467	. 2
Sequoia silt loam, rolling phase	152	. 1
Sequoia silt loam, undulating phase	158	. 1
Sequoia silty clay loam, eroded rolling phase	4, 551	1. 6
Sequoia silty clay loam, eroded undulating phase	4, 476	1. 6
Sequoia silty clay, severely eroded rolling phase	1, 964	. 7
Staser and Huntington silt loams	2, 776	1. 0
Stony hilly land, Talbott soil material	440	. 2
Stony rolling land, Talbott soil material	576	. 2
Stony steep land, Talbott soil material	191	. 1
Stony very steep land, Ramsey soil material	1, 637	. 6
Talbott silty clay loam, eroded rolling phase	802	. 3
Talbott silty clay loam, eroded undulating phase	168	. 1
Talbott silty clay, severely eroded rolling phase	257	. 1
Tellico clay loam, severely eroded hilly phase	2, 212	. 8
Tellico clay loam, severely eroded rolling phase	235	. 1
Tellico clay loam, severely eroded steep phase	4, 524	1. 6
Tellico loam, eroded hilly phase	759	. 3
Tellico loam, eroded rolling phase	2, 400	. 9
Tellico loam, hilly phase	698	. 3
Tellico loam, rolling phase	273	. 1
Tellico loam, steep phase	1, 035	. 4
Tellico stony loam, very steep phase	6, 096	2. 1
Waynesboro loam, eroded hilly phase	369	. 1
Waynesboro loam, eroded rolling phase	1, 082	. 4
Waynesboro loam, eroded undulating phase	176	. 1
Whitesburg silt loam	1, 310	. 5
Wolftever silt loam, undulating phase	196	. 1
Made land	41	(1)
Mines, pits, and dumps	227	. 1
Water	1, 766	. 6
Total	278, 400	100. 0

[1] Less than 0.1 percent.

Alcoa loam, eroded undulating phase (2 to 5 percent slopes) (Ae).—This undulating to gently sloping well-drained red soil consists of local alluvium or colluvium from Tellico soils. Much of it has been eroded to the extent that the plow layer now consists of remnants of the original surface soil mixed with subsoil. The areas are 2 to 15 acres in size and are on foot slopes below steeper

Tellico soils. All of this soil is in the Tellico-Neubert soil association.

Profile description:

0 to 10 inches, dark reddish-brown friable loam.
10 to 20 inches, dark-red friable but moderately firm clay loam.
20 to 60 inches, red, friable but moderately firm clay loam streaked with yellow and brown; bedrock, at depths of 3 to 12 feet, is calcareous sandstone in some places and shale in others.

This relatively fertile soil is medium to strongly acid and has a moderate content of organic matter. The surface layer has a good tilth. The subsoil is permeable. Internal drainage is medium, and the capacity for holding moisture available to crops is fairly high.

Use suitability.—Practically all of this soil has been cleared and is used for crops and pasture. Most of it is in corn, small grains, and lespedeza, but about 20 percent is in permanent pasture, and 10 percent is in cotton, tobacco, and vegetables. Very little is idle. Most farmers use some fertilizer and lime.

The smooth surface, moderately high fertility, and good tilth and permeability make this soil well suited to fairly intensive use for a wide variety of crops, including alfalfa, tobacco, cotton, and truck crops. Under a high level of management, short crop rotation can be used. Pasture of high quality and carrying capacity can be maintained where the fertility is at a high level and a good pasture mixture is properly seeded. For a further discussion of use and management, see group 6 in the section, Use and Management of Soils.

Alcoa loam, eroded rolling phase (5 to 12 percent slopes) (Ad).—This soil differs from the eroded undulating phase chiefly in having stronger slopes. In general, the plow layer contains more subsoil material and the depth to bedrock is less. This soil is associated with the eroded undulating phase on foot slopes below steeper areas of Tellico soils. It is in the Tellico-Neubert soil association.

The surface soil is dark reddish-brown loam or clay loam from 5 to 6 inches thick. The subsoil is dark-red firm but friable clay loam. Below about 18 inches, the material is streaked with yellow and brown. Bedrock is at depths ranging from 2 to 8 feet. The surface layer has fair to good tilth, and the subsoil is permeable. Internal drainage is medium. Runoff is high, and the soil is definitely erodible when cultivated. Fertility is moderately high, and the content of organic matter is moderate. The soil is medium to strongly acid.

Use suitability.—Practically all of this soil has been cleared and is cultivated. Corn, hay, small grains, and tobacco are the chief crops. Some fertilization is practiced, and much of the acreage is limed at intervals.

This soil is suited to the crops commonly grown, including alfalfa, tobacco, and truck crops. Its sloping surface, however, makes it erodible and not suitable for intensive use. Moderately long rotations are required, and fieldwork should be done on the contour. The soil responds well to proper management. For a discussion of use and management, see group 8 in the section, Use and Management of Soils.

Alcoa clay loam, severely eroded rolling phase (5 to 12 percent slopes) (Ab).—This soil differs from the eroded undulating phase chiefly in having stronger slopes and in having lost practically all of its original surface layer through erosion. It is widely distributed, generally in small areas among areas of other Alcoa soils, in the Tellico-Neubert soil association.

The plow layer consists of dark-red firm clay loam, and the underlying subsoil material, to depths of 15 to 18 inches, is similar. Bedrock of calcareous sandstone or shale is at depths ranging from 2 to 5 feet.

This soil is medium to strongly acid. The plow layer has unfavorable tilth and a low content of organic matter. Internal drainage is medium, but the soil does not absorb moisture well and has small capacity for holding moisture for crops. Fertility is lower than for the less eroded phases. There are small gullies in places, most of which can be filled by ordinary tillage.

Use suitability.—All of this soil has been cultivated. A small part is now used for crops, chiefly lespedeza and corn, but a great part is idle or is used as unimproved permanent pasture. Crop yields and the carrying capacity of pasture are low.

The unfavorable tilth, low fertility, low capacity for holding moisture available to plants, and the rolling surface limit the use of this soil to hay crops and pasture. Corn, soybeans, and other row crops should be grown only at very long intervals. Where the fertility and content of organic matter are materially improved, the soil is moderately productive of red clover, orchardgrass, lespedeza, white clover, bluegrass, and small grains. Where feasible, much of the soil can well be built to a fair state of fertility and used as permanent pasture. For a discussion of use and management, see group 16 in the section, Use and Management of Soils.

Alcoa loam, eroded hilly phase (12 to 25 percent slopes) (Ac).—This phase consists of moderately eroded hilly areas of Alcoa loam. It is a somewhat excessively drained soil derived from reddish local alluvium or colluvium washed from Tellico soils. Most of it has been eroded to the extent that the surface soil or plow layer now consists of a mixture of subsoil material and original surface soil material. The soil occurs in areas ranging from 4 to 20 acres and is associated with the other Alcoa soils throughout the Tellico-Neubert soil association. Most of the acreage is east and southeast of Athens.

The surface layer is a dark reddish-brown loam, 5 to 10 inches thick. The subsoil is dark-red firm but friable clay loam. Yellow and brown streaks are common below 18 inches. Shaly bedrock is below depths of 2 to 7 feet.

This is a relatively fertile soil. It is medium to strongly acid and has a moderate content of organic matter. The surface layer has good tilth, and the subsoil is permeable. Internal drainage is medium. Although runoff is rapid, the capacity for holding moisture available to crops is fairly high.

Use suitability.—All of this soil has been cleared and cultivated. About half is either idle or used as unimproved pasture. Corn and hay, chiefly lespedeza, are the predominant crops. Some fertilization is practiced, and lime has been applied to some areas.

This soil is not suited to intensive use because it is strongly sloping and very erodible when cultivated. Field operations, chiefly tillage and application of fertilizer and lime, are difficult. Much of the acreage probably can be well used as permanent pasture if it is fertilized, limed, and properly seeded. Areas to be used for crops require a long rotation consisting mainly of fall-sown small grains, hay, and pasture. For a discussion of use

and management, see group 17 in the section, Use and Management of Soils.

Alcoa clay loam, severely eroded hilly phase (12 to 25 percent slopes) (Aa).—This soil represents areas of hilly Alcoa loam that have been eroded to such extent that the plow layer now consists almost wholly of subsoil material. The plow layer is dark-red firm clay loam. The subsoil is similar to the plow layer to depths of 16 to 18 inches. Below this depth the material is streaked with yellow and brown. Shaly bedrock material is at depths ranging from 1½ to 4 feet. There are some large gullies in places.

This soil is associated with other Alcoa soils on foot slopes below steeper slopes of Tellico soils in the Tellico-Neubert soil association. Most of the acreage is east and southeast from Athens.

Alcoa clay loam, severely eroded hilly phase is medium to strongly acid, and the fertility and content of organic matter are moderately high. Internal drainage is medium, but runoff is high. The soil is moderately permeable but has a moderate to low capacity for holding moisture available to plants.

Use suitability.—All of this soil has been cleared and cultivated at some time. A great part is now either idle or used as unimproved pasture.

The strong slopes and unfavorable tilth and moisture relations make this soil very poorly suited to crops. With proper fertilization, liming, and seeding, it is capable of producing a fair amount of good grazing. The strong slopes, however, make liming a difficult process. If care is not taken to maintain a good stand of grass, the surface soil erodes and gullies form. For a discussion of use and management, see group 19 in the section, Use and Management of Soils.

Apison loam, eroded rolling phase (5 to 12 percent slopes (Af).—This well-drained friable soil of the uplands overlies interbedded variegated purplish, red, and yellow acid shale and sandstone. The color of the soil ranges from light reddish to yellow according to the color of the parent rock. The soil occupies valley positions below and adjacent to steeper Lehew-Montevallo soils.

Profile description:

0 to 8 inches, light reddish-brown or grayish-brown, grading to yellowish brown, very friable loam to clay loam; in forested areas upper 2 inches stained darker by organic matter.
8 to 14 inches, light reddish-brown or yellowish-brown friable clay loam.
14 to 30 inches, light reddish-brown or yellowish-brown firm clay loam of medium nut structure; material has a purplish cast in most places and contains sandy shale fragments in places.
30 inches+, bedded acid shale and sandstone of various colors, as red, purple, olive, and brown.

The entire profile is strongly to very strongly acid, and the amount of plant nutrients and organic matter is low. It is permeable and absorbs moisture readily, but its moisture-holding capacity is rather low because of the shallow depth to bedrock. The upper layers are nearly stone-free.

Use suitability.—Practically all of this soil has been cleared. About 20 percent is in corn, 15 percent in hay, 10 percent in forest, and 5 percent in tobacco and cotton. Most of the rest is in pasture or idle. Probably not more than half of the farmers fertilize corn and hay, but all of them consistently fertilize cotton and tobacco.

This soil is physically suited to crops and pasture, but yields are low because of low fertility and moderately low water-holding capacity. The soil is deficient in lime, organic matter, and all plant nutrients but responds well to proper fertilization. Corn, small grains, tobacco, cotton, and vegetables are suited to this soil, as well as hay crops such as red clover, lespedeza, and redtop. Alfalfa produces fairly well where proper soil amendments are used. The soil is moderately susceptible to erosion, and its control is an important part of management. A moderately long rotation that includes hay crops is well suited. Provision should be made for contour tillage and a cover crop during the winter. For a discussion of use and management, see group 11 in the section, Use and Management of Soils.

Barbourville loam (1 to 3 percent slopes) (Ba).—This moderately well drained to well drained soil on colluvial slopes consists of material originating from acid sandstone and sandy shale. The soil occurs as small very gently sloping areas at the heads of drains and at the base of slopes occupied by the Lehew-Montevallo, Jefferson, and Litz loam soils. Most of it is in the Lehew-Montevallo soil association at the base of Starr Mountain.

Profile description:

0 to 20 inches, yellowish-brown very friable loam.
20 to 40 inches, brown friable but slightly sticky fine sandy clay loam; a few gray and brown splotches in most places below 36 inches; bedrock shale at depths of 2½ to 7 feet.

This soil is medium acid and has a moderate supply of organic matter. It is relatively stone-free, except for several areas at the base of Starr Mountain that contain a few cobbles. The soil is permeable; water is readily absorbed and fairly well retained. The lay of the land is favorable. The water table is at depths ranging from 4 to 8 feet.

Barbourville loam, as mapped, includes small areas of the associated Jefferson and Cotaco soils.

Use suitability.—Most of Barbourville loam has been cleared and used for crops and pasture. An estimated 50 percent is now in crops, principally corn and hay. The rest is in pasture or idle. Farmers generally fertilize corn, small grains, cotton, and tobacco. Rotations are not systematically practiced.

This soil is physically well suited to intensive use for crops, particularly intertilled crops, if it is adequately fertilized. Fair yields of most crops can be obtained without fertilizer, but a moderate amount is necessary for high yields and continued productivity. The soil is well suited to tobacco, vegetables, and corn. A short rotation is satisfactory, and control of runoff and erosion is not a problem. In some places, however, deposition of material is harmful. Small grains generally are injured more than spring-grown crops. Alfalfa is grown successfully in places, but stands generally survive only about 2 years. For a discussion of use and management, see group 4 in the section, Use and Management of Soils.

Bolton silt loam, eroded hilly phase (12 to 25 percent slopes) (Bb).—This hilly well-drained soil of the uplands was derived from the residuum of sandy dolomitic limestone. It is distinguished by its permeable, somewhat resilient surface layer. A great part has been eroded to such extent that the plow layer now consists of a mixture of surface soil and subsoil. The soil occurs mostly on the north- and east-facing slopes of the limestone uplands.

It is associated with Fullerton and Clarksville soils. The areas are widely distributed in the Fullerton-Clarksville-Greendale, the Dewey-Fullerton-Emory, and the Clarksville-Fullerton soil associations.

Profile description:

0 to 6 inches, reddish-brown to brown very friable silt loam.
6 to 12 inches, dark reddish-brown moderately sticky but crumbly silty clay loam.
12 to 36 inches, dark-red to red, sticky, crumbly silty clay or silty clay loam.
36 inches +, red, firm, crumbly silty clay; bedrock sandy dolomitic limestone at depths of 15 to 30 feet.

The soil is strongly acid throughout and has a moderate supply of organic matter. It is moderately high in plant nutrients. The soil is permeable, and good tilth is maintained easily. Water is absorbed fairly rapidly, and the water-holding capacity is moderately high.

Some areas have not been cleared, and here erosion is negligible. There are a few chert fragments throughout the profile in most places. In some areas the surface soil and subsoil resemble corresponding layers of Decatur soils in color.

Use suitability.—Nearly all of Bolton silt loam, eroded hilly phase, has been cleared and used for crop and pasture. Probably 50 percent is now in pasture or idle, and about 5 percent is in forest. The rest is largely in corn and hay. Some fertilizer is applied to row crops, and much of the acreage has been limed.

This soil is hilly and therefore is somewhat difficult to work, subject to erosion, and not suited to intensive use for tilled crops. Long rotations consisting chiefly of small grains and hay crops are suited. If properly fertilized and seeded, much of the acreage probably can be well used for permanent pasture. For a discussion of use and management, see group 17 in the section, Use and Management of Soils.

Bolton silt loam, eroded rolling phase (3 to 12 percent slopes) (Bc).—This well-drained soil of the uplands has developed from the residuum of sandy dolomitic limestone. It is largely on the north- and east-facing slopes of ridge crests. It differs from Bolton silt loam, eroded hilly phase, chiefly in that it occupies lesser slopes. Erosion is less a hazard than in the eroded hilly phase, but in most places from one-fourth to one-half of the original surface soil has been lost. There are a few gullies, although the soil has not been injured greatly by erosion. This soil is associated with Fullerton soils of the cherty ridges.

The brown to reddish-brown surface soil is 4 to 8 inches thick. The subsoil is red to dark-red friable silty clay or silty clay loam. A few chert fragments are mixed with the soil in most places. A small part is in woods, and here the topmost 2 inches is stained darker by organic matter.

This is a strongly acid soil. The content of organic matter is moderate, and that of plant nutrient is moderately high. The soil is notably permeable and readily absorbs moisture. The water-holding capacity is moderately high. Both internal and external drainage are medium.

Use suitability.—Most of this soil has been cleared and used for crops and pasture. About 25 percent is in corn, 10 percent in small grains, and 25 percent in hay. Most of the rest is in pasture or idle. Some fertilization is practiced, and much of the acreage has been limed.

This soil is well suited to all crops grown in the county, including alfalfa, tobacco, and truck crops. It is an excellent soil for fruits and vegetables. Fair yields of most crops can be obtained without soil amendments, but high yields require substantial fertilization. For a discussion of use and management, see group 8 in the section, Use and Management of Soils.

Bolton silt loam, eroded steep phase (25 to 40 percent slopes) (Bd).—This soil has a steeper slope than the eroded hilly phase of Bolton silt loam. In general, the surface soil is thinner, more erosion has taken place, and bedrock of sandy dolomitic limestone is at shallower depths. Gullies have formed in places, and a few areas are severely eroded. Some areas are still under native forest, and on these erosion is not active. This soil is largely on north- and east-facing slopes in association with Fullerton soils of the cherty ridge areas.

The present surface soil in most places is reddish-brown friable silt loam to silty clay loam. The subsoil is red to dark-red firm silty clay loam.

Use suitability.—Most of this soil has been cleared for a number of years. A large part is now in pasture or lies idle. About 10 percent has been reforested with a natural stand of yellow pine, and 15 to 20 percent is in crops, principally corn and lespedeza. Both crop and pasture yields are moderately low under prevailing management.

The very strong slope makes this soil poorly suited to crops, but properly fertilized and seeded, it is productive of pasture. Lime and phosphorus probably are the most important amendments required. For a discussion of use and management, see group 19 in the section, Use and Management of Soils.

Bruno loamy fine sand (1 to 3 percent slopes) (Be).—This is an excessively drained sandy soil on bottom lands. The parent material is from sandstone and quartzite and the sandy component of sandy shale, of sandy dolomitic limestone, and of calcareous sandstone. The surface is gently undulating, and the areas are adjacent to the channels of the larger streams, chiefly the Hiwassee River and Conasauga Creek. All of this soil is subject to flooding.

Profile description:

0 to 18 inches, very pale brown loamy fine sand.
18 to 36 inches +, pale-yellow loamy fine sand, grading with depth to lighter colored more sandy material; bedrock at depths of 5 to 16 feet.

In places there are faint yellow mottles below a depth of several feet. The areas along the Hiwassee River have much mica in the form of fine flakes throughout the soil mass. The areas derived chiefly from Tellico soil material have red to reddish-brown loamy fine sand to a depth of about 18 inches. Below this is reddish-yellow loamy fine sand, grading to lighter colored fine sand.

The entire profile of Bruno loamy fine sand is loose, or open, and very rapidly permeable. The soil is very easily worked and can be cultivated when very wet or very dry. The fertility and content of organic matter are low, and the soil is neutral to medium acid. It absorbs water quickly, but its capacity for holding moisture is small. Its easy permeability and position on the bottom lands make moisture accessible to deep-rooted crops. On the whole, this soil is droughty. Erosion is no hazard, but in certain areas shallow rooted crops may be damaged by scouring or heavy deposits of material left by floodwaters.

Use suitability.—Most of this soil has been cleared and used for crops or pasture. Corn is the chief crop and in places is grown several years in succession. Bermudagrass is on some of this soil and apparently affords an appreciable amount of grazing.

The sandiness of this soil limits its ability to produce. Properly fertilized, it is suited to special crops such as melons. Corn produces fairly well under adequate fertilization, and alfalfa yields fairly well for a few seasons. The more common pasture grasses, especially bermudagrass, maintain a good stand but make limited growth during drier parts of the growing season. Frequent application of small amounts of fertilizer is thought to be more practical than applying larger amounts less frequently. Weed infestation is much less than on the more fertile soils, and a little cultivation thoroughly exposes their roots to drying. For a discussion of use and management, see group 2 in the section, Use and Management of Soils.

Clarksville cherty silt loam, rolling phase (3 to 12 percent slopes) (Ce).—This light-colored, well-drained, cherty soil is underlain by cherty dolomitic limestone. It occupies crests of the cherty ridges. The most extensive areas are on the ridges along McMinn, Mouse, and Rogers Creeks. This soil is associated with the Fullerton soils in the Clarksville-Fullerton and the Fullerton-Clarksville-Greendale associations.

Profile description:

0 to 6 inches, light-gray, loose, very friable cherty silt loam.
6 to 15 inches, yellow friable cherty silt loam.
15 to 36 inches, predominantly yellow compact but friable cherty silty clay loam or cherty silty clay; some yellowish-brown and reddish-yellow splotches and streaks.
36 to 48 inches +, variegated yellow and reddish-yellow compact but crumbly cherty silty clay; dolomitic limestone at depths of 20 to 40 feet.

The amount and size of the chert fragments vary; in places, they are less than 2 inches in size, whereas in others the pieces may be 12 to 16 inches in diameter. A small acreage has a cherty loam surface layer rather than cherty silt loam, and here the subsoil contains a noticeable amount of sand. In some places the deep subsoil is reddish.

The surface layer has good tilth, and on the whole the soil is permeable. Surface runoff and internal drainage are medium. The content of plant nutrients and organic matter is low. In fact the Clarksville soils have the lowest fertility of all those overlying limestone.

This soil is medium to strongly acid. Its capacity for holding moisture available to plants is moderate. Erosion is somewhat of a hazard, but in general less so than on other soils over limestone that have similar slopes.

Use suitability.—Practically all of this soil is under native deciduous forest that has been cut over. The chert interferes with cultivation and is hard on tillage implements and mowing equipment. The low fertility and acid condition require that heavy fertilization be practiced if moderately good yields are to be obtained. Organic matter and lime are among the amendments needed.

This soil is suited to moderately intensive use but keeping its fertility at a high level is more difficult than on most other soils over limestone. Where adequate fertilization is practiced, corn, small grains, lespedeza, red clover, and redtop are suited. Tobacco and some truck crops are well suited. Alfalfa, bluegrass, and whiteclover are much less suited to this soil than to soils such as those of the Decatur, Dewey, and Farragut series. For a discussion of use and management, see group 14 in the section, Use and Management of Soils.

Clarksville cherty silt loam, eroded rolling phase (5 to 12 percent slopes) (Cb).—This phase represents rolling areas of Clarksville cherty silt loam that have been cultivated and, consequently, materially eroded. The plow layer for much of the acreage is a mixture of remnants of the original surface layer with the upper part of the subsoil. It is grayish-yellow cherty silt loam and at a depth of 5 inches is underlain by yellow or yellowish-brown cherty firm but friable silty clay loam or silty clay. Bedrock of cherty dolomitic limestone is at depths of 20 to 40 feet. Most of this soil is in the Clarksville-Fullerton association. Practically all of the rest is in the Fullerton-Clarksville-Greendale association.

The surface layer has good tilth, but chert interferes with cultivation, and in a few places tillage is nearly impractical. A small acreage has a cherty loam rather than a cherty silt loam texture. A few patches on the more exposed positions have lost all the original surface layer, and here the subsoil is yellow cherty silty clay loam.

As for the rolling phase, this soil has low fertility and is medium to strongly acid. It is permeable and has a moderate capacity for holding moisture for plants.

Use suitability.—Practically all of this soil has been cleared and cultivated. Much of it is now used as unimproved pasture or is idle. Probably a third is cropped, chiefly to corn, lespedeza, and redtop. A small acreage is in tobacco, small grains, and red clover. Yields generally are low. Some farmers apply fertilizer, and a few areas have been limed.

This soil is suited to many kinds of tilled crops, including corn, tobacco, small grains, and some hay crops. Alfalfa, bluegrass, whiteclover, and other more exacting crops are not well suited. Good stands of these are difficult to maintain. With adequate fertilization, however, fairly good yields of the better suited crops are feasible, and good pasture can be maintained if lespedeza and redtop are seeded and enough fertilizer is applied. For a further discussion of use and management, see group 14 in the section, Use and Management of Soils.

Clarksville cherty silt loam, hilly phase (12 to 25 percent slopes) (Cd).—This light-colored well-drained cherty soil has developed over cherty dolomitic limestone. It differs from the rolling phase in having stronger slopes. It lies on ridge slopes below the smoother Clarksville soils on the ridgetops. The areas are widely distributed over the Clarksville-Fullerton and the Fullerton-Clarksville-Greendale soil associations.

The profile is similar to that of the rolling phase, except the surface layer may be thinner and the depth to bedrock somewhat less. A small part has a cherty loam rather than cherty silt loam texture; and in these places there is an appreciable amount of sand throughout the profile.

This soil is low in plant nutrients and organic matter and is medium to strongly acid. It is permeable, however, and has a moderate capacity for holding moisture available to plants. Its strong slopes make it subject to erosion, although the high content of chert retards removal of the soil material by runoff.

Use suitability.—All of this soil is under cutover deciduous forest. The chert, strong slopes, and low fertility limit its suitability for tilled crops. It can be made to produce fairly good pasture if it is adequately fertilized and properly seeded. Nevertheless, stands of the more exacting legumes and grasses are more difficult to maintain than on the more fertile soils. For this reason, hay and pasture plants such as lespedeza, redtop, and fescue may be better suited. Areas that must be used for crops require heavy fertilization, liming, and careful tillage if they are to be kept fairly productive. For a discussion of use and management, see group 18 in the section, Use and Management of Soils.

Clarksville cherty silt loam, eroded hilly phase (12 to 25 percent slopes) (Ca).—This phase consists of hilly areas of Clarksville cherty silt loam that have been eroded to such extent that the plow layer in much of the acreage is a mixture of original surface soil and subsoil. It is on cherty ridge slopes. Much of it is in the Clarksville-Fullerton soil association.

The plow layer, a grayish-yellow cherty silt loam, is underlain by yellow firm but friable cherty silty clay loam. Below approximately 2 feet is variegated yellow and reddish yellow, compact, cherty silty clay. Cherty dolomitic limestone is at depths of 15 to 35 feet.

The amount of chert is sufficient in practically all places to interfere materially with cultivation, and in a few places it very nearly prohibits tillage. The content of plant nutrients and organic matter is low, and the soil is medium to strongly acid. It is fairly permeable and is capable of holding a moderate amount of water for plants. The strong slope and rather firm subsoil increase runoff and encourage erosion.

Included with this soil is a small acreage that has a cherty loam rather than cherty silt loam plow layer. In these areas the subsoil contains some sand.

Use suitability.—Practically all of this soil has been cleared and cropped at some time. Probably two-thirds of it now is used for pasture or is idle; the rest is in corn and hay, chiefly lespedeza. Small grains are grown to some extent, and a small acreage may be in tobacco. Not much fertilization is practiced, and a little lime has been applied. Crop yields normally are low.

Chiefly because of the strong slope, low fertility, and the chertiness, this soil has limited suitability for tilled crops. Long rotations, heavy fertilization, and careful tillage are required for areas used for crops. With proper fertilization and liming, good stands of the less exacting hay and pasture grasses and legumes can be maintained. Pasture ceases to grow during the drier parts of the growing season. The north-facing slopes are normally less droughty than the south-facing slopes. The more eroded parts are more droughty than the less eroded parts, as moisture relations are less favorable where the surface layer is more clayey. For a further discussion of use and management, see group 18 in the section, Use and Management of Soils.

Clarksville cherty silt loam, steep phase (25 to 50 percent slopes) (Cf).—This phase represents areas of Clarksville soil that have steep slopes. In general the soil is more cherty than the hilly phase and its depth to bedrock of cherty dolomitic limestone is less. A great part of the acreage is in the Clarksville-Fullerton association, though some is in the Fullerton-Clarksville-Greendale association.

The surface layer is light-gray cherty silt loam. The subsoil at a depth of 10 inches is yellow firm but friable cherty silty clay loam. Below a depth of about 30 inches the material is splotched with reddish yellow, and the texture is more nearly a cherty silty clay. Bedrock is at depths ranging from 12 to 30 feet.

The soil is low in plant nutrients and organic matter and is medium to strongly acid. Much of it is so cherty as to be very difficult to cultivate. It is moderately permeable and holds a moderate amount of water available to plants.

Use suitability.—All of this soil is under cutover deciduous forest. The very strong slope, chert, and low fertility make it poorly suited to either crops or pasture. Where it must be used for these purposes, very careful management, including use of long rotations and adequate fertilization, is required if the areas are to be kept productive. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Clarksville cherty silt loam, eroded steep phase (25 to 50 percent slopes) (Cc).—In this separation are areas of steep Clarksville cherty silt loam that have been cleared and cultivated and, as a result, eroded to the extent that the plow layer now consists of a mixture of original surface soil with the subsoil. The soil occurs on the steep slopes of cherty ridges, chiefly in the Clarksville-Fullerton and Fullerton-Clarksville-Greendale soil associations.

The plow layer is a grayish-yellow cherty silt loam. It is underlain by yellow firm but friable cherty silty clay loam or cherty silty clay. The material below a depth of about 30 inches is variegated yellow and reddish-yellow cherty silty clay. Bedrock of cherty dolomitic limestone is at depths ranging from 12 to 30 feet. There may be a few rock outcrops in places. Gullies are common but can be obliterated by tillage or stabilized to such extent that erosion is arrested and they can be crossed with machinery.

Use suitability.—All of this soil has been cleared and cultivated at some time. Little of it is now used for crops. Some has reverted to forest, and the rest is lying idle or is used as unimproved permanent pasture.

The very strong slopes, chert, and low fertility make this soil poor for either crops or pasture. Areas that must be used for these purposes require very careful management if they are to be kept productive. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Cotaco loam (1 to 3 percent slopes) (Cg).—This imperfectly drained soil consists of local alluvium derived from adjacent higher lying sandy soils, chiefly those of the Lehew, Montevallo, and Jefferson series. The areas lie as very gently sloping strips along the drainageways.

The soil is closely associated with the Lehew-Montevallo, Jefferson, Apison, and Barbourville soils in the western part of the county and with the Litz loam, Ramsey, and Jefferson soils in the eastern part of the county.

Profile description:

0 to 15 inches, grayish-brown to light yellowish-brown very friable loam.
15 to 24 inches, mottled yellow, brown, and gray friable but sticky loam or sandy clay loam.
24 inches +, gray, splotched with yellow and brown, sticky clay loam.

The texture ranges from fine sandy loam to loam. There are some wet or poorly drained spots. A few areas

have small sandstone fragments, but not in quantities that prohibit cultivation. Small areas of Barbourville and Whitesburg soils are included.

Cotaco loam is medium acid and has a moderate amount of organic matter in the surface layer. It appears to be rather low in other plant nutrients. The soil material is permeable, but external and internal drainage are slow. Seepage from the adjacent slopes and lack of surface relief keeps the lower soil horizons saturated much of the time. Accordingly, moisture is available to plants through a great part of the growing season. The moisture supply is excessive for alfalfa, tobacco, and cotton.

Use suitability.—Most of the acreage has been cleared and used for crops and pasture. A large part is now in pasture and some is idle. Corn and hay are the chief crops. Many areas are farmed with the surrounding soils. Fertilizers are used sparingly where crops are grown.

This soil is suited to crops, but the lack of good internal drainage limits its range of use. The relatively moist subsoil favors corn, certain hay crops, and pasture. Its smooth surface and ability to respond to adequate fertilization make this soil well suited to intensive cultivation. Internal drainage can be improved in many places. For a discussion of use and management, see group 4 in the section, Use and Management of Soils.

Cotaco silt loam (1 to 3 percent slopes) (Ch).—This imperfectly drained soil consists of local alluvium washed from adjacent areas of Litz and Sequoia soils. It occupies very gently sloping strips along the drainways and is widely distributed throughout the Sequoia-Litz-Cotaco and Litz-Cotaco soil associations.

Profile description:

0 to 20 inches, dark yellowish-brown to brown friable heavy silt loam.
20 to 42 inches, mottled dark-brown, light yellowish-brown, and gray crumbly silty clay loam.

The depth to the gray mottling varies considerably; in places, it is within 10 inches of the surface, and in others it is below 24 inches, which is an indication of better drainage. Shale fragments occur throughout the soil in places.

This soil is medium acid. Apparently it is moderately well supplied with organic matter and nitrogen but is not high in other plant nutrients. It is permeable and its capacity for holding moisture available to plants is high. In most places the subsoil is saturated much of the time. External drainage is slow but adequate. Internal drainage is slow. Temporary flooding after heavy rains occurs on many areas.

Use suitability.—Most of this soil has been cleared, and a large part is used for pasture. A considerable proportion is idle. Probably 25 percent is now in crops. Most of the areas are small and narrow. Many are not given individual attention; instead they are treated in much the same way as surrounding areas of more extensive soils. Most areas have inadequate drainage for alfalfa, small grains, and tobacco, but corn and many hay crops are grown successfully. Some of the better drained areas, however, make good yields of tobacco.

Drainage would broaden the use suitability and productivity for most crops, but this may be impractical in areas subject to seepage. Lime and phosphate are essential for pasture and general crops on this soil. Bluegrass, whiteclover, and lespedeza are well suited where these amendments are added. For a discussion of use and management, see group 4 in the section, Use and Management of Soils.

Cumberland silt loam, undulating phase (2 to 5 percent slopes) (Ck).—This is a red well-drained soil of the stream terraces. Most of the areas are 10 to 25 feet above the present flood plains; however, some along the Hiwassee River lie 75 to 125 feet above the flood plains. The parent material of the soil consists of old mixed alluvium strongly influenced by limestone. Included in the alluvium are materials from sandstone, shale, and quartzites. In this county these stream terrace deposits are largely underlain by limestone at depths of 4 to 20 feet or more.

Most of the acreage is in the valleys of the Hiwassee River, Oostanaula Creek, and Conasauga Creek. The soil is associated with the Etowah, Waynesboro, Dewey, and Decatur soils.

Profile description:

0 to 8 inches, dark-brown friable silt loam.
8 to 36 inches, red or dark-red friable but moderately sticky firm silty clay loam; crumbly when dry.
36 to 52 inches, reddish-brown to red friable crumbly clay loam; gravel beds or bedrock are at depths of 4 to 20 feet.

Areas on the high terraces adjacent to the Hiwassee River have gravel and cobbles in the soil, but not in numbers that interfere greatly with cultivation. On the lower terraces the soil is nearly free of gravel.

This is one of the more fertile soils of the county, although it is medium to strongly acid. The soil material is moderately permeable, and internal drainage is good. The capacity for holding moisture available to plants is high.

Use suitability.—Most of this soil has been cleared and cultivated. It is used for practically all crops grown in the county. Corn and hay occupy a large part. Small grains, tobacco, and cotton occupy about 20 percent, and pasture 15 to 20 percent. Probably 5 percent is idle. Most farmers use lime and fertilizer and a short crop rotation.

The smooth surface, fairly high fertility, good internal drainage, and capacity for holding moisture make this one of the more desirable soils for crops and pasture. It has a wide range of suitability for crops. It is a good soil for alfalfa, tobacco, cotton, and certain market vegetables. It is especially favorable for the more exacting legumes and grasses. Although relatively productive, it responds well to proper liming and fertilization. In some places, the firm subsoil and moderate slope are somewhat a problem because they encourage erosion. In general, well-managed moderately short rotations are suitable. For a discussion of use and management, see group 6 in the section, Use and Management of Soils.

Cumberland silty clay loam, eroded undulating phase (2 to 5 percent slopes) (Cm).—Most of this soil is along the Hiwassee River, Oostanaula Creek, and Conasauga Creek and is associated with the other Cumberland soils and with Waynesboro soils. It is areas of undulating Cumberland silty clay loam that have been eroded to the extent that the plow layer of much of the acreage now consists of a mixture of surface and subsoil materials.

The 5- or 6-inch surface layer is reddish-brown friable silty clay loam. Below this is red or dark-red friable but moderately sticky firm silty clay loam. Below a depth of about 32 inches is reddish-brown to red, friable but firm, crumbly clay loam. Gravel beds or bedrock are at depths ranging from 4 to 20 feet.

Areas on the high stream terraces adjacent to the Hiwassee River have gravel and cobbles, but not in numbers that interfere greatly with cultivation. A few patches on the more exposed slopes have lost most of the original surface soil and therefore have a plow layer of red firm silty clay loam.

The plow layer is not so high in organic matter and the tilth is not so favorable as for the undulating phase. Permeability is good but not so favorable as for the uneroded undulating phase. Internal drainage is medium, and the soil has a good capacity for holding moisture for crops. The natural fertility is moderately high, and the reaction is medium to strongly acid.

Use suitability.—All of this soil has been cleared and cultivated. A very great part is now used for crops and pasture. Red clover and alfalfa, corn, hay, and small grains occupy much of the acreage. Pastures are of good quality and are grown in rotation with crops. Fertilization is practiced on much of the soil, and a great part of the acreage has been limed. Crop yields are high, compared to those on many soils.

This soil is well suited to a wide variety of crops, and under proper management it can be used in a 3-year rotation. Tobacco yields well but the quality may not be so high as on some other soils. The soil is especially well suited to the more exacting legumes and grasses. Erosion is somewhat a hazard on the more sloping parts, but it is not difficult to control. For a discussion of use and management, see group 6 in the section, Use and Management of Soils.

Cumberland silty clay loam, eroded rolling phase (5 to 12 percent slopes) (Cl).—This soil occupies gentle slopes in association with the smoother Cumberland soils. Most of the acreage is along the Hiwassee River and Oostanaula and Conasauga Creeks. It differs from the undulating phase chiefly in having stronger slopes and in having lost a sizeable part of the original surface layer through erosion.

In most places the plow layer consists of remnants of the original surface layer mixed with the upper subsoil material. This layer is a reddish-brown friable silty clay loam. Beneath it lies red or dark-red friable but moderately sticky, firm, silty clay loam. At a depth of 30 inches there is reddish-brown to red, friable but firm, crumbly clay loam. Gravel beds or bedrock are at depths ranging from 3 to 16 feet.

This fertile soil has a moderate content of organic matter. It is medium to strongly acid. The tilth is good, though somewhat less so than that of Cumberland silt loam, undulating phase. The soil is permeable and has good internal drainage. The firm subsoil, however, somewhat retards percolation of moisture. For most of the soil, the capacity for holding moisture available to plants is relatively high. Exceptions are patches on the more exposed parts of slopes where all of the surface soil has been lost. In these patches the plow layer consists entirely of subsoil material, and moisture conditions and tilth are not so favorable.

Use suitability.—All of this soil has been cleared and cultivated, and a great part is now used for crops and pasture. Corn, hay, and small grains predominate. Some fertilization is practiced, and much of the acreage has been limed.

This soil is well suited to cultivation but its rolling surface makes it less suitable than the undulating Cumberland soils. It is especially well suited to general farm crops such as corn, small grains, alfalfa, red clover, bluegrass, and white clover. Some special attention needs to be given to erosion control. For a further discussion of use and management, see group 8 in the section, Use and Management of Soils.

Dandridge silt loam, hilly phase (12 to 25 percent slopes) (Dd).—This shaly soil is shallow to bedrock of calcareous shale. Internal drainage is medium, but surface runoff is high. Much of this soil is in the Dandridge-Needmore association, and a great part of the rest is in the Needmore-Dandridge. This soil is a part of a hilly landscape in which there is a limited acreage suitable for crops.

Profile description:

0 to 4 inches, light yellowish-brown to dark grayish-brown friable silt loam; upper inch or so notably darker because it contains more organic matter.
4 to 12 inches, brownish-yellow friable shaly silty clay loam.
12 inches +, variegated yellowish-brown and grayish-yellow partly disintegrated shale contaning a small amount of silty material; bedrock of calcareous shale at depths of 1 to 4 feet.

Probably half the acreage is over "black shale" and is shallow to bedrock. Elsewhere, the shale is more variegated and its upper part may be leached of lime. In these places the depth to shale varies widely within the 1-foot to 4-foot range. In many places the surface layer is shaly silt loam rather than silt loam.

The content of plant nutrients is moderate, and the supply of organic matter is not high. The reaction ranges from medium acid to calcareous, but the material at depths of 12 to 18 inches is commonly calcareous. The soil material is permeable, and normally water can percolate into the shale at a moderate rate. Runoff, however, develops rapidly during rains. The capacity for holding moisture available to plants is limited, chiefly because the soil is shallow to bedrock.

Use suitability.—Practically all of this soil is under cutover deciduous forest. Chiefly because it is hilly and shallow to bedrock, the soil is not well suited to tilled crops. It is suited to pasture, and stands of bluegrass and whiteclover are not difficult to establish. The carrying capacity of pasture is limited because the soil is rather droughty. The plants cease growing during the drier parts of the grazing season. For a further discussion of use and management, see group 21 in the section, Use and Management of Soils.

Dandridge shaly silt loam, eroded hilly phase (12 to 25 percent slopes) (Da).—This soil differs from Dandridge silt loam, hilly phase, chiefly in having lost a considerable part of its surface soil through erosion. It predominates in the Dandridge-Needmore soil association and occupies much of the strongly sloping part of the Needmore-Dandridge association.

The 4-inch plow layer is light brownish-yellow friable shaly silt loam. Beneath it lies brownish-yellow shaly silty clay loam. This last-named layer contains much shale. Below depths ranging from 10 inches to 3 feet is partly disintegrated shale or calcareous bedrock shale. The degree of erosion varies greatly. In some places gullies are 1 to 2 feet deep and bedrock shale is exposed.

This soil is permeable, but the shallow depth to bedrock greatly limits its ability to absorb moisture. As a result, runoff develops quickly during rains. The fertility is

moderately low. Much of the soil is either neutral or calcareous throughout.

Use suitability.—Practically all of this soil has been cleared and used for crops. At present, most of it is in unimproved pasture. Parts are idle. A small portion is cropped, chiefly to corn and lespedeza. Minor acreages are in alfalfa and small grains. Crop yields are low. Little fertilization is practiced.

The strong slopes and shallow depth to bedrock make this soil poorly suited to crops. Its adequate supply of lime favors growth of the more desirable pasture plants. Where the soil is adequately fertilized and properly seeded, a good stand of legumes and grasses having a fair carrying capacity can be obtained. The low capacity for holding moisture available to plants, however, greatly restricts use for grazing during the drier parts of the growing season. For a further discussion of use and management, see group 21 in the section, Use and Management of Soils.

Dandridge silt loam, steep phase (25 to 60 percent slopes) (Df).—This shaly soil is shallow to bedrock of calcareous shale. It differs from the hilly phase chiefly in having stronger slopes. Also the depth to bedrock is generally less and the surface layer normally contains more shale. There are some rock outcrops. Most of this soil is in the Dandridge-Needmore soil association.

Use suitability.—Practically all of this soil is under cutover deciduous forest. The strong slopes, shale, and shallow depth to bedrock make it poor for crops. It is capable of producing good grazing, as bluegrass and whiteclover form a good stand where the soil is fertilized and properly seeded. The carrying capacity of pasture, however, is limited because the soil is droughty. The north-facing slopes are more productive than the south-facing because they have a more favorable moisture supply. For a further discussion of use and management, see group 21 in the section, Use and Management of Soils.

Dandridge shaly silt loam, eroded steep phase (25 to 60 percent slopes) (Dc).—This phase represents steep areas of Dandridge silt loam that have been eroded to such extent that the plow layer consists of remnants of the original surface soil mixed with subsoil. This plow layer is light brownish-yellow very shaly silt loam or silty clay loam. Bedrock of calcareous shale is at depths of 1 to 2 feet. Gullies are common, some of which are too large to be filled in by tillage. Most of this soil is in the Dandridge-Needmore soil association.

Use suitability.—All of this soil has been cleared and cultivated at some time. Much is now idle or used for improved pasture. A part has reverted to forest.

The strong slopes and shallow depth to bedrock make this soil poorly suited to crops, and the most eroded parts are not well suited to pasture. If adequately fertilized and seeded, a great part of the acreage could be made moderately productive of those legumes and grasses most desirable in pastures. Particular care should be taken to stabilize the more eroded or gullied patches. For a further discussion of use and management, see group 21 in the section, Use and Management of Soils.

Dandridge silt loam, rolling phase (5 to 12 percent slopes) (De).—This rolling well-drained soil is shallow to bedrock of calcareous shale. Much of it is known as black shale land. It lies largely on the smooth rather narrow ridgetops in association with the more strongly sloping Dandridge soils. It is mainly in the Dandridge-Needmore soil association, but some areas occur on a relatively smooth landscape in the Needmore-Dandridge association.

Profile description:

0 to 5 inches, light yellowish-brown to dark grayish-brown friable silt loam; upper inch or so darker because it contains more organic matter.
5 to 14 inches, brownish-yellow friable shaly silty clay loam.
14 inches +, variegated yellowish-brown and grayish-yellow partly disintegrated shale; bedrock of calcareous shale at depths of 1 to 4 feet.

Probably more than half the acreage is underlain by black calcareous shale and is shallow to bedrock. Elsewhere, the shale has a more variegated color and in places may be leached of lime. In these areas the calcareous bedrock is at a relatively greater depth. In practically all places, however, bedrock is within the depth range stated.

This soil is moderately low in fertility and in most places is slightly acid or slightly calcareous. It has a low supply of organic matter. The soil material is permeable, and moisture can percolate through the underlying rock fairly well. Nevertheless, the capacity for holding moisture available to plants is low. This soil, compared to some others in the county, is rather droughty.

Use suitability.—All of this soil is under native deciduous forest. It is suited chiefly to small grains and hay crops. In general, crops requiring a long growing season can be expected to be damaged by drought. Tobacco and truck crops are not well suited, and it may be that much of the acreage should be used as pasture. For a further discussion of use and management, see group 11 in the section, Use and Management of Soils.

Dandridge shaly silt loam, eroded rolling phase (5 to 12 percent slopes) (Db).—This phase is in the Dandridge-Needmore and the Needmore-Dandridge soil associations. Much of it is in the vicinity of and to the northeast of Etowah. This phase consists of rolling areas of Dandridge silt loam that have been materially eroded.

The plow layer consists of yellowish-gray shaly or very shaly silt loam or silty clay loam. This material extends to depths of 1 to 3 feet. Below this is black calcareous shale or variegated calcareous shale that may be leached of its lime in the upper part. There are a few shallow gullies, most of which can be obliterated by deep tillage or subsoiling.

This soil is low in plant nutrients, but a great part of it is either neutral or slightly alkaline. The soil material is permeable but it holds little moisture for plants.

Use suitability.—All of this soil has been cleared and cropped at some time. More than half is now in pasture or lying idle. Possibly a quarter is used for crops, chiefly corn and lespedeza. In places some fertilization is practiced. Crop yields generally are low.

Droughtiness and shallow depth to shale make this soil difficult to work and limit its use for crops. Small grains and hay crops are best suited. Much of the acreage is best used as pasture. Where properly fertilized, bluegrass and whiteclover develop a good stand. For a further discussion of use and management, see group 11 in the section, Use and Management of Soils.

Decatur silty clay loam, eroded undulating phase (2 to 5 percent slopes) (Dm).—This dark-red, well-drained soil overlies high-grade limestone. It has been eroded to such extent that the plow layer now consists of a mixture of

the original surface layer with subsoil material. A great part of this soil is in the Decatur-Dewey-Emory soil association. It occupies smooth limestone valleys that pass through the central part of the county from northeast to southwest. It is associated with other members of the Decatur series and with Dewey and Emory soils.

Profile description:

0 to 6 inches, brown to dark reddish-brown friable silty clay loam.
6 to 36 inches, red to dark-red silty clay; firm in place but friable and crumbly when dug out; becomes more clayey with depth.
36 to 60 inches +, red, firm to very firm silty clay; slightly lighter colored than layer above; bedrock limestone at depths of 6 to 18 feet.

In the less eroded areas the surface layer is thicker and more nearly a silt loam. Small patches have lost all of the original surface layer through erosion, and in these the plow layer consists of dark-red firm silty clay. In places the 36- to 60-inch layer has yellowish streaks and splotches.

This is one of the soils of the county that holds up well under cultivation. Its fertility is fairly high, it has a moderate content of organic matter in the surface layer, and it generally stands continuous cropping fairly well. Internal drainage is medium because the firm subsoil retards movement of moisture. Consequently, runoff water accumulates rather quickly during rains. The soil holds a moderately large supply of moisture for plants but not so much as the Emory soils on local alluvial slopes. The soil is medium to strongly acid.

Use suitability.—All of this soil has been cleared and cultivated. A great part is now used for crops, principally corn, lespedeza, and alfalfa. Large acreages of small grains and pasture are also grown. Some acreage may be used for tobacco and cotton. Moderately short rotations are used on much of the soil, and some fertilization is practiced. Lime has been applied to most of the acreage. Crop yields are high.

The smooth surface, high fertility, and fairly favorable moisture relations make this one of the most desirable soils for crops and pasture. It is especially well suited to general farm crops, including alfalfa, red clover, and orchardgrass. This soil responds well to fertilization. Lime is needed to establish good stands of the more exacting legumes. Boron is required for productive stands of alfalfa. Runoff should be controlled in the more eroded parts when the soil is cultivated. For a further discussion of use and management, see group 7 in the section, Use and Management of Soils.

Decatur silty clay loam, eroded rolling phase (5 to 12 percent slopes) (Dl).—This phase differs from the eroded undulating phase chiefly in having stronger slopes. In general the plow layer contains more clay, exposed patches of silty clay subsoil caused through erosion are more common, and the depth to bedrock is less. Practically all of this soil is in the Decatur-Dewey-Emory soil association.

The 5-inch plow layer is brown to dark reddish-brown, moderately friable silty clay loam. The subsoil to a depth of about 32 inches is red or dark-red crumbly silty clay, firm in place but crumbly when disturbed. Bedrock limestone is at depths ranging from 4 to 14 feet.

This fertile soil has a fairly high content of organic matter, except in the more eroded parts. It is medium to strongly acid. Internal drainage is medium, but the firm silty clay subsoil retards percolation. The subsoil is sufficiently permeable, however, to allow normal development of plant roots. This soil has a moderate capacity for holding moisture available to plants. Because it is somewhat more droughty, plants do not grow so well on this soil during dry periods as they do on soils of the Emory series.

Use suitability.—All of this soil has been cleared and cropped at some time. About one-fifth is in pasture consisting of bluegrass, bermudagrass, and whiteclover. The rest is used for general farm crops, chiefly corn, alfalfa, red clover, oats, and wheat. Moderately short crop rotations are used, and some fertilization is practiced. Lime has been applied to a great part of the acreage.

This soil is well suited to general farm crops, but its rolling surface, slow permeability, and erodibility when cultivated require that moderately long rotations be used. It is particularly well suited to alfalfa, red clover, and other more exacting legumes and grasses. It is less suited to truck crops. The quality of tobacco is not so high as on some of the well-drained lighter colored soils. For a further discussion of use and management, see group 9 in the section, Use and Management of Soils.

Decatur silty clay, severely eroded rolling phase (5 to 12 percent slopes) (Dh).—This soil differs from the eroded undulating phase chiefly in having stronger slopes and in having lost more soil material through erosion. Practically all of its surface soil is gone, and in places, part of the subsoil. Some shallow gullies have formed. Most of this soil lies in small tracts that are associated with the less eroded Decatur soils. Practically all of it is in the Decatur-Dewey-Emory soil association.

The plow layer consists of red to dark-red firm silty clay. The subsoil is similar, except below 30 inches it is lighter colored. Bedrock limestone is at depths ranging from 2 to 12 feet.

The plow layer has poor tilth. Moisture infiltrates rather slowly, although the soil material is fairly permeable to plant roots. The content of organic matter and plant nutrients is low. The soil is medium to strongly acid. It responds well to proper fertilization. The slow rate of water percolation and the moderately strong slopes make the soil subject to erosion when cultivated.

Use suitability.—All of this soil has been cleared and cropped at some time. Much of it is now used as pasture. Corn and hay occupy a small part. Yields are not high. Moderate fertilization is practiced in places, and lime has been applied to part of the acreage.

The unfavorable tilth, limited capacity for holding moisture for plants, and susceptibility to erosion limit the use of this soil. If properly fertilized and limed, it can be used for tilled crops grown in a long rotation that consists mainly of sod crops. Among the more suitable crops are small grains and legume-and-grass hay. Good stands of alfalfa, red clover, orchardgrass, and timothy can be established if lime and fertilizer are applied. The soil is droughty, especially for the shallow-rooted crops. Pasture vegetation ceases to grow during the drier parts of the growing season, so supplemental pasture is needed to prevent overgrazing. For a further discussion of use and management, see group 16 in the section, Use and Management of Soils.

Decatur silty clay loam, eroded hilly phase (12 to 25 percent slopes) (Dk).—This soil differs from Decatur silty clay loam, eroded undulating phase, chiefly in having stronger slopes. Much of the acreage is in the Decatur-

Dewey-Emory soil association. Practically all of it is in small strips that lie on the short, strong slopes below smoother areas of Decatur and Dewey soils.

The surface layer consists of a mixture of remnants of the original surface soil with the upper part of the subsoil. The mixture is brown to dark reddish-brown friable silty clay loam. Next occurs a red to dark-red friable silty clay that extends to a depth of 30 inches. This layer is firm when in place but friable and crumbly when disturbed. Underlying this is a lighter red, firm to very firm, silty clay. The depth to bedrock limestone ranges from 4 to 12 feet.

In the more exposed patches the subsoil material is at the surface and the plow layer consists of red firm silty clay. Shallow gullies have formed in places. Most of them can be obliterated by deep tillage or a moderate amount of filling.

This fertile soil has a moderate amount of organic matter, except where all of the surface layer has been removed through erosion. It is medium to strongly acid. The surface soil is moderately permeable, but the firm subsoil causes runoff to develop quickly during rains. The soil has a fairly good capacity for holding moisture available to plants. Although its firm subsoil retards percolation of water, this hilly phase is permeable to plant roots. If it is properly fertilized, deep-rooted legumes will thrive.

Use suitability.—Most of this soil has been cleared and cropped at some time. At present much of it is used for pasture, and a sizable part is used for general farm crops, especially alfalfa and small grains. Some fertilization is practiced, and a great part of the acreage has been limed.

This soil is suited to crops requiring cultivation. Because it is strongly sloping and has a subsoil that retards percolation of moisture, it is not suitable for truck crops, particularly root crops. Proper management requires a long crop rotation. The soil is well suited to small grains and to legumes and grasses grown for hay and pasture. If properly fertilized and limed, it will produce high-quality grazing. For a further discussion of use and management, see group 17 in the section, Use and Management of Soils.

Decatur silty clay, severely eroded hilly phase (12 to 25 percent slopes) (Dg).—This phase consists of areas of hilly Decatur silty clay from which erosion has removed practically all of the original surface soil and, in places, part of the subsoil.

The plow layer consists of red to dark-red firm silty clay. The underlying subsoil is similar material but becomes lighter red with depth. Bedrock limestone is at depths ranging from 3 to 12 feet. In places there are gullies, most of which can be obliterated by deep tillage or a moderate amount of filling.

The content of organic matter is low, and the general level of fertility is not high. The tilth of the plow layer is unfavorable, moisture percolates slowly, and the capacity for holding moisture available to plants is relatively low. The soil is droughty.

Use suitability.—All of this soil has been cleared and cropped at some time. A great part now is used as pasture. Small grains and corn occupy a small acreage. Yields are not high.

The strong slope, poor tilth, and droughtiness make this soil poorly suited to crops. If properly fertilized and limed, it is capable of supporting legume-and-grass pasture of high quality. Pasture grows luxuriantly during the moist parts of the growing season but ceases to grow during the dry periods. For a further discussion of use and management, see group 19 in the section, Use and Management of Soils.

Dewey silty clay loam, eroded undulating phase (2 to 5 percent slopes) (Dv).—This undulating well-drained red soil of the uplands is underlain by high-grade limestone. It differs from the Decatur soils in having a lighter brown surface layer and a lighter red and somewhat more friable subsoil. Compared to the Fullerton soils, it has a browner surface soil and redder and less cherty subsoil. Most of this soil lies on the gently rounded crests of the low ridges of the limestone valleys. It is widely distributed throughout the Decatur-Dewey-Emory soil association.

Profile description:

0 to 8 inches, brown to reddish-brown friable silt loam or silty clay loam.
8 to 16 inches, yellowish-red to red, firm but friable silty clay loam.
16 to 40 inches, yellowish-red to red, firm but friable silty clay that is lighter red with depth.
40 inches +, yellowish-red firm silty clay, streaked and splotched with yellow; bedrock limestone at depths of 8 to 20 feet.

Some fine chert fragments are in the lower part of the subsoil. A few patches on the more exposed knobs have lost all of the original surface soil and now have a plow layer consisting of red firm silty clay loam or silty clay.

This fertile soil has a moderate amount of organic matter. It is medium to strongly acid. The surface layer absorbs moisture well, but the subsoil is sufficiently firm to somewhat retard percolation. On the whole, the soil has a high capacity for holding moisture available to plants although it is less favored in this respect than the soils of the Emory, Staser, and Huntington series.

Use suitability.—Practically all of this soil has been cleared and cropped. About 40 percent is used for corn and small grains; 30 to 40 percent for hay, chiefly lespedeza and alfalfa; and about 15 percent for pasture. The rest is either idle or under native deciduous forest. Rotations of moderate length are used, and some fertilization is practiced. Lime has been applied to much of the acreage. Crop yields are generally high.

This is one of the more desirable soils for general farming, as it is well suited to practically all crops commonly grown. It is productive, easily worked, and not difficult to conserve against erosion and losses of plant nutrients. It responds well to fertilization. The more exacting legumes and grasses, as alfalfa, red clover, white clover, and bluegrass, are not difficult to establish. Where fertility is kept high, the yields of crops and the carrying capacity of pasture are high. This soil is also well suited to tobacco and cotton, and to several of the truck crops. For a further discussion of use and management, see group 7 in the section, Use and Management of Soils.

Dewey silty clay loam, eroded rolling phase (5 to 12 percent slopes) (Du).—This soil differs from the eroded undulating phase chiefly in having stronger slopes, but it also has lost more of its original surface soil through erosion and has a greater number of severely eroded patches where the more clayey subsoil is exposed. The soil is widely distributed throughout the Decatur-Dewey-Emory soil association.

The plow layer normally is brown to reddish-brown silty clay loam, and the subsoil is red firm silty clay loam

to silty clay. Below a depth of 40 inches is red or yellowish-red firm silty clay streaked and splotched with yellow. Some small chert fragments are in the greater part of the soil, especially in the lower subsoil. Bedrock limestone is at depths ranging from 7 to 18 feet.

This fertile soil contains a moderate amount of organic matter. It is medium to strongly acid. The surface soil absorbs moisture well, but the subsoil retards percolation, so runoff develops more quickly than on the more friable, permeable soils. Erosion is a hazard where the soil is cultivated. Except on the more eroded patches, the soil holds a moderately large amount of moisture for plants. The few small gullies that occur in some places generally are easily filled in by deep tillage.

Use suitability.—Practically all of this soil has been cleared and cropped at some time. A great part is now used for crops, predominantly corn, lespedeza, and alfalfa. Probably 20 percent is used as pasture. Some tobacco is grown. Fertilization is practiced to some extent, and much of the acreage has been limed.

This soil is well suited to general farming. Because it is moderately strongly sloping, a fairly long rotation is required to maintain productivity. Like those of the Decatur series, this soil is especially well suited to a system of farming in which the more desirable legumes and grasses are important. With proper fertilization and liming, good stands of alfalfa, red clover, timothy, white clover, and bluegrass are not difficult to establish, and high yields can be expected. Some special care is required to control erosion. For a further discussion of use and management, see group 9 in the section, Use and Management of Soils.

Dewey silty clay, severely eroded rolling phase (5 to 12 percent slopes) (Ds).—This soil differs from the eroded undulating phase chiefly in having stronger slopes and in having lost practically all its original surface soil through erosion. It is widely distributed in small areas throughout the Decatur-Dewey-Emory soil association.

The plow layer consists of yellowish-red to red firm but friable silty clay. The material below this is similar, but it is lighter red with increasing depth and contains some small chert fragments. Bedrock limestone is at depths of 5 to 16 feet.

The tilth of the plow layer is unfavorable because it is clayey and has a low content of organic matter. The fertility of this soil is not high. It absorbs moisture slowly and holds a limited amount for plant growth. The strong slopes and slow permeability cause runoff to develop quickly. Small gullies occur in places, but most of them can be filled by deep tillage. Although moisture percolates slowly, the soil material is fairly permeable to roots.

Use suitability.—All of this soil has been cleared and cropped at some time. A notable part is idle or used as pasture. Some is cropped, chiefly to small grains, corn, and hay. Some areas are fertilized, and much of the soil has been limed. Crop yields generally are low.

This soil is suited to crops and pasture but its usefulness is limited by its unfavorable moisture relations, poor tilth, and susceptibility to erosion. If properly managed, especially if fertilizer and organic matter are properly applied, it can be made fairly productive. Deep-rooted legumes such as alfalfa are well suited where the fertility is brought to a moderately high level. Much of the acreage probably can well be used as permanent pasture. The soil is droughty, so plants stop growing late in summer or early in fall when the driest weather commonly prevails. Supplemental feed or pasture is needed to prevent overgrazing of this soil during dry weather. For a further discussion of use and management, see group 16 in the section, Use and Management of Soils.

Dewey silty clay loam, eroded hilly phase (12 to 25 percent slopes) (Dt).—This soil differs from Dewey silty clay loam, eroded undulating phase, chiefly in having much stronger slopes and in having lost somewhat more soil material through erosion. Much of this soil lies as narrow strips on strong slopes of the upland part of the limestone valleys. It is widely distributed throughout the Decatur-Dewey-Emory soil association.

The plow layer consists of reddish-brown silty clay loam, and the subsoil is a yellowish-red to red, firm but friable silty clay loam that grades to silty clay. Below a depth of about 30 inches is somewhat lighter red firm silty clay, streaked and splotched with yellow. Bedrock limestone is at depths ranging from 5 to 16 feet. There is a small amount of fine chert throughout much of the soil, especially in the lower subsoil.

Included with this phase are a few areas of Talbott silty clay loam, eroded hilly phase. In these Talbott areas the subsoil is more compact and the material below a depth of 24 inches or so is mottled with yellow and gray. Bedrock limestone in these included areas is 2 to 5 feet from the surface.

In places Dewey silty clay loam, eroded hilly phase, has a few gullies, most of which can be obliterated by deep tillage or a moderate amount of filling. Small patches in the more exposed areas have lost all the original surface soil and have a plow layer of red silty clay.

This well-drained soil is moderately high in fertility and contains a moderate amount of organic matter, except in the more eroded patches. It is medium to strongly acid. The surface layer is permeable to moisture, but the subsoil somewhat retards percolation. It is permeable to roots, however. The strong slopes and retarded percolation of moisture in the subsoil make this soil subject to erosion when cultivated.

Use suitability.—Most of this soil has been cleared and cultivated at some time, although a small acreage is still under native deciduous forest. Much of this soil now is used for hay and pasture. Some fertilization is practiced, and lime has been applied to part of the acreage. Crop yields are moderate.

This soil is suited to crops requiring cultivation, but its strong slopes and the retarded percolation of moisture make it somewhat difficult to work and subject to erosion. Under proper management, long rotations, consisting chiefly of small grains and hay and pasture crops, are required. The soil is well suited to these crops, and where properly fertilized and limed, is productive of the more desirable legumes and grasses. Much of the acreage probably can well be used as permanent pasture. For a further discussion of use and management, see group 17 in the section, Use and Management of Soils.

Dewey silty clay, severely eroded hilly phase (12 to 25 percent slopes) (Dr).—This soil is widely distributed throughout the Decatur-Dewey-Emory soil association. It consists of hilly areas of Dewey silty clay loam that have lost practically all of the original surface layer, and in places part of the subsoil, through erosion.

The plow layer is yellowish-red or red firm silty clay, and the upper subsoil is similar. Below a depth of about

30 inches is lighter red silty clay, streaked and splotched with yellow. Bedrock limestone is at depths of 4 to 15 feet. Much of this soil has a small amount of fine chert scattered throughout the profile, especially in the lower subsoil.

Included with this phase is a small acreage of Talbott silty clay, severely eroded hilly phase. In these included areas the subsoil below a depth of about 24 inches may be mottled with yellow and gray, and the entire subsoil is more compact silty clay than that of the Dewey subsoil. Bedrock is at depths ranging from 2 to 5 feet.

There are shallow gullies in many places throughout Dewey silty clay, severely eroded hilly phase. Most of them can be obliterated by ordinary tillage.

This soil has unfavorable tilth in the plow layer and absorbs moisture slowly. Its capacity for holding moisture available to plants is low. The fertility is not high, and the content of organic matter is low. The soil is medium to strongly acid. Although moisture percolates slowly, the soil in general is fairly permeable to plant roots.

Use suitability.—All of this soil has been cleared and cropped at some time, but a large part now is idle or used as pasture. Only a small part is cropped, and on it small grains and lespedeza predominate.

Strong slopes, unfavorable tilth, and droughtiness make this soil poor for tilled crops. If properly fertilized and limed, it is capable of supporting a good stand of the more desirable legumes and grasses for pasture. Its droughtiness, however, stops plant growth early in drier parts of the growing season. Either supplemental feed or use of pasture on the more favorable soils is necessary at such times. For a further discussion of use and management, see group 19 in the section, Use and Management of Soils.

Dewey clay loam, eroded undulating phase (2 to 5 percent slopes) (Dp).—This well-drained red soil has developed over relatively high-grade sandy dolomitic limestone. It differs from Dewey silty clay loam, eroded undulating phase, in having an appreciable amount of sand throughout the surface soil and sublayers. It occurs in the Decatur-Dewey-Emory and the Dewey-Fullerton-Emory soil associations. Much of it is in areas east and south of Englewood.

Profile description:

0 to 6 inches, brown or reddish-brown clay loam.
6 to 14 inches, yellowish-red, grading to red, notably friable but firm clay loam.
14 to 36 inches, red clay loam; friable but somewhat firmer than layer above.
36 inches +, red, streaked and splotched with yellow, firm, clay loam grading to clay; bedrock limestone at depths of 8 to 20 feet.

Small amounts of fine chert and sandstonelike fragments are scattered throughout the profile. The chert is more common in the lower subsoil. Included in this soil are areas where the surface layer is loam. These included areas occur in the less eroded places.

Dewey clay loam, eroded undulating phase, has a moderately high content of organic matter. It is medium to strongly acid. The surface layer is permeable to moisture, and the subsoil is somewhat more permeable than that of Dewey silty clay loam, eroded undulating phase.

This soil holds a relatively large amount of moisture for plants. Erosion is not a great hazard, except on the stronger slopes.

Use suitability.—All of this soil has been cleared and cropped at some time. A great part now is used for general farm crops. Corn occupies about 25 percent, lespedeza 20 percent, and alfalfa about 5 percent. Probably a third is used for pasture. Moderate fertilization and liming have been practiced. Yields are moderately high.

This is one of the better soils for general farming. It is suited to practically all crops commonly grown, including tobacco, cotton, alfalfa, and truck crops. Its loamy nature makes it easier to work than the Dewey silty clay loams. It is well suited to the more exacting legumes and grasses, especially where its fertility is kept at a high level. For a further discussion of use and management, see group 7 in the section, Use and Management of Soils.

Dewey clay loam, eroded rolling phase (5 to 12 percent slopes) (Do).—This soil differs from the eroded undulating phase chiefly in having stronger slopes, and in having lost more of its surface soil through erosion. In most places the plow layer consists of remnants of the original surface soil that have been mixed with subsoil material. This soil is distributed throughout the Dewey-Fullerton-Emory and the Decatur-Dewey-Emory soil associations. Most of it is east and south of Englewood.

The plow layer consists of brown or reddish-brown friable clay loam. Below this and continuing to a depth of about 16 inches is red, firm but friable clay loam. At depths of 30 inches or more this last-named layer is replaced by a somewhat lighter red firm clay, streaked and splotched with yellow. Fine chert occurs throughout much of the soil body and is especially evident in the lower subsoil. Some sandstonelike fragments also are in the soil. Bedrock limestone is at depths of 7 to 18 feet. On the more exposed knobs and slopes, practically all of the original surface soil has been lost and the plow layer consists of red firm clay loam or clay.

This fertile soil has a moderate supply of organic matter and is medium to strongly acid. The plow layer has fairly good tilth and is permeable to moisture. The subsoil is permeable to roots, but it retards infiltration of water. The soil, on the whole, holds a fairly large amount of moisture for plants. The moderately strong slopes and retarded permeability of the subsoil cause runoff to develop rapidly during rains.

Use suitability.—A great part of this soil has been cleared and cropped. Most of it is now in crops, chiefly corn, lespedeza, and small grains. The rest is in pasture, except for a very small part still under native deciduous forest. The soil is used chiefly in crop rotations of moderate length and receives some fertilizer. Crop yields are moderately high, compared to those obtained on other soils of the upland.

This soil is suited to a wide variety of crops and, under proper management, can be kept at a relatively high level of productivity by using a 3-year or 4-year rotation. It is among the better soils for general farming and is especially well suited to the more exacting legumes and grasses. Some care needs to be taken to restrict runoff. For a further discussion of use and management, see group 9 in the section, Use and Management of Soils.

Dewey clay loam, eroded hilly phase (12 to 25 percent slopes) (Dn).—This soil differs from Dewey clay loam, eroded undulating phase, chiefly in having much stronger slopes and, in general, a more eroded surface layer. It is

in the Dewey-Fullerton-Emory and the Decatur-Dewey-Emory soil associations.

The plow layer in most places is brown or reddish-brown friable clay loam. The underlying subsoil is red firm but friable clay loam. At a depth of about 30 inches the subsoil is somewhat lighter red, firm but fairly friable clay that shows streaks and splotches of yellow. Bedrock limestone is at depths of 5 to 16 feet.

Patches where all of the surface soil has been removed through erosion are more common than in the undulating and rolling phases, and in places there are a few gullies. Most of the gullies are shallow and can be filled by ordinary tillage.

This is a fertile soil and has a moderate supply of organic matter. It is medium to strongly acid. Internal drainage is medium. The surface layer absorbs moisture fairly well. The subsoil notably retards infiltration of moisture but is permeable to roots. The strong slopes and somewhat slowly permeable subsoil cause runoff to develop quickly during rains.

Use suitability.—About three-fourths of this soil has been cleared and cropped. The remaining acreage is under cutover deciduous forest. Much of the cleared part is used for pasture. Some areas are in hay and small grains.

Strong slopes make this soil erodible and limit its suitability chiefly to close-growing crops and pasture. Long rotations, consisting chiefly of small grains and legume-and-grass mixtures for hay or pasture, are best suited. This soil will support good stands of the more desirable legumes and grasses if its fertility is kept at a high level. For a discussion of use and management, see group 17 in the section, Use and Management of Soils.

Emory silt loam (1 to 7 percent slopes) (Eb).—This dark-brown, nearly level to sloping, well-drained very fertile soil consists of local alluvium washed from soils that developed over high-grade limestone. The associated soils are chiefly of the Decatur, Dewey, and Farragut series. A great part of Emory silt loam is in the Dewey-Fullerton-Emory and the Decatur-Dewey-Emory soil associations. Most of the acreage lies as strips along gently sloping drainageways or on fans where these drainageways join the larger valleys.

Profile description:

0 to 18 inches, dark yellowish-brown to dark-brown very friable silt loam.
18 to 40 inches, reddish-brown or dark reddish-brown friable silt loam or silty clay loam.
40 inches +, yellowish-red friable but somewhat firm silty clay loam; bedrock limestone at depths of 5 to 12 feet.

In places the dark surface soil may be 24 to 36 inches thick. The material below a depth of 30 inches may have some grayish and brownish mottlings. The mottling is most obvious in the lower parts—those areas nearest to the drainage channels.

This very fertile soil is one of the most productive in the county. It has a moderately high content of organic matter and exceptionally favorable moisture relations. It is permeable and has a relatively great capacity for holding moisture available to plants. It is medium acid. The tilth of the plow layer is very favorable. Owing to the smooth surface and good permeability, the soil is free of erosion hazard in all except a few of the more sloping parts.

Use suitability.—Practically all of this soil has been cleared and cultivated. It now is used intensively. Corn, tobacco, small grains, and hay crops occupy a great part of the acreage. Little of it is under pasture. Fertilization is practiced, and lime has been applied to a large part. Crop yields generally are high.

The high fertility, smooth surface, good tilth, and favorable moisture relations make this soil well suited to intensive use. Under proper management, which includes adequate fertilization, much of it can be used in a short rotation. It is well suited to practically all crops commonly grown, although good stands of alfalfa can be maintained for longer periods of time on the Decatur and Dewey soils. The good moisture relations and the favorable growth of plants during the drier parts of the season favor this soil for pasture. For a further discussion of use and management, see group 3 in the section, Use and Management of Soils.

Emory and Abernathy silt loams (0 to 2 percent slopes) (Ea).—This mapping unit occupies depressions or sinkholes where there is little or no surface drainage. It consists of local alluvium washed from surrounding areas of Decatur, Dewey, Fullerton, and Hermitage soils. Internal drainage is good to a depth of 3 feet. The surface is nearly level or somewhat saucerlike; the outer parts are Emory soil and have gentle slopes, and the inner parts are Abernathy soil and are nearly level. Because of lack of surface drainage, water is ponded on the nearly level parts for short periods following heavy rains or during part of the wet winter season. Most of this soil is in small areas and widely distributed throughout the Dewey-Fullerton-Emory and the Decatur-Dewey-Emory soil associations.

Profile description (Abernathy silt loam parts):

0 to 20 inches, dark-brown or dark reddish-brown friable silt loam.
20 to 40 inches, reddish-brown friable silt loam; below this, material generally mottled; bedrock limestone at depths of 5 to 15 feet.

In places mottlings are within 28 inches of the surface. The surface layer in some areas consists of very recently deposited alluvium and is somewhat lighter brown than the surface layer as described. In such areas a dark brown or very dark brown layer may be directly below this recent overwash. This dark layer represents what was the surface soil at a previous time.

For a description of the Emory silt loam parts see the profile description of Emory silt loam.

The soils of this complex are among the most fertile soils in the county. They have a moderately high content of organic matter and are slightly to medium acid. Internal drainage is medium, but there is very little surface drainage. Practically all water leaves the areas by subterranean channels. The soil material is permeable and has a high capacity for holding moisture for plants. Tilth is good to very good.

Use suitability.—All of this complex has been cleared and cultivated. Nearly all of it is now used intensively for general farm crops, chiefly corn. Short rotations prevail.

This soil is well suited to intensive use, and where the fertility is maintained, it can be used for row crops several years in succession. It is suited to practically all general farm crops and is especially productive of row crops and legume-and-grass mixtures for hay or pasture. Fall-sown small grains may be damaged by ponding during the winter season, and stands of alfalfa cannot be maintained so

long as on the Decatur, Dewey, and Hermitage soils. Certain truck crops can be expected to produce well. This soil is particularly well suited to midsummer pasture, because vegetation grows for a greater part of the dry season than it does on the associated upland soils. For a further discussion of use and management, see group 3 in the section, Use and Management of Soils.

Etowah silt loam, undulating phase (2 to 5 percent slopes) (Ed).—This undulating, well-drained, brown soil is on stream terraces that lie 5 to 15 feet above the adjacent first bottoms. The soil consists of mixed general alluvium that has been strongly influenced by limestone material. It lies on alluvial benches along some of the larger streams, especially Chestuee Creek and the Hiwassee River.

Profile description:

0 to 10 inches, brown friable silt loam.
10 to 18 inches, dark-brown to reddish-brown friable but moderately firm silty clay loam.
18 to 40 inches, yellowish-brown to reddish-yellow friable silty clay loam.
40 to 50 inches, yellowish-red, mottled with yellowish-gray, friable silty clay loam; bedrock at a depth of 4 to 15 feet; in a few places where the soil overlies shale, bedrock is within 2 or 3 feet of the surface.

In most places there are soft dark concretions in the material below a depth of 40 inches. The texture of the surface layer in some areas is loam rather than silt loam. Most of the areas having the loam texture are in the vicinity of uplands that are underlain by sandy rock. The surface layer in some of the more sloping parts is much less thick. In the eroded patches there may be some subsoil material mixed with the surface soil. Those areas of this soil along the Hiwassee River have a noticeable amount of mica flakes throughout the profile. Some parts having a yellowish-brown subsoil are mottled yellow and gray at a depth of 24 inches. Internal drainage here is impaired.

This is a fertile soil that has a moderate content of organic matter. The tilth of the plow layer is favorable, and the soil absorbs moisture well. The subsoil is permeable to both roots and moisture, and, consequently, runoff water does not accumulate rapidly during rains. The capacity for holding moisture available to plants is high.

Use suitability.—Practically all of this soil has been cleared and cropped. Most of it is now used for corn, small grains, and hay crops, chiefly lespedeza and alfalfa. Some fertilization is practiced, and lime has been applied to a great part of the acreage. Crop yields generally are high.

This is one of the more desirable soils for crops, including alfalfa, truck crops, and pasture. It is productive, easily worked, and not difficult to conserve. Alfalfa, however, is not suited to the less well-drained parts. This soil's good moisture relations make it especially favorable for crops that make much of their growth during drier parts of the growing season. For a further discussion of use and management, see group 6 in the section, Use and Management of Soils.

Etowah silty clay loam, eroded rolling phase (5 to 12 percent slopes) (Ec).—This soil differs from the undulating phase chiefly in having stronger slopes and in having lost more of its surface soil through erosion. The plow layer consists of subsoil material mixed with the original surface layer; it is a brown or yellowish-brown silty clay loam. The subsoil below is reddish-yellow friable silty clay loam. The underlying material is similar to that of the undulating phase. Bedrock is at depths of 3 to 10 feet.

This moderately fertile soil is permeable to moisture. It holds a fairly large amount of moisture for plants, but somewhat less than the undulating phase. Runoff water develops more rapidly than on the less eroded undulating phase; consequently, control of erosion requires some attention. The soil is medium to strongly acid.

Use suitability.—Practically all of this soil has been cleared and cropped. Most of it now is used for corn, small grains, and hay. Some fertilization is practiced, and much of the acreage has been limed.

This is a desirable soil for crops, but its sloping surface requires that at least moderately long rotations be used. A rotation consisting of corn, tobacco, or some other row crop, and 2 or 3 years of legume-and-grass hay is well suited. The more exacting legumes and grasses develop a good stand if adequately fertilized and limed. For a further discussion of use and management, see group 8 in the section, Use and Management of Soils.

Farragut silty clay loam, eroded undulating phase (2 to 5 percent slopes) (Fb).—This undulating well-drained brown soil is moderately shallow to acid shale bedrock. The upper 18 to 24 inches of the profile resembles the upper part of the Decatur soils. The surface layer is brown like that of the Decatur, and the subsoil is reddish, firm but friable silty clay. The upper part of this Farragut soil consists of material derived from limestone, and it rests on shale material that is not its parent material. This soil is associated with Sequoia soils in the Sequoia-Litz-Cotaco soil association.

Profile description:

0 to 8 inches, dark-brown friable silt loam or silty clay loam.
8 to 24 inches, red or reddish-yellow firm but somewhat friable silty clay loam to silty clay.
24 to 36 inches, yellowish-red to strong-brown rather tough plastic silty clay; has some soft, weak-structured shale fragments in the lower part.
36 inches +, yellowish-brown silty clay streaked and splotched with yellow and very dark brown; contains great amount of soft shale fragments; bedrock shale at depths of 1½ to 4 feet.

The surface layer varies according to the amount of material that has been lost through erosion. For much of the acreage, the plow layer consists of a mixture of surface soil and subsoil materials, and here the color is more reddish and the texture is definitely a silty clay loam.

Included are a few patches where all surface soil has been lost. In these the plow layer consists of reddish silty clay. Where the shale is less than 36 inches from the surface, the subsoil layers are thinner.

This is a fertile soil and has a moderate amount of organic matter in the surface layer. It is medium to strongly acid. The tilth of the plow layer is moderately favorable, but the silty clay loam texture makes it more difficult to work than many of the soils having silt loam surface layers. The material also puddles more easily, so it clods if plowed when too wet. The soil is permeable to roots, but moisture soaks into it more slowly than into many of the more permeable soils. The soil holds a moderately good supply of moisture for plants.

Use suitability.—Practically all of this soil has been cleared and cropped. Most of it is now used for corn, small grains, lespedeza, and alfalfa. A small part is used for pasture. Little is idle. Most farmers regularly

apply moderate amounts of fertilizer, and a great part of the acreage has been limed. Crop yields are moderately high.

The soil is well suited to general farm crops, such as corn, small grains and legume-and-grass mixtures for hay and pasture. Under proper management a 3- or 4-year crop rotation should be used. The soil erodes rapidly because it is shallow to bedrock shale. It is especially important that runoff water be controlled carefully. Alfalfa and others of the more exacting legumes are well suited. On most of the acreage it is not difficult to maintain a good stand of legumes and grasses. For a further discussion of use and management, see group 7 in the section, Use and Management of Soils.

Farragut silty clay loam, eroded rolling phase (5 to 12 percent slopes) (Fa).—This soil has stronger slopes than the undulating phase, and most of its acreage has lost more soil material through erosion. The plow layer, a reddish-brown silty clay loam, in most places consists of remnants of the original surface soil mixed with the subsoil material. The subsoil is predominantly reddish-yellow to red very firm silty clay. Acid bedrock shale is at depths ranging from 1½ to 3 feet.

A notable part of the acreage is severely eroded. In these severely eroded areas the plow layer consists of the reddish, very firm, silty clay material of the subsoil. In some of these eroded areas shale is intermixed throughout the entire soil.

This moderately fertile soil is capable of responding well when properly fertilized. It holds less moisture for plants than many soils and tends to be droughty during the drier periods. Roots penetrate well, but moisture infiltrates rather slowly. The moderately strong slopes and fairly slow permeability make control of runoff an important problem. Tilth of the plow layer is rather unfavorable, especially in the more eroded parts.

Use suitability.—All of this soil has been cleared and cropped. Corn, wheat, lespedeza, and alfalfa now occupy a great part of the acreage. A small part is used for pasture, and probably 10 percent is idle much of the time. Crop yields range widely according to the amount of soil material that has been lost through erosion.

This soil is suited to crops and pasture but its strong slopes, slow permeability, and somewhat unfavorable tilth make it less suitable to intensive use than many of the smoother more permeable soils. It is capable of producing well if used for a long crop rotation that consists chiefly of close-growing small grains and legume-and-grass mixtures for hay or pasture. It requires moderately heavy applications of fertilizer, lime, and organic matter if it is to be kept productive. For a further discussion of use and management, see group 9 in the section, Use and Management of Soils.

Fullerton silt loam, rolling phase (5 to 12 percent slopes) (Fx).—This rolling soil is deep to bedrock of moderately cherty dolomitic limestone. It occupies crests of the cherty ridges and is associated chiefly with hilly Fullerton soils. This soil is widely distributed in the Dewey-Fullerton-Emory, the Fullerton-Clarksville-Greendale, and the Clarksville-Fullerton soil associations.

Profile description:

0 to 8 inches, very pale brown to yellowish-brown friable silt loam; upper inch or two, in those areas not cleared and cultivated, contains notable amount of organic matter.
8 to 16 inches, reddish-yellow friable silty clay loam.
16 to 36 inches, yellowish-red to red firm but friable silty clay.
36 to 48 inches +, variegated yellowish-red, reddish-yellow and yellow firm but friable silty clay; moderately cherty dolomitic limestone bedrock at depths of 16 to 40 feet.

The texture of the soil in general is finer with depth. The upper part of the subsoil consists of silty clay loam, and the material below a depth of 3 feet, of tight silty clay. There is some chert throughout a great part of the soil, but the chert in the surface layer does not interfere materially with cultivation.

This soil is low in fertility and organic matter. It is medium to strongly acid. As a result of its permeability, the accumulation of runoff during rains is not an appreciable amount. The soil holds a moderate amount of moisture for plants, and the tilth of the plow layer is favorable.

Use suitability.—A great part of this soil is under cutover deciduous forest but is well suited to most crops commonly grown in the county (fig. 2). Tobacco, cotton, and truck crops can be grown. Heavy fertilization and liming are required if the soil is to be kept productive. Although this soil is capable of supporting a good stand of the more desirable legumes and grasses, these stands are not so easily established and maintained as on the more fertile soils of the Decatur and Dewey soils. Nevertheless, its favorable tilth and moisture relations make it one of the more desirable soils for truck crops. For a further discussion of use and management, see group 14 in the section, Use and Management of Soils.

Fullerton silt loam, eroded rolling phase (5 to 12 percent slopes) (Fu).—This phase covers rolling areas of Fullerton silt loam that have lost an appreciable amount of surface soil through erosion. This soil is one of the more extensive of the Fullerton soils. It is widely distributed over the Dewey-Fullerton-Emory, the Fullerton-Clarksville-Greendale, and the Clarksville-Fullerton soil associations. Much of it lies on ridge crests in hilly landscapes.

The plow layer, a mixture of surface soil and subsoil materials, is a brownish-yellow or reddish-yellow friable silt loam. Below this and continuing to a depth of 16 inches is yellow silty clay loam. From a depth of 16 to

Figure 2.—Rolling and hilly phases of Fullerton silt loam; when substantially fertilized and well managed, these soils are suited to a wide variety of crops.

36 inches is yellowish-red or red, firm but moderately friable, silty clay loam that grades to silty clay. The underlying material is variegated yellowish-red, reddish-yellow, and yellow firm silty clay. Bedrock is at depths of 16 to 40 feet. Some chert is scattered throughout most of the soil, but it does not materially interfere with cultivation.

The fertility and organic-matter content of this soil are moderately low. The reaction is medium to strongly acid. The soil is notably permeable, even though the somewhat compact sublayers retard percolation of water. The capacity for holding moisture available to plants is moderately high.

Use suitability.—All of this soil has been cleared and cropped. Much of it is now used for general farm crops, including corn, small grains, and hay. Probably one-third is used for pasture, most of which has not been improved. A small part is idle. Tobacco and cotton are important cash crops, although they occupy only a small acreage. Fertilizer is applied to most crops, and heavy applications are made for tobacco. A small acreage is in alfalfa. This crop normally receives a large application of fertilizer when seeded. Lime has been applied to much of the acreage.

This soil is suited to pasture and a wide variety of crops. It is less fertile than the Dewey and Decatur soils but responds well if it is properly fertilized and is otherwise well managed. The more exacting legumes and grasses yield fairly well under good management, but stands are more difficult to maintain than on many of the more fertile soils. In general, rotations of moderate length are suited, but care is required to restrain runoff. For a further discussion of use and management, see group 14 in the section, Use and Management of Soils.

Fullerton silty clay loam, severely eroded rolling phase (5 to 12 percent slopes) (Fz).—This soil represents rolling areas of Fullerton silt loam that have lost practically all of the original surface soil through erosion. It occupies small tracts on slopes and is associated with other undulating and rolling Fullerton soils.

The plow layer, consisting of subsoil material, is a yellowish-red firm silty clay loam or silty clay. The underlying material is similar to that of the rolling phase. Bedrock is at depths of 15 to 35 feet.

This soil is difficult to cultivate because the plow layer is clayey. In general, its moisture relations are unfavorable. The soil puddles or clods easily when cultivated and holds little moisture for plants. Water infiltrates slowly, so runoff accumulates quickly during rains. The soil is droughty, low in fertility and organic matter, and medium to strongly acid.

Use suitability.—All of this soil has been cleared and cultivated at some time. Now, some of it is idle or is used as unimproved pasture. A small part is cropped along with associated areas of more productive soils.

Unfavorable moisture relations and poor tilth make this soil poor for cultivated crops. If properly fertilized and seeded, it will provide some grazing. The soil is droughty however, and pasture plants grow only during the moist parts of the growing season. For a further discussion of use and management, see group 20 in the section, Use and Management of Soils.

Fullerton silt loam, eroded undulating phase (2 to 5 percent slopes) (Fv).—Most areas of this soil have lost some material through erosion. The 5- to 7-inch surface layer is very pale brown friable silt loam, Below this layer, to a depth of about 15 inches, is reddish-yellow silty clay loam. This material is underlain by yellowish-red to red silty clay that, at a depth of 36 inches, is followed by variegated yellowish-red, reddish-yellow, and yellow firm silty clay. Bedrock of moderately cherty dolomitic limestone is 16 to 40 feet below the surface.

The surface layer has good tilth, and the soil is permeable to moisture and plant roots. It is low in fertility and organic matter and is medium to strongly acid. The capacity for holding moisture for plants is moderately high.

Use suitability.—Most of this soil has been cleared and cropped, chiefly to corn, small grains, and hay. The rest is used mainly for pasture or is still under cutover deciduous forest. Some fertilization is practiced, and much of the acreage now in crops or pasture has been limed. Crop yields are not high under average conditions.

This soil is well suited to many crops, including tobacco, cotton, and truck crops. Heavy fertilization is required for high yields. Under good management a moderately short rotation is suited. The more exacting legumes and grasses can be grown, but they are not so easily established and maintained on this soil as on the more fertile Decatur and Dewey soils. Because the soil is permeable and friable and has a smooth surface, it is one of the more desirable soils for such row crops as potatoes, beans, and strawberries. For a further discussion of use and management, see group 10 in the section, Use and Management of Soils.

Fullerton silt loam, hilly phase (12 to 25 percent slopes) (Fw).—Although this soil differs from the rolling phase mainly in slope, it has a thinner surface soil in places and some patches containing an appreciable amount of chert. It occurs in a few areas in the cherty ridge parts of the county in association with other Fullerton soils.

The surface layer, to a depth of about 7 inches, is very light-brown to yellowish-brown silt loam. Reddish-yellow silty clay loam occurs at depths of 7 to 14 inches. Below this depth is yellowish-red or red, firm but somewhat friable, silty clay. After a gradual transition, at a depth of 36 inches, there is variegated yellowish-red, reddish-yellow, and yellow firm rather tight silty clay. Bedrock is at depths ranging from 10 to 25 feet.

This soil is low in fertility and organic matter. It is medium to strongly acid. The soil is permeable to both roots and moisture; as a result runoff accumulates less rapidly than on soils of the Decatur and Dewey series. The soil holds a moderate supply of moisture for plant growth.

Use suitability.—All of Fullerton silt loam, hilly phase, is under cutover deciduous forest. Although the soil is suited to tilled crops, its strong slopes and low fertility prevent intensive use. It is suitable for general farm crops grown in a long rotation consisting chiefly of close-growing fall-sown small grains and a legume-and-grass mixture for hay or pasture. If productivity is to be maintained at a high level, the soil requires adequate applications of fertilizer and lime. Runoff is very active on cultivated areas; consequently, care is necessary to restrain erosion.

Where feasible, this soil can well be maintained in permanent pasture. Legumes and grasses produce well when the soil is kept fertile, but the more exacting ones

are somewhat more difficult to maintain than on the more fertile soils. For a further discussion of use and management, see group 18 in the section, Use and Management of Soils.

Fullerton silt loam, eroded hilly phase (12 to 25 percent slopes) (Ft).—This phase consists of hilly areas of Fullerton silt loam that have lost an appreciable part of the surface soil through erosion. The plow layer in most places consists of a mixture of original surface soil and subsoil. The soil is widely distributed throughout the Dewey-Fullerton-Emory, Fullerton-Clarksville-Greendale, and Clarksville-Fullerton soil associations. The areas of this soil are about 15 to 80 acres in size and occur on ridge slopes in association with the smoother Fullerton, Clarksville, and Bolton soils, which are on the ridge crests.

The plow layer, a brownish-yellow or reddish-yellow silt loam, is underlain by reddish-yellow firm but friable silty clay loam. The layers below are similar to corresponding layers of the hilly phase of Fullerton silt loam. Bedrock of moderately cherty dolomitic limestone is at depths ranging from 10 to 25 feet. Some patches on the more exposed parts of slopes have lost practically all of the surface soil, and in these the plow layer consists of firm silty clay loam or silty clay subsoil material.

The plow layer has fairly good tilth but is low in plant nutrients and organic matter. The entire soil is medium to strongly acid. Internal drainage is medium, and moisture infiltrates moderately well. The soil has a fairly good capacity for holding moisture for plants.

Use suitability.—All of this soil has been cleared and cropped. Much of it now is used as unimproved pasture or is idle. About 40 percent is in crops, chiefly corn and lespedeza. Not much fertilization is practiced, but a part of the acreage has been limed.

This soil is suitable for tilled crops, but its strong slopes limit its suitability to moderately long rotations that require less intensive management. Small grains and hay crops are among the better suited. Good stands of the more exacting legumes and grasses can be established. However, they require heavy fertilization and are otherwise more difficult to maintain over long periods than on the more fertile Decatur, Dewey, and Emory soils. Much of the acreage probably can be used as permanent pasture on farms where there is sufficient acreage of soils better suited to tilled crops. For a further discussion of use and management, see group 18 in the section, Use and Management of Soils.

Fullerton silty clay loam, severely eroded hilly phase (12 to 25 percent slopes) (Fy).—This soil covers areas that have lost practically all of the original surface soil through erosion, and, in places, part of the subsoil. It is associated with the other Fullerton soils and with other soils of the cherty ridges. Most of it is in tracts of less than 30 acres.

The plow layer consists of subsoil material and is yellowish-red firm but moderately friable silty clay loam. The material below this is more nearly silty clay and is similar to the subsoil of Fullerton silt loam, hilly phase. Bedrock is at depths ranging from 10 to 25 feet. Gullies are common in places but can mostly be obliterated by a little special work or deep tillage. Particular care is needed to establish vegetation vigorous enough to stabilize the gullies.

This soil is low in fertility and organic matter. It is medium to strongly acid. The plow layer has poor tilth, chiefly because of the high clay content. Infiltration of moisture is very slow, and as a result runoff develops quickly during rains. Although the soil is fairly permeable to roots, it is decidedly droughty because of its low capacity for holding moisture for plants.

Use suitability.—All of this soil has been cleared and cropped at some time. Much of it now is idle or used as unimproved pasture. A portion is cropped, chiefly to corn and hay. Yields are low.

The strong slopes, unfavorable tilth, and droughtiness make this soil poorly suited to tilled crops. If properly fertilized and carefully seeded; it is capable of supporting desirable pasture vegetation. Grazing of high quality is more difficult to maintain than on the more productive soils, and droughtiness greatly limits the growing periods for pasture. For a further discussion of use and management, see group 20 in the section, Use and Management of Soils.

Fullerton loam, rolling phase (5 to 12 percent slopes) (Fs).—This well-drained, light-colored soil of the cherty ridges differs from the silt loam Fullerton soils in having a coarser textured surface layer and a noticeable amount of sand in the subsoil. It occurs in rather small tracts on the ridge crests in the Dewey-Fullerton-Emory and the Fullerton-Clarksville-Greendale soil associations.

Profile description:

0 to 8 inches, very pale brown to yellowish-brown loam.
8 to 16 inches, reddish-yellow or yellow, friable, sticky sandy clay loam grading to sandy clay.
16 to 36 inches, yellowish-red to red, firm but friable, sandy clay.
36 inches +, variegated yellowish-red, reddish-yellow, and yellow firm sandy clay; moderately cherty dolomitic limestone bedrock at depths of 16 to 40 feet.

Some chert occurs throughout much of this soil, but there is not enough in the plow layer to interfere with cultivation. A few brown sandstonelike fragments are scattered throughout the soil.

The soil is low in plant nutrients and organic matter and is medium to strongly acid. The plow layer has good tilth, and moisture infiltrates fairly rapidly. The capacity for holding moisture available to plants is moderately high.

Use suitability.—All of this soil is under native deciduous forest. It is suited to many crops, but substantial applications of fertilizer are needed regularly to keep productivity high. Because of the loam plow layer and the good permeability and internal drainage, this soil is well suited to truck crops, tobacco, cotton, and small grains. Other row crops, as corn and soybeans, yield well under good management. Good stands of the more exacting legumes and grasses are more difficult to maintain on this soil than on the Decatur, Dewey, and Hermitage soils. The less exacting legumes and grasses, as lespedeza sericea, orchardgrass, and redtop, may be better suited where it is practical to maintain high fertility. For a further discussion of use and management, see group 14 in the section, Use and Management of Soils.

Fullerton loam, eroded rolling phase (5 to 12 percent slopes) (Fo).—This soil comprises areas of rolling Fullerton loam that have lost a considerable amount of surface soil through erosion. Most of the acreage lies on ridge crests in tracts ranging from 20 to 50 acres. The slopes

of these ridges are occupied chiefly by hilly Fullerton soils. The soil is widely distributed throughout the Dewey-Fullerton-Emory and the Fullerton-Clarksville-Greendale soil associations.

The plow layer, consisting of remnants of surface soil mixed with subsoil, is a yellowish-brown or reddish-yellow loam. The subsoil is similar to that of the rolling phase of Fullerton loam. Moderately cherty dolomitic limestone bedrock is at depths ranging from 16 to 40 feet. In a few patches all of the surface soil has been lost and the plow layer consists of sandy clay subsoil material.

This soil is low in fertility and organic matter. It is medium to strongly acid. Internal drainage is moderate, and moisture infiltrates fairly rapidly except where the subsoil is at or near the surface. The capacity for holding moisture available to plants is moderate. The strong slopes and moderately shallow depth to the firm subsoil material cause runoff to accumulate fairly rapidly during rains.

Use suitability.—Practically all of this soil has been cleared and cropped, and a large part is now used for crops and pasture. Corn occupies about 20 percent; small grains, chiefly wheat, about 10 percent; and hay crops, about 20 percent. A small acreage is idle. Most crops receive some fertilization, and much of the acreage has been limed. Pastures are not fertilized.

This soil is well suited to many kinds of crops, but substantial fertilization must be practiced regularly to produce high yields. Moderately long rotations are required, as there is some erosion hazard on cultivated areas. The more exacting legumes produce fairly well when properly fertilized, but productive stands are more difficult to maintain than on the more fertile soils. This soil is favorable for many of the commonly grown row crops, including tobacco, truck crops, and cotton, because it is loamy and friable and shows good response to fertilization. For a further discussion of use and management, see group 14 in the section, Use and Management of Soils.

Fullerton loam, eroded undulating phase (2 to 5 percent slopes) (Fp).—Parts of this soil have been so eroded that the plow layer now consists of a mixture of original surface soil with subsoil materials. The soil occurs on crests of cherty ridges. It is associated with rolling Fullerton soils on the ridge crests and the hilly Fullerton soils on the ridge slopes. Most of it is in the Dewey-Fullerton-Emory and Fullerton-Clarksville-Greendale soil associations.

In most places the surface layer is light-brown or yellowish-brown friable loam. The subsoil layers are similar to those of the rolling phase of Fullerton loam, and bedrock is at depths of 16 to 40 feet.

This soil is medium to strongly acid. The natural fertility and content of organic matter are low. The surface layer is permeable and has very good tilth. Moisture penetrates fairly rapidly. The capacity for holding moisture for plants is moderate. Internal drainage is medium, and roots penetrate the soil easily.

Use suitability.—A small part of this soil is still under cutover deciduous forest, but most of it has been cleared and cropped. Corn, small grains, lespedeza, and tobacco are the main crops. Some fertilization is practiced and most of the cultivated acreage has been limed. Except for tobacco, yields are not high.

This soil is well suited to many crops. Its good tilth and rapid infiltration make it relatively well suited to truck crops, tobacco, and cotton. Because of low fertility, the soil requires fairly heavy fertilization at regular intervals. A good stand of legumes and grass for hay and pasture can be maintained, but more intensive management (especially heavier fertilization) is necessary on it than on some of the more fertile soils. For a further discussion of use and management, see group 10 in the section, Use and Management of Soils.

Fullerton loam, hilly phase (12 to 25 percent slopes) (Fr).—Besides having a stronger slope, this soil has a thinner surface layer than the rolling phase of Fullerton loam, and a little less depth to bedrock. It occurs in relatively small tracts, mostly on cherty ridge slopes. Some of the areas may include narrow ridgetops. This soil is widely distributed in the Dewey-Fullerton-Emory and the Fullerton-Clarksville-Greendale soil associations.

The 6-inch surface layer is very pale brown to yellowish-brown loam. Below this layer is reddish-yellow firm but friable sandy clay loam. At 16 inches is yellowish-red to red, firm but friable, sandy clay loam that grades to sandy clay. The material below 36 inches is variegated yellowish-red, reddish-yellow, and yellow firm sandy clay. Moderately cherty dolomitic limestone bedrock is at depths ranging from 10 to 25 feet. A small amount of chert occurs throughout much of the soil but, except in a few places, does not interfere materially with cultivation. The subsoil is relatively free of sand in places, and the texture ranges from silty clay loam to silty clay.

This soil is low in fertility and organic matter and is medium to strongly acid. It is permeable to roots, and the surface layer absorbs water fairly rapidly. The soil, as a whole, holds a fairly good supply of moisture for plant growth.

Use suitability.—Practically all of this soil is under cutover deciduous forest. The strong slopes limit its suitability to crops that are grown in moderately long rotations. Small grains and legumes and grasses for hay or pasture are well suited. Corn, tobacco, and cotton are also suited but can be grown only at infrequent intervals. Many areas probably can best be used for permanent pasture. The more exacting legumes and grasses can be grown, but they require heavy fertilization and liming if good stands are to be maintained. For a further discussion of use and management, see group 18 in the section, Use and Management of Soils.

Fullerton loam, eroded hilly phase (10 to 25 percent slopes) (Fn).—This soil consists of areas of hilly Fullerton loam that have lost a considerable part of the surface soil through erosion. It is widely distributed in the cherty ridge parts of the county and occurs in association with other rolling and hilly Fullerton soils.

The plow layer consists of yellowish-brown or reddish-yellow loam; the subsoil layers are similar to those of the hilly phase of Fullerton loam. Moderately cherty dolomitic limestone bedrock is at depths ranging from 10 to 25 feet.

This soil is low in fertility and organic matter and is medium to strongly acid. Internal drainage is medium. Moisture infiltrates the surface layer well, but the firm subsoil retards it. The capacity for holding moisture available to plants is moderate.

Use suitability.—All of this soil has been cleared and cropped at some time. Much of it is now in pasture or

is idle. The soil is generally fertilized or limed only where row crops or small grains are grown.

The suitability of this soil for crops is restricted chiefly by the rather strong slopes. Long rotations consisting chiefly of small grains, hay, and pasture are well suited. Such row crops as corn, tobacco, and cotton can be grown successfully, but only at infrequent intervals. Fairly good pastures can be obtained with proper fertilization and liming, and a large acreage can well be used for pasture. The more exacting legumes can be grown if heavily fertilized, but they are not so productive as on the more fertile soils. For a further discussion of use and management, see group 18 in the section, Use and Management of Soils.

Fullerton cherty silt loam, rolling phase (2 to 12 percent slopes) (Fg).—This well-drained soil has developed over moderately cherty dolomitic limestone. It differs from Fullerton silt loam, rolling phase, chiefly in having chert in amounts that interfere with cultivation. The soil occupies fairly extensive tracts on the crests of the cherty ridges and is widely distributed throughout the Dewey-Fullerton-Emory and the Fullerton-Clarksville-Greendale soil associations.

Profile description:

0 to 8 inches, yellowish-gray or very pale brown cherty silt loam.
8 to 14 inches, yellow or reddish-yellow friable cherty silty clay loam.
14 to 36 inches, yellowish-red to red firm but friable cherty silty clay.
36 to 48 inches +, variegated yellowish-red, reddish-yellow, and yellow firm cherty silty clay; bedrock at depths of 16 to 40 feet.

Some brown sandstonelike fragments are scattered throughout the soil. In a few places the abundant chert fragments practically prevent cultivation.

This soil is low to very low in fertility and content of organic matter and is medium to strongly acid in reaction. It is permeable to both roots and moisture. On most areas runoff is not a great hazard. The capacity for holding moisture for plants is moderate.

Use suitability.—All of this soil is under cutover forest. It is suitable for most general farm crops, but the chert interferes greatly with cultivation and other field operations, such as mowing. The more exacting legumes and grasses are not well suited. Row crops are fairly well suited, and under average conditions a rotation made up of corn or tobacco, a small grain, and lespedeza is well suited. Heavy fertilization is needed to make the soil highly productive. Legumes especially require substantial applications of lime. This soil is suited to pasture, but grazing vegetation of high quality is more difficult to maintain than on the more fertile soils. For a further discussion of use and management, see group 14 in the section, Use and Management of Soils.

Fullerton cherty silt loam, eroded rolling phase (5 to 12 percent slopes) (Fd).—This soil consists of rolling areas of Fullerton cherty silt loam that have lost a considerable part of the original surface soil through erosion. It is one of the most extensive of the Fullerton soils. The areas, 15 to 60 acres in size, occupy broad ridge crests and are widely distributed over the Clarksville-Fullerton, the Fullerton-Clarksville-Greendale, and the Dewey-Fullerton-Emory soil associations.

The plow layer consists of yellowish-brown to reddish-yellow friable cherty silt loam, and the underlying material is similar to that of the rolling phase of Fullerton cherty silt loam. Moderately cherty dolomitic limestone bedrock is at depths ranging from 16 to 40 feet.

In some small eroded patches the subsoil is exposed and the plow layer consists of reddish-yellow or yellowish-red firm but friable silty clay.

This eroded rolling phase is low to very low in fertility and organic matter and medium to strongly acid in reaction. It has somewhat less favorable permeability than the rolling phase because it is shallower to the firm, more clayey subsoil. The soil has a moderately good capacity for holding moisture for plants. The tilth is good except where subsoil material is exposed or makes up a great part of the plow layer.

Use suitability.—All of the acreage has been cleared and cropped at some time. At present about 40 percent is used for crops, 40 percent is in pasture, and the rest is either idle or reverting to forest. Some fertilization is practiced, and at least a part of the acreage has been limed. Crop yields are not high.

This soil is suited to crops, but it has low fertility and productivity and is somewhat difficult to work because of chertiness. It is suited to moderately intensive use but requires runoff control. Heavy fertilization is necessary to maintain high fertility. The soil is fairly well suited to small grains, lespedeza, redtop, corn, and tobacco. It is suitable for pasture but needs heavy fertilization to maintain desirable vegetation. For a further discussion of use and management, see group 14 in the section, Use and Management of Soils.

Fullerton cherty silty clay loam, severely eroded rolling phase (5 to 12 percent slopes) (Fl).—This soil consists of areas of Fullerton cherty silt loam that have lost practically all of the surface soil and, in places, part of the subsoil. It is associated with the other cherty Fullerton soils. Most of the areas are small and occur on slopes in close association with the less eroded Fullerton cherty silt loams.

The plow layer consists of yellowish-red moderately friable cherty silty clay loam or cherty silty clay, and the underlying layers are similar to corresponding layers of the rolling phase of Fullerton cherty silt loam. The plow layer is firm, plastic, and clayey, and consequently has very unfavorable tilth. Moisture infiltrates the soil very slowly, and the low capacity for holding moisture for plants makes the soil droughty. The fertility and content of organic matter are very low, and the reaction is medium to strongly acid. In most places chert interferes materially with cultivation.

Use suitability.—All of the acreage has been cleared and cropped at some time, and now a very great part either is used for unimproved pasture or is lying idle. Some has reverted to pine forest.

This soil is poorly suited to crops because of unfavorable tilth, droughtiness, and low fertility. It can be rejuvenated for pasture, but considerable amounts of fertilizer and lime and proper seeding are required to maintain desirable vegetation. The droughtiness of this soil greatly limits the growing periods for pasture vegetation. For a further discussion of use and management, see group 20 in the section, Use and Management of Soils.

Fullerton cherty silt loam, hilly phase (12 to 25 percent slopes) (Ff).—This soil differs from Fullerton cherty silt loam, rolling phase, chiefly in having stronger slopes.

The 6-inch surface layer is yellowish-gray or very pale brown cherty silt loam. Below this material, to a depth of about 12 inches, is yellow or reddish-yellow friable cherty silty clay loam. From about 12 to 36 inches is yellowish-red to red firm but friable cherty silty clay. This material is underlain by variegated yellowish-red, reddish-yellow, and yellow firm cherty silty clay. Bedrock is at depths ranging from 10 to 25 feet.

This soil is low in fertility and organic matter and is medium to strongly acid. It is permeable to moisture and roots and has a moderate capacity for holding moisture available to plants. Its strong slopes make it particularly subject to erosion when cultivated. In most places chert interferes with cultivation.

Use suitability.—A very great part of this soil is under cutover deciduous forest. Because of strong slopes, chertiness, and rather low fertility, this soil is poorly suited to crops. If adequately fertilized and properly seeded, it will produce grazing of fairly good quality. The carrying capacity, however, cannot be maintained at so high a level as on some of the more fertile soils that have more favorable moisture relations. For a discussion of use and management, see group 18 in the section, Use and Management of Soils.

Fullerton cherty silt loam, eroded hilly phase (12 to 25 percent slopes) (Fc).—This hilly phase of Fullerton cherty silt loam has lost a substantial part of the original surface soil through erosion. It is one of the most extensive soils of the Fullerton series and is widely distributed throughout the Clarksville-Fullerton and the Fullerton-Clarksville-Greendale soil associations.

The plow layer in most places is a mixture of original surface soil and subsoil. It is yellowish-brown friable cherty silt loam. The subsoil layers are similar to those of the hilly phase of Fullerton cherty silt loam. Moderately cherty dolomitic limestone bedrock is at depths of 10 to 25 feet.

Fullerton cherty silt loam, eroded hilly phase, is low in fertility and organic matter and is medium to strongly acid. It is relatively permeable to moisture and roots but the shallower depth to the firm subsoil causes runoff to develop somewhat more rapidly than on the uneroded hilly phase. The capacity for holding moisture available to plants is moderate.

Use suitability.—All of this soil has been cleared and cropped at some time, but only about a third is now being cultivated. About half is used for pasture and the rest is idle. Some fertilizer is used on the cropped part, and lime has been applied to about half the acreage.

Chertiness, strong slopes, and low fertility make this soil poor for crops. It can support fairly desirable grazing where adequately fertilized and limed. For further discussion of use and management, see group 18 in the section, Use and Management of Soils.

Fullerton cherty silty clay loam, severely eroded hilly phase (12 to 25 percent slopes) (Fk).—This phase has lost practically all of the original surface soil through erosion. In places part of the subsoil is gone. The soil is associated with other Fullerton cherty soils and with Clarksville soils. It occupies the steep slopes of some of the cherty ridges. Practically all of the acreage is in the Clarksville-Fullerton and Fullerton-Clarksville-Greendale soil associations.

The plow layer now consists of yellowish-red, firm but somewhat friable, cherty silty clay loam or cherty silty clay. The subsoil layers are similar to those of the hilly phase of Fullerton cherty silt loam. Bedrock is at depths ranging from 10 to 25 feet.

Because of the very poor tilth of the surface layer and the very slow moisture infiltration, runoff develops rapidly during rains. The soil is permeable to roots but its small capacity for holding moisture available to plants makes it droughty. The soil is low in fertility and organic matter and is medium to strongly acid. Gullies are common in places, but most of them can be obliterated by deep tillage or by filling.

Use suitability.—All of this soil has been cleared and cropped, but a great part now is used as unimproved pasture or is idle. Some has reverted to pine forest. Practically none is cultivated.

The soil is poorly suited to crops because of unfavorable tilth, slow permeability, low fertility, and strong slope. It is unsuitable for pasture because of low fertility and chertiness. Most areas can best be used for forest. Areas that must be used for pasture require heavy applications of fertilizer and lime. Their carrying capacity is not high. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Fullerton cherty silt loam, steep phase (25 to 60 percent slopes) (Fh).—Besides steeper slopes, this soil has a thinner surface layer and less depth to bedrock than the hilly phase of Fullerton cherty silt loam. This soil is widely distributed over the Clarksville-Fullerton and the Fullerton-Clarksville-Greendale soil associations. It occupies rather large tracts on extensive parts of steep cherty ridge slopes.

The surface layer consists of yellowish-gray or very pale brown cherty silt loam. Below about 5 inches is reddish-yellow firm but friable cherty silty clay loam. At a depth of about 14 inches is yellowish-red to red very firm but slightly friable cherty silty clay that, below about 34 inches, is variegated yellowish red, reddish yellow, and yellow. Moderately cherty dolomitic limestone bedrock is at a depth of 5 to 25 feet. There are a few outcrops of chert rock and limestone.

The soil is relatively permeable and has a moderate capacity for holding moisture for plants. It is low in fertility and organic matter and is medium to strongly acid. In general, cleared areas on south-facing slopes are droughty; those on the north-facing slopes have somewhat better moisture relations.

Use suitability.—Practically all of this soil is under cutover deciduous forest. Steep slopes, low fertility, and chertiness make this soil poorly suited to crops or pasture. The north-facing slopes are better suited to pasture because of their better moisture supply. Substantial fertilization and liming are necessary to establish pasture vegetation. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Fullerton cherty silt loam, eroded steep phase (25 to 60 percent slopes) (Fe).—In this separation are areas of steep Fullerton cherty silt loam that have lost so much of the original surface soil that the plow layer now consists of a mixture of original surface soil with subsoil material. These areas are fairly large, or from 20 to 60 acres in size. They occur on the steeper parts of the cherty ridges, chiefly in association with the less eroded steep phase. This soil is widely distributed throughout the

Clarksville-Fullerton and the Fullerton-Clarksville-Greendale soil associations.

The 4- or 5-inch surface layer is yellowish-brown to reddish-yellow cherty silt loam, and the underlying layers are similar to corresponding layers of the steep phase. Moderately cherty dolomitic limestone bedrock is at depths ranging from 5 to 25 feet.

This soil is low in fertility and organic matter and is medium to strongly acid. It absorbs moisture fairly rapidly; but because of less depth to the firm subsoil, it has somewhat less favorable moisture absorption than the less eroded steep phase. It has a fair capacity for holding moisture available to plants, but the south-facing slopes are generally more droughty than those facing north.

Use suitability.—All of this soil has been cleared and cropped, but a great part now is in unimproved pasture or is idle. A small part has reverted to pine forest.

Strong slope, chertiness, and low fertility make this soil poorly suited to crops or pasture. If the soil is used for pasture, the north-facing slopes are preferable. Substantial amounts of fertilizer and lime are needed to establish grazing of good quality. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Fullerton cherty silty clay loam, severely eroded steep phase (25 to 60 percent slopes) (Fm).—This soil has lost practically all of the original surface soil through erosion. In places part of the subsoil is missing. Most of the tracts are small.

The plow layer consists of yellowish-red firm but slightly friable, cherty silty clay loam or cherty silty clay. The underlying layers are similar to the corresponding layers of the steep phase of Fullerton cherty silt loam. Moderately cherty dolomitic limestone bedrock is at depths ranging from 5 to 25 feet.

The clayey plow layer has very unfavorable tilth and is very slowly permeable to moisture. The soil is low in fertility and organic matter. It is very droughty because of its small capacity for holding moisture available for plants. Increased runoff makes the soil very erodible where the surface is not protected by a close-growing vegetation or by forest.

Use suitability.—All of this soil has been cleared and cropped at some time. Now, practically all of it is idle, has reverted to pine forest, or is in unimproved pasture. The steep slopes, unfavorable moisture conditions, and poor tilth make this soil unsuitable for crops or pasture. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Greendale cherty silt loam (1 to 7 percent slopes) (Ga).—This light-brown, well-drained cherty soil consists of local alluvium washed chiefly from Fullerton and Clarksville soils. It occurs as narrow strips along the drainageways in areas of Fullerton and Clarksville soils and on gently sloping alluvial fans at the base of strong slopes of these soils. A great part is within the Clarksville-Fullerton and the Fullerton-Clarksville-Greendale soil associations.

This soil occupies positions similar to those of the Emory soils. It differs from them in having a lighter color, lower fertility, and an appreciable amount of chert.

Profile description:

0 to 30 inches, very pale brown to light yellowish-brown very friable cherty silt loam.

30 inches +, pale-brown to dark yellowish-brown, friable cherty silt loam or cherty silty clay loam, mottled with yellow and gray; cherty limestone bedrock at depths of 5 to 12 feet.

In places the material below a depth of about 12 inches is yellowish-brown cherty silty clay loam or cherty silt loam. Some areas have beds of chert at depths ranging from 2 to 5 feet. In a few places the surface layer has a dark-brown color similar to that of the Emory soil.

This is a moderately fertile soil and has a fair supply of organic matter. It is medium to strongly acid. The surface layer has good tilth, but chert interferes materially with cultivation. The soil is permeable to both moisture and roots. It holds a relatively large amount of moisture for plants, although some areas are droughty because of the chertiness and openness of the soil. The position of the soil along drainageways and on gentle foot slopes favors good moisture relations in the subsoil.

Use suitability.—About 75 percent of this soil has been cleared. Probably two-thirds of the cleared acreage is used for crops, chiefly corn and lespedeza, but some red clover is grown. Most of the rest of the cleared acreage is in pasture, some of which has been fertilized and limed. A small part of the soil is idle. Crop yields normally are moderately low.

The smooth surface, good permeability, and relatively favorable moisture relations make this soil well suited to intensive use. It is much less desirable for crops, however, than several of the more fertile stone-free soils, because of its chert content and low fertility. Where heavy fertilization and liming are practiced, row crops can be grown several years in succession without great damage from erosion. This soil is capable of producing good pasture when properly fertilized and limed. Generally, good moisture relations favor its use for pasture during the drier parts of the growing season. For a further discussion of use and management, see group 4 in the section, Use and Management of Soils.

Greendale silt loam (1 to 7 percent slopes) (Gb).—This gently sloping soil differs from Greendale cherty silt loam chiefly in having less chert. In general, it consists of material washed mainly from Fullerton soils, but, in places, partly from Dewey soils. It is widely distributed throughout those parts of the cherty ridges where Fullerton soils predominate.

Profile description:

0 to 30 inches, very pale brown to yellowish-brown silt loam.

30 inches +, pale-brown to dark yellowish-brown, mottled with yellow and gray, friable silt loam or silty clay loam; cherty limestone bedrock at depths of 5 to 12 feet.

Some chert occurs throughout this soil but it does not interfere materially with cultivation. It is very prevalent below depths of 3 to 4 feet. In many places the subsoil below a depth of 15 inches is notably more yellowish than the surface layer.

This moderately fertile soil contains a fair amount of organic matter in the surface layer. It is medium to strongly acid. The plow layer has good tilth, and moisture infiltrates readily. The soil holds a fairly large amount of moisture for plants, and its subsoil has favorable moisture relations because of the location along drains and gentle foot slopes.

Use suitability.—A large part of this soil has been cleared and cropped. Now, corn and pasture occupy much of it. Tobacco and small grains are grown to some

409049—57——3

extent. Lespedeza is the most common hay crop, but red clover and alfalfa are also grown. Crop yields are fairly good. Some fertilizer is applied to row crops; larger amounts are used on small grains and tobacco.

The favorable tilth, permeability, good moisture-holding capacity, and smooth surface make this soil well suited to intensive use. Because of low natural fertility, the soil needs substantial applications of fertilizer and lime to keep productivity high. Under good management, such row crops as corn and tobacco can be grown several years in succession. This soil is especially desirable for pasture because of favorable moisture relations. Its pasture vegetation is not affected by dry weather so soon as that on many of the higher lying productive soils. For further discussion of use and management, see group 4 in the section, Use and Management of Soils.

Gullied land, acid shale material (5 to 40 percent slopes) (Gc).—This hilly land type is made up of areas of Litz, Sequoia, Apison, Lehew, and Montevallo soils that have been greatly mutilated through erosion (fig. 3).

***Figure 3.*—Gullied land, acid shale material. This is an area, formerly Litz shaly silt loam, eroded rolling phase, that has been greatly mutilated by runoff water when under cultivation. The shallow gullies are broad and extend to bedrock shale.**

The general lay of the land is hilly. In most places the surface soil has been removed and gullies from 18 inches to 3 feet deep form an intricate pattern. As a result the surface is too rough for the use of ordinary farm machinery. Areas of this soil range from a few acres to about 25 acres in size. They are widely distributed throughout the Litz-Cotaco, the Sequoia-Litz-Cotaco, and the Lehew-Montevallo soil associations.

The soil material is predominantly variegated weak-red and yellow shaly silty clay. Bedrock shale is exposed in the gullies and on some of the higher parts between the gullies. Thin lenses of limestone outcrop in places. This land type has low fertility and poor tilth and is droughty.

Use suitability.—All of this soil has been cleared and used for crops. A great part of the acreage is now idle and occupied by briers, sassafras, and other vegetation. Some of it is under volunteer pine forest. Kudzu has been established in a few places.

This land type is of little value except for forest. Shortleaf pine is well suited and can be expected to produce timber in 25 to 40 years. Kudzu develops a good cover. Some farmers may find it feasible in places to smooth off the gullied areas, fertilize heavily, and seed suitable pasture plants. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Gullied land, calcareous shale and sandstone materials (5 to 75 percent slopes) (Gd).—This land type comprises areas of Tellico, Dandridge, Needmore, and Alcoa soils that have been badly eroded. Much of the surface soil has been removed, and an intricate pattern of gullies of different depths has been formed. The surface is too rough for the use of ordinary farm machinery, and the general lay of the land is hilly to steep. Most of the gullies in the Dandridge and Needmore soils are shallow; few of them exceed 3 feet. The gullies in the Tellico and Alcoa soils, on the other hand, are moderately shallow to very deep. Some of them are 20 feet deep.

A great part of the original surface soil has been removed from the Dandridge and Needmore soils. However, a notable part of the surface layer still remains on the Tellico and Alcoa areas, where these erosion losses are generally confined to the gullies. Bedrock shale is at or very near the surface in many of the Dandridge and Needmore areas; the depth to bedrock in the Tellico and Alcoa areas is much more variable. This land type is widely distributed throughout the Dandridge-Needmore, the Tellico-Neubert, and the Needmore-Dandridge soil associations. The fertility of much of the acreage is low, and a great part is droughty.

Use suitability.—All of the acreage has been cleared and cropped at some time. In places pine forest has redeveloped. A great part is now covered with briers, sassafras, and other growth. Kudzu has been established in a few areas. Much of the acreage consisting of Dandridge and Needmore material can be rejuvenated for pasture, but at high cost. The Tellico and Alcoa areas, because of the deeper gullies and in many places the harder rock, are more difficult to work to a smooth surface. Most of these areas are probably best suited to pine forest. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Gullied land, limestone material (5 to 40 percent slopes) (Ge).—This land type is made up of areas of Decatur, Dewey, Talbott, Fullerton, Bolton, and Clarksville soils that have been greatly mutilated through erosion. It is generally hilly. Most areas have lost much, or all, of the surface soil and are cut by gullies of various depths and intricate patterns. The surface is too rough for the use of ordinary farm machinery. Most of this land type is in the Decatur-Dewey-Emory and the Dewey-Fullerton-Emory soil associations. The soil material is low in fertility and has poor tilth. A great part is droughty, as the clayey subsoil has a low capacity for holding moisture for plants.

Use suitability.—All of the acreage has been cleared and cropped. Now much of it is covered by briers, sassafras, and other growth. Some of the acreage is occupied by reestablished pine forest.

This land type is poor for crops and pasture. Most areas are best suited to forest. Some of the less severely gullied areas can be smoothed off with heavy machinery.

If properly fertilized and seeded, these areas are capable of supporting fair pasture. Erosion is a considerable hazard on cultivated soil before the plant cover is established. The cost of preparing such areas for pasture is high. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Guthrie silt loam (0 to 2 percent slopes) (Gf).—This is a poorly drained gray soil on upland flats and in upland depressions in the cherty ridge and limestone valley parts of the county. It occurs in small tracts and consists of local alluvium washed from surrounding soils that developed over limestone. Much of the material comes from the Fullerton soils. Most of the acreage is in the Fullerton-Clarksville-Greendale soil association.

Profile description:

0 to 8 inches, light-gray friable silt loam.
8 to 16 inches +, mottled light-gray, with some yellow and brown, rather plastic firm silty clay; bedrock limestone at depths of 5 to 20 feet.

Because of its position in sinkholes, this soil has very slow or no surface drainage and very slow internal drainage. Some areas remain ponded during most of the winter and well into the growing season. The clayey nature and low capacity for holding moisture for plants make these areas rather droughty after excess moisture has been removed. This soil is low in fertility and very low in organic matter. Most of the acreage is medium to strongly acid. The tilth of the plow layer varies from good to poor. The slow drainage and poor tilth of some areas greatly limit the time of possible cultivation.

Use suitability.—Much of this soil has been cleared, but only a small part has been cultivated. The cleared areas are used for pasture, but the grazing is not of high quality. Little fertilization has been practiced, and only a small acreage has been limed.

The low fertility, unfavorable tilth, and slow drainage make this soil poor for crops. Where drainage has been improved and the soil is adequately fertilized and limed, a fair amount of pasture can be produced. Properly drained areas are fairly productive of corn, soybeans, and hay and pasture. For a further discussion of use and management, see group 22 in the section, Use and Management of Soils.

Hamblen fine sandy loam (0 to 2 percent slopes) (Hc).—This is an imperfectly drained sandy soil on bottom lands. Much of the material has been washed from Tellico, some from Apison, Lehew and Montevallo, and a small part from Ramsey soils. About one-half of the acreage is associated with the Tellico soils, a small part is at the base of the steep Ramsey slopes, and some is associated with the Apison soils.

The color of this soil varies widely because of the wide variations in color of the soils from which the parent materials came. Areas consisting of material predominantly from Tellico soils are reddish, and those consisting of materials from the other soils are mainly light brown or yellowish.

Profile description (from an area consisting chiefly of material from Tellico soils):

0 to 8 inches, reddish-brown fine sandy loam or loam.
8 to 16 inches, somewhat lighter colored and finer textured than layer above; predominantly reddish-brown or light reddish-brown friable fine sandy clay loam.
16 inches +, mottled reddish-brown, gray, and yellow fine sandy loam or fine sandy clay loam; bedrock at depths of 4 to 15 feet.

The thickness of the surface layer may be 12 to 14 inches. The second layer may be more sandy than the surface layer, or it may consist of lenses of fine sand and more clayey material. The mottled layer may be within 10 inches of the surface, or in a few places 20 inches below it. This lower subsoil material also may be sandy loam rather than sandy clay loam.

Profile description (from an area consisting chiefly of material from Ramsey or Apison soils):

0 to 8 inches, brownish-gray fine sandy loam.
8 to 20 inches, yellowish-brown firm fine sandy loam or silt loam; some mottlings in lower part.
20 to 40 inches +, mottled grayish-yellow and brown loamy fine sand to silt loam.

Included with this soil are some poorly drained areas in which the surface layer is gray or dark gray, finely mottled with yellowish brown. Below this the material is predominantly gray, mottled with yellow and brown, firm fine sandy loam or sandy clay loam.

All of Hamblen fine sandy loam is subject to overflow, and the subsoil is moist much of the time. The fertility is moderate, and the content of organic matter ranges from moderately low to moderate. This soil is slightly to medium acid. It is permeable and has good tilth. In general, the moderate capacity for holding moisture for plants in the upper part of the soil, and the relatively moist deep subsoil make this soil favorable for crops throughout the drier part of the growing season. The poorly drained areas described above as a variation are wet a great part of the time and generally are the first to be flooded.

Use suitability.—A great part of Hamblen fine sandy loam has been cleared and is used for crops and pasture. Corn is the chief crop, but there is also some lespedeza. Because the floodwaters tend to maintain the fertility, less fertilizing and liming are required than on the average upland soils.

This soil is well suited to intensive use because of its smooth surface, suitable response to fertilization, good tilth, and favorable moisture relations. Its range of suitability to crops is somewhat limited by slow internal drainage and susceptibility to flooding. Corn is one of the better suited crops, and many of the legumes and grasses are productive of hay and pasture. Truck crops, tobacco, and cotton are less well suited. Flooding is too great a hazard during the growing season for such high-value crops as tobacco. Small grains tend to lodge, although this hazard is not as great as on the Hamblen and Lindside silt loams. If the soil is moderately fertilized and weeds are eliminated, relatively high yields can be expected. For a further discussion of use and management, see group 1 in the section, Use and Management of Soils.

Hamblen and Lindside silt loams (0 to 2 percent slopes) (Ha).—This mapping unit consists of imperfectly drained silt loam soils on bottom lands. Areas consisting predominantly of material washed from soils developed over limestone are of the Lindside type; those consisting of a mixture of material originating from limestone, shale, and sandstone, are of the Hamblen type. All of the areas have a nearly level surface and are subject to overflow. They occupy a great part of the bottom lands throughout the county, mostly along the larger creeks.

Profile description of Hamblen silt loam:

0 to 16 inches, dark yellowish-brown friable silt loam.
16 to 24 inches, yellowish-brown, mottled with gray and yellow, friable silt loam or silty clay loam.
24 inches +, gray, mottled with brown and yellow, friable silty clay loam; bedrock at depths of 4 to 15 feet.

Profile description of Lindside silt loam:

0 to 16 inches, brown or dark-brown silt loam.
16 to 24 inches, brown, with some gray and yellow mottlings, silt loam or silty clay loam.
24 inches +, mottled gray, yellow, and some brown heavy silt loam or silty clay loam; bedrock at depths of 4 to 15 feet.

In general, the areas of this mapping unit along Little Sewee and Rogers Creeks, those along small streams from the cherty limestone areas, and those along small streams from areas in the Lehew-Montevallo soil association have lighter colored surface soils. On the other hand, areas along streams from the Tellico-Neubert soil association have a reddish color.

The depth to the mottled material in the profile ranges from 8 or 10 inches to 20 inches. A few wet spots are included that have mottling throughout the profile.

This mapping unit has moderate to high fertility. Generally, the Lindside silt loam areas are more fertile than the Hamblen. The soils of this complex have a moderate content of organic matter and are medium acid to neutral. They are permeable and hold a good supply of moisture for plants. The depth to the water table ranges from 16 to 40 inches throughout most of the growing season. Tilth of the plow layer is fairly good, although the soils are somewhat subject to puddling if cultivated when too wet.

Use suitability.—Much of the acreage has been cleared and cropped. Corn, hay, and pasture occupy a large part (fig. 4). Lespedeza is the chief hay crop, but some red clover is grown. In places corn is grown for several years in succession. Not much fertilizer or lime is used. Yields are moderately high.

Because of smooth surface, relatively high fertility, and favorable moisture relations, these soils are well suited to intensive use for some row crops. Corn and soybeans are well suited; tobacco, truck crops, and cotton are less so. These soils are particularly well suited to hay and pasture because they have high fertility and maintain good moisture condition throughout a great part of the growing season. They respond well to fertilization, but much of their acreage does not require lime. For a further discussion of use and management, see group 1 in the section, Use and Management of Soils.

***Figure 4.*—Hamblen and Lindside silt loams are fertile and have moisture relations especially favorable for summer pasture.**

Hamblen and Lindside silty clay loams (0 to 2 percent slopes) (Hb).—This complex differs from Hamblen and Lindside silt loams chiefly in having a finer texture. The surface layer of the Hamblen soil in the complex is yellowish-brown to brown silty clay loam, and that of the Lindside soil is brown or dark-brown silty clay loam. The material below a depth of about 15 inches is mottled yellowish-brown, gray, and brown silty clay loam. Bedrock is at depths ranging from 4 to 15 feet. In some places there is a darker brown layer at about 12 inches, and the subsoil in many places is finer textured than the soil of the surface layer. This complex has a nearly level surface, and all of the acreage is subject to overflow. A great part of the complex consists of material washed from soils developed over limestone and shale. Much of it is on the broader bottom lands along Chestuee Creek.

These soils are fertile and have a fairly high content of organic matter. Most of the acreage is slightly acid. Because of the clayey nature and less favorable tilth of these soils, they can be cultivated for shorter periods than the silt loam soils. Moisture relations are moderately good, although not so good as on the somewhat coarser textured soils of the bottom lands.

Use suitability.—Most of this acreage is cleared. Much is used for pasture. Corn and lespedeza are the chief crops. Not much fertilizer is used and very little or no lime. Crop yields are moderate to high.

These soils are suited to intensive use for corn, soybeans, hay, and pasture, because of their smooth surface, high fertility, and moderately favorable moisture relations. Areas less subject to overflow may be suited to small grains. Tobacco and truck crops, especially root crops such as potatoes, are not well suited. Heavy tillage implements are required to prepare the soil for planting. For a further discussion of use and management, see group 1 in the section, Use and Management of Soils.

Hayter loam, undulating phase (2 to 12 percent slopes) (Hd).—This well-drained brown soil consists of local alluvium or colluvium, predominantly from sandstone or quartzite that has been influenced by limestone or lime-bearing water. Most of it is on smooth foot slopes below Starr Mountain and along Conasauga Creek.

Profile description:

0 to 12 inches, dark-brown or dark reddish-brown very friable loam.
12 to 30 inches, reddish-brown friable sandy clay loam.
30 to 45 inches, yellowish-red sticky plastic clay loam or clay; bedrock occurs at depths of 2 to 8 feet and in a great many places is shale.

In places where the bedrock is at shallower depths, the shaly residuum is within 12 inches of the surface. The color ranges from light brown to dark reddish brown. The lighter colored areas are on the high sites and the darker colored areas along the draws or lower parts.

This fertile soil has a moderate supply of organic matter. Tilth is very good. The soil absorbs moisture well and retains a high proportion of it for plants. It is medium acid.

Use suitability.—Practically all of this soil has been cleared and cropped. At present corn, small grains, and

lespedeza predominate. Cotton and tobacco are also grown. Very little of the soil is idle. Some fertilization is practiced, and rotations of moderate length are used. Tobacco and cotton are heavily fertilized. Lime has been applied to much of the acreage. Yields are moderately high.

Most of this soil is suited to moderately short rotations and to practically all the crops commonly grown, including alfalfa and truck crops. Some care is required to restrain erosion. The more exacting legumes and grasses are suited but require some fertilizer and lime. The soil is productive of high-quality pasture vegetation, and the carrying capacity under proper management is high. For a further discussion of use and management, see group 6 in the section, Use and Management of Soils.

Hermitage silt loam, undulating phase (2 to 5 percent slopes) (Hf).—This reddish-brown, well-drained soil consists of local alluvium and colluvium derived chiefly from high-grade limestone. The material has been washed from Decatur, Dewey, Bolton, and Talbott soils, and to some extent from Fullerton soils. Much of this soil is in the Decatur-Dewey-Emory and the Dewey-Fullerton-Emory soil associations. It lies on gently sloping foot slopes directly below soils of the upland and above the narrow strips of Emory soils along the drainageways. The profile differs from that of the Emory chiefly in being more reddish and in having a firmer subsoil.

Profile description:

0 to 10 inches, brown to dark reddish-brown mellow silt loam.
10 to 36 inches, reddish-brown or dark-red friable but firm silty clay loam.
36 inches +, dark-red, grading to reddish-yellow (some splotches of more yellowish material), firm but somewhat friable silty clay; some dark-brown soft concretions; bedrock limestone at depths of 5 to 12 feet.

In some areas associated with the Fullerton soils the subsoil is dark yellowish brown. The surface layer in practically all areas is uniformly brown to dark reddish brown, but its thickness ranges from 6 to 15 inches.

This fertile soil has a moderate to rather high content of organic matter. It is medium to strongly acid. The surface soil is permeable, and the subsoil is moderately so. Roots penetrate easily, and the capacity of the soil for holding moisture available to plants is high. Erosion is not a great hazard, although some erosion control is required on the more sloping parts.

Use suitability.—Practically all of this soil has been cleared and used for crops. About a fourth is now used for corn, nearly as much for hay, and a minor part for small grains. Pasture occupies about 25 percent, and miscellaneous crops, such as tobacco and cotton, the rest. The soil is regularly fertilized. Tobacco, cotton, and alfalfa receive heavy applications. Lime has been applied to most parts. Crop yields generally are high.

This is one of the most desirable soils of the county for crops and pasture. It is suited to a wide variety of crops, and although fertile, it responds well to regular applications of fertilizer. This soil is productive of the more exacting legumes and grasses, and the carrying capacity of pasture is high. It is one of the better soils for alfalfa, although a good stand may be more difficult to maintain for several years than on Dewey and Decatur soils. For a further discussion of use and management, see group 6 in the section, Use and Management of Soils.

Hermitage silt loam, eroded rolling phase (5 to 15 percent slopes) (He).—Erosion has been more active on this phase than on the undulating phase. The plow layer in many places now consists of a mixture of original surface soil and subsoil material. It is red or dark-red silt loam or silty clay loam. The underlying material is similar to that of the undulating phase but has somewhat less depth to bedrock. This soil is widely distributed throughout the Decatur-Dewey-Emory and the Dewey-Fullerton-Emory soil associations.

This fertile soil has a moderate to high content of organic matter and is medium to strongly acid. It is permeable to moisture. However, runoff develops more rapidly than on the undulating phase because of the more shallow depth to the firmer subsoil material, and erosion is more of a hazard. The soil holds a moderately large amount of moisture for plants.

Use suitability.—All of this soil has been cleared and cultivated. At present much of it is used chiefly for corn, hay, and small grains. Tobacco and cotton are common cash crops. Fertilizer and lime are regularly used. Yields are moderately high, although lower than on the undulating phase.

This soil is suited to many crops, but it cannot be used so intensively as the undulating phase because it has moderately strong slopes. Generally, a rotation consisting of a row crop, a small grain, and 2 or 3 years of hay is well suited. Some care is required to restrain erosion. The more desirable legumes and grasses yield well. The moderately favorable moisture relations make this soil somewhat less droughty than many of the associated rolling soils of the uplands. For a further discussion of use and management, see group 8 in the section, Use and Management of Soils.

Holston loam, undulating phase (2 to 5 percent slopes) (Hk).—This light-colored, well-drained soil on low to moderately high stream terraces consists of a mixture of alluvium derived from shale, sandy rocks, and limestone. Most areas are from 5 to 15 feet above the adjacent flood plains, but a few along the Hiwassee River are nearly 100 feet above them. Much of this soil is along Rogers Creek. Other small areas are scattered about the county along the larger creeks, and a small part is in the valley of the Hiwassee River.

Profile description:

0 to 8 inches, light yellowish-brown to dark yellowish-brown friable loam.
8 to 28 inches, yellowish-brown firm but friable silty clay loam.
28 inches +, mottled or splotched yellow, gray, and brown, firm, brittle, rather compact clay loam; bedrock at depths of 5 to 15 feet.

The small acreage in the valley of the Hiwassee River contains a few cobblestones and has a noticeable amount of mica throughout the profile. In some areas along the creeks the mottled or splotched material is somewhat nearer the surface. The texture of the surface layer ranges from fine sandy loam to silt loam. A few areas are so eroded that the plow layer includes some subsoil material.

This soil has moderately low fertility and not much organic matter in the surface layer. It is medium to strongly acid. The soil is permeable and holds a fair moisture supply for plants.

Use suitability.—Practically all of this soil has been cleared and cropped. At present it is used for various

crops, including corn, small grains, tobacco, cotton, and lespedeza. Some fertilization is practiced, and lime has been applied to much of the acreage. Crop yields generally are moderate but are low where little fertilizing is done.

This soil is well suited to moderately intensive use. It is adaptable to practically all crops commonly grown, including tobacco, alfalfa, cotton, and some truck crops. Erosion is not a great hazard. Substantial applications of fertilizer and lime are necessary for good yields. The more exacting legumes and grasses are suited, but good stands are somewhat more difficult to maintain than on some of the more fertile well-drained soils. For a further discussion of use and management, see group 10 in the section, Use and Management of Soils.

Holston loam, eroded undulating phase (2 to 5 percent slopes) (Hh).—This soil is associated with the Holston loam, undulating phase, on terraces along the larger streams. It differs from the undulating phase chiefly in having lost a notable amount of the original surface soil through erosion. The plow layer now consists of a mixture of original surface soil and subsoil material and is light yellowish-brown friable loam. Below this is the typical yellowish-brown, firm but friable, silty clay loam subsoil. Bedrock is at depths ranging from 5 to 15 feet.

This soil is not high in fertility, and the surface layer does not contain much organic matter. It is medium to strongly acid. The soil absorbs moisture well and has a moderate capacity for holding moisture for plants.

Use suitability.—All of this soil is used for a wide variety of crops, including corn, tobacco, cotton, small grains, and hay. Some fertilization is practiced, and yields are moderate.

This soil is suited to many crops. It can be used in a moderately short rotation if fertility is kept high. Erosion is active where the soil is cultivated, but it is not difficult to control. The more exacting legumes and grasses are suited, but stands are somewhat more difficult to maintain than on some of the more fertile soils. Substantial applications of fertilizer, organic matter, and lime are necessary for high yields. For a further discussion of use and management, see group 10 in the section, Use and Management of Soils.

Holston loam, eroded rolling phase (5 to 12 percent slopes) (Hg).—This soil differs from the undulating phase chiefly in degree of slope and erosion losses. So much of the original surface soil has been removed by erosion that the plow layer now consists of a mixture of the original surface soil with subsoil material. This soil occupies low to moderately high stream terraces along some of the larger streams of the county.

In most places the plow layer is light yellowish-brown friable but somewhat firm loam. In patches where erosion has removed a great part of the surface soil, the plow layer is firm clay loam.

This soil is low in fertility and organic matter. Runoff develops fairly rapidly because of the moderately strong slope and shallow depth to subsoil, and erosion results. The soil is fairly permeable to moisture and plant roots and holds a fair to moderate supply of moisture for plant growth.

Use suitability.—Practically all of this soil has been cleared and cropped at some time. Now corn and hay are the principal crops, but small grains, cotton, and tobacco are grown to some extent. Probably a third of the soil is used for pasture or is idle. Some fertilizer is used, and a part of the acreage has been limed.

The moderately strong slopes and somewhat slow permeability of the subsoil limit the intensity of use under which this soil can be maintained. Moderately long rotations and substantial fertilization are needed to keep productivity high. Generally, close-growing crops, as small grains and hay, are among the better suited. The more exacting legumes and grasses can be grown for hay and pasture, but good stands are somewhat more difficult to maintain than on the more fertile well-drained soils. For a further discussion of use and management, see group 15 in the section, Use and Management of Soils.

Jefferson fine sandy loam, rolling phase (3 to 12 percent slopes) (Ja).—This sloping, light-colored, friable, well-drained soil consists of local alluvium or colluvium washed chiefly from Ramsey soils. The parent rock is predominantly quartzite and sandstone, but some slaty material is intermixed. Areas of the soil lie on gentle foot slopes, most of them at the foot of Starr Mountain (fig. 5). They

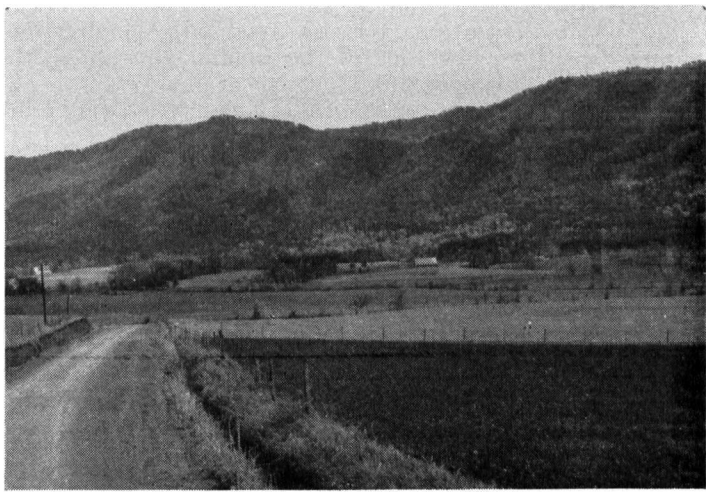


Figure 5.—**Jefferson fine sandy loam, rolling phase, in the valley of Conasauga Creek. Starr Mountain in the background.**

are associated with strips of Cotaco and Barbourville soils that lie along the drainageways in lower positions than the Jefferson soils. The lowest gradients occur on the areas on the higher terrain and may range from 3 to 4 percent.

Profile description:

0 to 12 inches, yellowish-gray to yellowish-brown loose sandy loam or fine sandy loam; lower 3 or 4 inches more yellow and finer textured.
12 to 30 inches, yellow to strong-brown friable sandy clay loam.
30 inches +, splotched yellow, yellowish-brown, and yellowish-red firm (somewhat plastic when wet) but friable sandy clay; bedrock shale or sandy rock at depths of 2 to 12 feet.

Sandstone and quartz fragments from 2 to 6 inches in diameter occur throughout the soil but do not greatly interfere with cultivation. The surface layer in a few places is brown rather than yellowish-gray. Some of the cultivated areas are eroded to the extent that the plow layer includes some subsoil material and consists of friable sandy clay loam.

This soil is rather low in fertility and organic matter. It is permeable to moisture and holds a fair to moderate

supply of moisture for plants. Although subject to erosion, the rapid percolation of water makes it less erodible than soils with much firmer subsoils. This soil is medium to strongly acid.

Use suitability.—A great part of this soil has been cleared and cultivated. About 40 percent is now used for crops, chiefly corn and lespedeza. Some cotton and tobacco are grown. Most of the rest of the acreage is used for unimproved pasture or is idle.

This soil is well suited to crops but it cannot be used intensively for row crops because it is rolling. Under good management it is capable of supporting a 4-year rotation in which close-growing small grains and legumes and grasses are grown for 3 years. It is adaptable to practically all crops commonly grown in the county except such crops as alfalfa. Furthermore, the shallower rooted legumes and grasses do not produce so well as on some other soils. This soil is desirable for truck crops because it is permeable and friable; it is easily worked, warms early in the spring, and is responsive to fertilizer. For a further discussion of use and management, see group 15 in the section, Use and Management of Soils.

Jefferson stony fine sandy loam, rolling phase (3 to 12 percent slopes) (Jf).—This soil differs from Jefferson fine sandy loam, rolling phase, chiefly in having sufficient stones or cobbles to interfere with cultivation and in some places to make it impractical. The soil consists of local alluvium or colluvium washed from areas of Ramsey soils. Practically all of it is along the base of Starr Mountain.

The 10- to 12-inch surface layer is yellowish-gray to yellowish-brown loose stony fine sandy loam or sandy loam. Below this is yellow to strong-brown stony sandy clay loam. Below a depth of 30 inches is splotched yellow, yellowish-brown, and yellowish-red firm but friable sandy clay that is somewhat plastic when wet. Bedrock shale or sandy rock is at depths ranging from 2 to 12 feet.

This soil is low in fertility and has little organic matter in the surface layer. The soil is medium to strongly acid. The soil material is very permeable. Although runoff does not accumulate very rapidly, care should be taken to restrain it. The capacity for holding moisture available to plants is moderate.

Use suitability.—A great part of this soil is still under cutover deciduous forest. Possibly about 25 percent is cleared, and much of this is used as pasture. There is a small acreage in corn and lespedeza. Most of the cropped acreage is fertilized a little. Some lime has been used. Yields are not high.

This soil is suited to cultivation, but stoniness and low fertility limit its usefulness. It is difficult to work and needs substantial applications of fertilizer to maintain productivity. Since the soil is permeable and friable, it is favorable for truck crops. However, because of erosion hazard, these crops cannot be grown at frequent intervals. Where adequately fertilized, this soil is capable of producing fairly good yields. Corn, cotton, tobacco, small grains, and the less exacting hay and pasture plants are among the suitable crops. For a further discussion of use and management, see group 15 in the section, Use and Management of Soils.

Jefferson stony fine sandy loam, hilly phase (12 to 25 percent slopes) (Je).—In many places, stones are sufficiently abundant on this hilly soil to make cultivation impractical. All of it is on strong foot slopes along the base of Starr Mountain.

The 10-inch surface layer is yellowish-gray to yellowish-brown loose stony fine sandy loam or stony sandy loam. The underlying material is similar to that of the rolling phase of Jefferson stony fine sandy loam. The depth to bedrock is somewhat less.

This hilly phase is low in fertility and organic matter and is medium to strongly acid. It is permeable to both roots and moisture and its capacity for holding moisture is limited.

Use suitability.—Most of the acreage is under forest. A small part is used for crops or unimproved pasture. The stoniness, strong slopes, and low fertility make this soil poor for crops. It is capable of producing fair to good pasture when adequately fertilized and limed. For a further discussion of use and management, see group 18 in the section, Use and Management of Soils.

Jefferson loam, undulating phase (2 to 5 percent slopes) (Jd).—This light-colored, well-drained soil consists of local alluvium or colluvium washed chiefly from Lehew, Montevallo, and Ramsey soils. It differs from the Jefferson fine sandy loam in having a finer textured surface layer and somewhat finer textured sublayers. It occurs on gentle foot slopes below higher lying areas of Lehew, Montevallo, and Apison soils. Much of the acreage is in the Lehew-Montevallo soil association or along drainageways in adjacent associations that lie in areas of Lehew-Montevallo soils. A few areas occur at the base of Starr Mountain.

Profile description:

0 to 4 inches, light-gray to yellowish-gray loam.
4 to 15 inches, yellow or yellowish-brown friable fine sandy clay loam.
15 to 32 inches, splotched or mottled yellow and reddish-yellow friable but firm clay loam.
32 inches +, strongly splotched very pale brown and yellowish-red firm brittle but somewhat friable clay loam; bedrock shale at depths of 2 to 10 feet.

The fertility is rather low, and the content of organic matter is low. The soil is medium to strongly acid. It is permeable to moisture, although the subsoil is sufficiently firm to retard infiltration somewhat. This soil holds a moderately large amount of moisture for plants. It responds well to fertilization and is not very erosive.

Use suitability.—A great part of this soil has been cleared and is cultivated. Probably 60 percent is used for crops, and the rest for unimproved pasture. A small amount of fertilizer is used, and some of the acreage has been limed. Crop yields are fair to moderate.

This soil is suited to a wide variety of crops and to pasture. Heavy fertilization is needed to produce good yields. Most of the acreage can be cropped under a moderately short rotation. The more exacting legumes and grasses can be grown, but they are more difficult to maintain than on the more fertile soils. For a further discussion of use and management, see group 10 in the section, Use and Management of Soils.

Jefferson loam, rolling phase (5 to 12 percent slopes) (Jc).—This soil differs from the undulating phase chiefly in slope. It is a well-drained, light-colored soil consisting of local alluvium or colluvium washed predominantly from Lehew, Montevallo, Apison, and, in a few places, Ramsey soils. Much of it is associated with Lehew, Montevallo,

and Apison soils. A small acreage occurs along the base of Starr Mountain.

The surface layer to a depth of about 10 inches is yellowish-gray or grayish-yellow loam. The sublayers are similar to those of the undulating phase. Bedrock shale is at depths ranging from 2 to about 8 feet. A few sandstone and quartzite cobbles or fragments occur in those areas along the base of Starr Mountain.

The fertility is low, and there is not much organic matter in the surface layer. The soil is medium to strongly acid. It is permeable to moisture and plant roots, but the firm subsoil retards infiltration somewhat and increases the erosion hazard.

Use suitability.—Practically all of this soil is under cutover deciduous forest. It is well suited to tilled crops, but fairly long rotations are needed because of its low fertility and moderately strong slopes. Practically all of the crops commonly grown produce well where proper management that includes adequate fertilization is used. Stands of the more exacting legumes and grasses are more difficult to maintain than on some of the more productive soils. For further discussion of use and management, see group 15 in the section, Use and Management of Soils.

Jefferson loam, eroded rolling phase (5 to 12 percent slopes) (Jb).—This phase consists of rolling areas of Jefferson loam that have been eroded to the extent that the plow layer now consists of remnants of the original surface soil mixed with subsoil. Most areas occur on gentle foot slopes in association with Lehew, Montevallo, and Apison soils.

The plow layer to a depth of about 5 inches is grayish-yellow loam. This material is underlain by the more yellowish firm but friable clay loam similar to that in the subsoil of the undulating phase of Jefferson loam. Bedrock shale is at depths of 2 to 8 feet.

In some patches on the stronger slopes the subsoil is exposed and the plow layer is yellow or yellowish-brown firm but friable clay loam. A small acreage that has slopes as steep as 25 percent is included with this phase.

This soil is not high in fertility and is low in organic matter. It is medium to strongly acid. It is fairly permeable to moisture, but because of the rolling surface and the firm subsoil that retards infiltration, erosion is a hazard where the soil is cultivated. The capacity for holding moisture for plants is fair to moderate. The soil responds well if properly fertilized.

Use suitability.—Practically all of this soil has been cleared and cultivated. About 50 percent is used for crops, and about 30 percent for pasture, much of which is unimproved. A small part is idle. Corn, tobacco, cotton, small grains, and lespedeza are the chief crops. Most of the soil is not highly fertilized, and yields are moderate.

Because of the rather strong slopes and somewhat retarded infiltration of moisture, this soil is not suited to intensive use for row crops. Where good management is practiced, productivity probably can be maintained under a 4-year rotation in which a cultivated crop is grown only for 1 year. However, on much of the acreage a cropping system consisting chiefly of small grains and hay and pasture crops is preferable. The more exacting legumes and grasses can be grown where fertility is increased to a high level, but stands are more difficult to maintain than on some of the more fertile soils of the county. For further discussion of use and management, see group 15 in the section, Use and Management of Soils.

Leadvale silt loam, undulating phase (2 to 5 percent slopes) (Lb).—This moderately well drained soil consists of local alluvium washed chiefly from Litz and Sequoia soils, which originate from predominantly acid shale in which there are occasional lenses of limestone or other calcareous material. This soil lies as very gentle foot slopes along drainageways and is associated with Litz and Sequoia soils. Practically all of it is in the Litz-Cotaco and Sequoia-Litz-Cotaco soil associations. A few areas are in the Needmore-Dandridge soil association.

Profile description:

0 to 7 inches, light yellowish-brown to pale-yellow friable silt loam.
7 to 16 inches, yellowish-brown moderately firm but friable silty clay loam.
16 to 24 inches, yellowish-brown, somewhat mottled with gray, moderately compact silty clay.
24 to 60 inches, mottled gray, yellow, and brown firm or compact silty clay; platy structure of parent shale in much of material; bedrock shale at depths of 3 to 10 feet.

The surface layer in some places, especially on the smoother parts, is darker and is brown when moist.

This soil is low to moderate in fertility and low in content of organic matter. It is medium to strongly acid. The surface layer is permeable to moisture, but the subsoil is firm enough to retard infiltration. The capacity for holding moisture is moderate. Since the lower subsoil is not very permeable to roots, this soil is somewhat less well suited to alfalfa and other deep-rooted legumes than the Decatur, Dewey, and Hermitage soils.

Use suitability.—Practically all of this soil has been cleared and is now used for crops or pasture. Rotations consisting chiefly of corn, small grains, and hay crops are used. In some sections tobacco responds well to fertilization and is of high quality. Most of the acreage receives some fertilizer, and a great part has been limed. Crop yields are moderate.

This soil is well suited to most crops commonly grown because of the smooth surface, fairly good permeability, and favorable response to fertilization. However, its retarded internal drainage and low fertility make it poorly suited to alfalfa. The more permeable open soils are better suited to truck crops.

If adequately fertilized, this soil is productive of most of the grasses and legumes used for pasture or hay. Where fertility is kept high, the soil can be used in a fairly short rotation, but the more sloping parts need erosion control. For a further discussion of use and management, see group 5 in the section, Use and Management of Soils.

Leadvale silt loam, eroded rolling phase (5 to 12 percent slopes) (La).—This phase consists of rolling areas of Leadvale silt loam that have been so eroded that the plow layer now consists of a mixture of surface soil and subsoil materials. The areas are widely distributed on foot slopes in association with Litz and Sequoia soils. A great part of the acreage is in the Litz-Cotaco and Sequoia-Litz-Cotaco soil associations.

The plow layer is grayish-yellow silt loam, and the sublayers are similar to those of Leadvale silt loam, undulating phase. The more exposed parts in many places have lost all of the surface layer and now have a plow layer of yellowish-brown firm but friable silty clay loam.

This soil does not have high fertility and is low in content of organic matter. It is medium to strongly acid. Because of erosion, the capacity of the soil to absorb moisture has been lowered, as the more slowly permeable subsoil material is within a few inches of the surface. Consequently, runoff is rapid during rains on the moderately strong slopes of this soil. This phase holds less moisture for plants than the undulating phase, and the more eroded parts are droughty.

Use suitability.—Practically all of this soil has been cleared and cropped. About half of it is now used for general farm crops, chiefly corn and hay. Lespedeza is the principal hay crop. About a fourth is used for pasture. Part of the acreage is idle. Some fertilizing and liming is done. Crop yields are not high.

This soil is suited to tilled crops, but rather long rotations are needed because of its strong slope, somewhat retarded infiltration, and moderately low fertility. A rotation consisting of close-growing small grains and hay and pasture crops probably could be used on much of the soil. Corn, tobacco, and cotton can be grown at infrequent intervals. Truck crops are not well suited to this soil, chiefly because of the shallow depth to the firm less friable subsoil material. Most of the more desirable legumes and grasses can be grown, but good stands are more difficult to maintain than on many of the more fertile soils. For a further discussion of use and management, see group 15 in the section, Use and Management of Soils.

Lehew-Montevallo loams, hilly phases (12 to 25 percent slopes) (Lc).—This is a complex of Lehew and Montevallo soils. The Lehew parts of the complex are residuum from dusky-red or purplish shale and sandstone, and the Montevallo parts are residuum from acid gray or olive-gray fissile shale. All of the material is shallow to bedrock. This complex occurs in the Lehew-Montevallo soil association.

Profile description of the Lehew soil:

0 to 6 inches, light reddish-brown or purplish-gray loose fine sandy loam or loam; surface inch or two darker and contains an appreciable amount of organic matter.
6 to 20 inches, light reddish-brown to reddish-brown loam with abundant fragments of shale and sandy shale; bedrock shale at depths of 1 to 2 feet.

Profile description of the Montevallo soil:

0 to 5 inches, grayish-yellow or gray silt loam; some shale fragments.
5 to 14 inches, brownish-yellow friable shaly silt loam or shaly silty clay loam; gray or olive-gray fissile shale at depths of 12 to 20 inches.

These soils are rather low in fertility and organic matter. They are medium to strongly acid. The soil material is permeable, but the shallow depth to bedrock limits the amount of water that can be absorbed and held. Because of strong slopes and low water-holding capacity, these soils have rapid runoff during rains and are droughty. The south-facing slopes are more droughty than the north-facing slopes.

Use suitability.—Practically all the acreage of these soils is under cutover deciduous and pine forest. The shallow depth to bedrock, low fertility, and rather strong slope make them poorly suited both to crops and to pasture. With careful management, however, including adequate fertilization and liming, these soils can be made productive. Maintenance of a good cover requires careful management. Many areas can best be used for forest. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Lehew-Montevallo shaly loams, eroded hilly phases (12 to 25 percent slopes) (Le).—This complex of soils consists of hilly areas of Lehew-Montevallo loams that have been cleared and cropped and consequently have lost a considerable amount of soil material through erosion. Very shaly material makes up much of the plow layer. Bedrock shale is at a very shallow depth and in places outcrops at the surface. All of this complex is in the Lehew-Montevallo soil association.

The soils of this complex are low in fertility and organic matter. They are strongly acid. There are some relatively shallow gullies. Runoff develops quickly during rains because the soils absorb a limited amount of moisture and are droughty.

Use suitability.—All of this complex has been cleared and cropped. Probably 20 percent is now cultivated and is mainly in corn. About half of the acreage is in pasture, and the rest is idle or has reverted to pine forest. Little fertilizing or liming has been done.

The low fertility, shallow depth to bedrock, and hilly surface make these soils poor for crops or pasture. If acreage for pasture is needed, some of the more favorable parts of this complex can be made fertile enough to provide fair grazing. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Lehew-Montevallo shaly loams, steep phases (25 to 60 percent slopes) (Lh).—This complex differs from the eroded hilly phases of Lehew-Montevallo shaly loams chiefly in having stronger slopes. The 4- or 5-inch surface layer of the Lehew parts of the complex is purplish-gray or light reddish-brown loose fine sandy loam or loam. The underlying material is purplish shale in a matrix of pinkish-gray loamy material. The Montevallo parts of the complex consist of brownish-yellow very shaly friable silt loam. Bedrock is within 1½ feet of the surface, and outcrops in places.

This complex is the most extensive of the Lehew-Montevallo soils. All of it is in the Lehew-Montevallo soil association.

These soils are low in fertility and organic matter and are medium to strongly acid. They are permeable; but the shallow depth to bedrock limits the amount of moisture that can be absorbed, and runoff develops quickly during rains. The soils are inclined to be droughty, especially on the south-facing slopes.

Use suitability.—Practically all the acreage of these soils is under cutover deciduous and pine forest. The low fertility, very shallow depth to bedrock, and strong slopes make them poor for crops or pasture. Most areas can best be used for forest. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Lehew-Montevallo shaly loams, eroded steep phases (25 to 60 percent slopes) (Lg).—This complex of soils consists of areas of the steep phases of Lehew-Montevallo shaly loams that have been cleared and cropped and as a result have lost a considerable amount of soil material through erosion. The areas are widely distributed throughout the Lehew-Montevallo soil associations.

The plow layer is purplish-gray or light reddish-brown loam or silt loam containing a large quantity of shale

409049—57——4

fragments. Bedrock shale is at depths of less than 1½ feet and in places outcrops at the surface.

This complex of soils is low in fertility and organic matter. It is medium to strongly acid. The soil material is permeable, but the shallow depth to bedrock greatly limits the amount of water that can be absorbed.

Use suitability.—All of this complex has been cleared and cropped. Much of it now is idle or used as unimproved pasture. Some has reverted to pine forest. A small part is in crops.

The steep slopes, shallow depth to bedrock, and low fertility make these soils poorly suited to crops or pasture. Most areas can best be used for forest. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Lehew-Montevallo loams, rolling phases (5 to 12 percent slopes) (Ld).—This complex differs from Lehew-Montevallo loams, hilly phases, chiefly in having a smoother surface. It also has a little greater depth to bedrock and a somewhat less shaly surface layer. A great part of this complex occurs on the narrow ridge crests of the Lehew-Montevallo soil association.

The 4- or 5-inch surface layer in the Lehew parts of the complex is purplish-gray or light reddish-brown fine sandy loam or loam with some shale fragments intermixed. Below this layer, to a depth of about 12 inches, the material is purplish or reddish-brown friable shaly loam or clay loam. A mixture of shale and soil material occurs below this material. Bedrock is at depths ranging from 1½ to 2 feet.

The Montevallo parts of the complex make up a smaller proportion of this mapping unit than of the complex of hilly phases. The 4- or 5-inch surface layer is grayish-yellow silt loam that contains various amounts of shale fragments. Below this the material is more shaly and consists in most places of a mixture of brownish-yellow silt loam and olive-gray fissile shale. Bedrock is at depths ranging from 1 to 2 feet.

The fertility and content of organic matter are both low, but the soil material is sufficiently deep to bedrock to absorb and hold a fair amount of moisture. Internal drainage is medium. As a result of the shallow depth to bedrock and the rolling surface, runoff develops rather quickly during rains.

Use suitability.—All of these soils are under cutover deciduous and pine forest. They are suitable for crops, but the low fertility, shale content, and shallow depth to bedrock greatly limit their productivity. Moreover, they occur in narrow strips on the crests of the steep Lehew-Montevallo ridges and are very difficult to reach for cultivation. A great part of the acreage is therefore better used for forest than for crops. For a further discussion of use and management, see group 11 in the section, Use and Management of Soils.

Lehew-Montevallo shaly loams, eroded rolling phases (5 to 12 percent slopes) (Lf).—This complex of soils consists of areas that were formerly Lehew-Montevallo loams, rolling phases. These areas were cropped and as a result have lost a considerable amount of soil material through erosion. Much of this complex lies in narrow strips on the crests of steep ridges.

The plow layer of this complex of soils is very shaly. The depth to bedrock shale is from 1 to 2 feet, and in the more eroded parts shale may outcrop at the surface. These soils are low in fertility and organic matter. Although they are permeable and absorb a fair amount of moisture, on the whole they are rather droughty, and runoff develops quickly during rains.

Use suitability.—These soils are suited to crops. Where carefully managed and heavily fertilized, they produce fair yields of corn, small grains, and some hay and pasture crops, as lespedeza and redtop. They are capable of producing fair pasture, but the grazing period is greatly limited by their low moisture-holding capacity. For a further discussion of use and management, see group 11 in the section, Use and Management of Soils.

Litz silt loam, rolling phase (5 to 12 percent slopes) (Lv).—This is a light-colored soil that is shallow to acid shale bedrock. In places the shale is soft and appears to have been leached of lime. A few thin layers or lenses of limestone are exposed in many places. This soil is associated with other Litz soils and the Sequoia soils. A great part of the acreage is in the Litz-Cotaco and the Sequoia-Litz-Cotaco soil associations.

Profile description:

0 to 5 inches, light yellowish-brown or pale-yellow silt loam; some fine shale fragments.
5 to 10 inches, brownish-yellow friable shaly silty clay or shaly silty clay loam.
10 to 20 inches +, variegated yellow, yellowish-red, and strong-brown very shaly silty clay loam; bedrock fissile shale at depths of 1 to 2 feet.

Much of the shale is soft and easily crushed, but in a few places it is moderately hard and is more nearly pale yellow or pale olive.

This soil is low in fertility and organic matter. Moisture infiltrates easily, but the shallow depth to bedrock greatly limits the amount of moisture the soil can hold. Accordingly, runoff develops quickly during rains. The limited capacity for holding moisture makes the soil more droughty than many soils that are deeper to bedrock.

Use suitability.—All of this soil is under cutover deciduous forest. The low fertility, rather shallow depth to bedrock, and rolling surface restrict its suitability for tilled crops. It is capable of supporting most of the legumes and grasses, including alfalfa, where properly fertilized, limed, and seeded. Under good management, bluegrass and whiteclover have a fair carrying capacity as permanent pasture, but growth ceases during dry periods. For further discussion of use and management, see group 11 in the section, Use and Management of Soils.

Litz shaly silt loam, eroded rolling phase (5 to 12 percent slopes) (Lr).—This phase occupies areas of Litz silt loam that have lost a considerable part of the soil material under cultivation. It is the most extensive of the Litz soils. The areas make up a great part of Litz-Cotaco soil association and are extensive in the Sequoia-Litz-Cotaco soil association.

The plow layer in most places is brownish-yellow or light yellowish-brown, friable shaly silt loam. The underlying material is similar to corresponding layers of the rolling phase of Litz silt loam. Bedrock is at depths of ½ to 1½ feet. In many places the plow layer is very shallow, and occasionally shale outcrops at the surface. Shallow gullies occur on many of the more sloping parts.

This soil is very low in fertility and organic matter. As a result of its limited capacity to absorb and retain moisture, runoff develops quickly and the soil is droughty.

Use suitability.—All of this soil has been cleared and

cropped. Parts are abandoned or idle, and a considerable acreage is used as unimproved pasture. Some parts are in crops, predominantly corn, small grains, and lespedeza. Yields are low.

Because of the low fertility, droughtiness, and susceptibility to erosion, this soil is poorly suited to crops. If adequately fertilized and properly seeded, it can support fairly good pasture. Whiteclover and bluegrass are among the well-suited pasture plants. Although bedrock shale is at a shallow depth, a fair seedbed or plow layer can be developed by breaking the shale with heavy tillage implements. By the same means the small gullies can be eliminated. Where such practices are followed, additional erosion is a great hazard until a good close-growing vegetation is developed. Areas that must be cropped are suited to rotations consisting of small grains and hay and pasture crops. Because small grains mature before the drier part of the growing season, they are better suited to this droughty soil than corn. For a further discussion of use and management, see group 21 in the section, Use and Management of Soils.

Litz shaly silt loam, eroded undulating phase (2 to 5 percent slopes) (Lt).—This soil differs from Litz silt loam, rolling phase, chiefly in having a smoother surface, a little greater depth to bedrock, and considerable loss of material through erosion. However, a small acreage still under forest is not materially eroded. This soil is widely distributed throughout the Litz-Cotaco and the Sequoia-Litz-Cotaco soil associations.

Most of the acreage has a plow layer consisting of light yellowish-brown or brownish-yellow shaly silt loam. Bedrock is at depths ranging from 1 to 2 feet.

This soil is low in fertility and organic matter. Its capacity for holding moisture is low, chiefly because of the shallow depth to bedrock. The soil material, however, is friable and permeable. Where bedrock shale is near the surface, it can be broken by heavy tillage implements to form a tillable plow layer.

Use suitability.—A great part of this soil has been cleared and cropped. At present about 40 percent is used for crops and 40 percent for pasture. A very small part is under forest, and the rest is idle (fig. 6). Most of the cropped acreage receives some fertilizer, and much of it has been limed. Crop yields are generally low.

Figure 6.—Hay on Litz shaly silt loam, eroded undulating phase, in center; cropped and recently abandoned area in foreground; 12- to 15-year old growth of pine in background.

The shallow depth to bedrock, the low fertility, and low capacity for holding moisture for plants greatly limit the productivity of this soil and the range of crops suited to it. Where adequately fertilized, the soil is suited to occasional row crops, as corn, and to small grains and most legumes and grasses for hay and pasture, including alfalfa. Substantial applications of fertilizer and lime are necessary to develop good stands of these crops. For a further discussion of use and management, see group 11 in the section, Use and Management of Soils.

Litz silt loam, hilly phase (12 to 25 percent slopes) (Lu).—This soil differs from the rolling phase mainly in slope. In most places it is shallower to bedrock shale, and on the steeper parts the shale may outcrop. This soil occurs on the stronger slopes in association with other Litz soils and Sequoia soils in the Litz-Cotaco and the Sequoia-Litz-Cotaco soil associations.

The 3-inch to 4-inch surface layer is light yellowish-brown or pale-yellow silt loam or shaly silt loam. Below this layer is a brownish-yellow shaly silty clay or shaly silty clay loam. Bedrock is at depths ranging from ½ to 1½ feet.

This soil is low in fertility and organic matter. It is medium to strongly acid. Although the soil is permeable and friable, the shallow depth to bedrock greatly limits the amount of moisture it can absorb. Consequently, runoff develops quickly during rains and the soil is generally droughty.

Use suitability.—Most of this soil is under cutover deciduous forest. It is poorly suited to tilled crops because of shallow depth to bedrock, strong slopes, and low fertility. If adequately fertilized, however, it can produce fairly desirable pasture, but droughtiness greatly limits the carrying capacity. A plant cover is needed to protect the soil from erosion. For a further discussion of use and management, see group 21 in the section, Use and Management of Soils.

Litz shaly silt loam, eroded hilly phase (12 to 25 percent slopes) (Lp).—This soil consists of former areas of the hilly phase of Litz silt loam that have been eroded to a considerable degree as a result of cropping. It is the second most extensive of the Litz soils and is widely distributed throughout the Litz-Cotaco and the Sequoia-Litz-Cotaco soil associations.

The soil material is from ½ to 1 foot thick and consists predominantly of brownish-yellow very shaly silt loam or shaly silty clay loam. Bedrock is at depths of ½ to 1 foot, and in places shale outcrops at the surface. There are some shallow gullies.

The fertility and organic-matter content of this soil are very low. Although the soil absorbs moisture well, its capacity for holding moisture for plants is very low.

Use suitability.—All of this soil has been cleared and cropped. Approximately half is now used as unimproved pasture, and a fourth is virtually abandoned or idle. The rest is used for corn, small grains, and lespedeza. Not much fertilization is practiced, but lime has been applied to some of the acreage. Yields are low.

The very shallow depth to bedrock and strong slopes make this soil poorly suited to crops. If adequately fertilized and limed, however, and properly seeded, most of it can support a fair stand of desirable grasses and legumes

for pasture, including whiteclover and bluegrass. Droughtiness so greatly restricts the grazing period that supplemental pastures with better moisture relations are required during much of the grazing season. For a further discussion of use and management, see group 21 in the section, Use and Management of Soils.

Litz silt loam, steep phase (25 to 60 percent slopes) (Lw).—This soil differs from the rolling phase mainly in slope. In general, the depth to bedrock is less, in most places ranging from ½ to 1 foot. Most of the areas are small and are associated with less steep Litz and Sequoia soils in the Litz-Cotaco and Sequoia-Litz-Cotaco soil associations.

The 3- to 4-inch surface layer is light yellowish-brown or pale-yellow silt loam or shaly silt loam. The underlying material is brownish-yellow very shaly silty clay or shaly silty clay loam. In most places the variegated yellow, yellowish-red, and strong-brown bedrock is soft shale. In a few places, however, the shale is harder and predominantly olive gray.

This soil is low in fertility and organic matter. Although it is permeable, the shallow depth to bedrock greatly limits its capacity for absorbing and holding moisture. Consequently, runoff develops quickly and the soil is droughty.

Use suitability.—Practically all of this soil is under cutover deciduous forest. The very strong slopes and shallow depth to bedrock make it poorly suited either to crops or pasture. Some areas, if properly fertilized, limed, and seeded, are capable of supporting a fair stand of the more desirable legumes and grasses. The carrying capacity of such pasture is low because of the very limited moisture and the great difficulty of maintaining a good stand on such steeply sloping and shallow soil. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Litz shaly silt loam, eroded steep phase (25 to 60 percent slopes) (Ls).—This soil occupies areas of Litz silt loam that were cleared and cropped and, as a result, have lost a considerable amount of soil material through erosion. Bedrock is at a very shallow depth and frequently outcrops at the surface.

Most of this soil occurs in small areas associated with less steep Litz and Sequoia soils in the Litz-Cotaco and the Sequoia-Litz-Cotaco soil associations.

This soil is low in fertility and organic matter and has a very low capacity for absorbing moisture. Runoff develops quickly, and the soil generally is very droughty.

Use suitability.—Little of this soil is now used for crops. Much of it is idle or in unimproved pasture. Its carrying capacity as pasture is low. The very steep slopes, shallow depth to bedrock, and low fertility make this soil poorly suited to crops or pasture. For further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Litz loam, eroded hilly phase (12 to 25 percent slopes) (Lk).—This light-colored, well-drained soil is shallow to calcareous sandstone. It differs from the silt loam type in being more loamy or more sandy and somewhat deeper to bedrock. Much of the acreage has been cleared and cropped and as a result has lost an appreciable part of the original surface soil through erosion. This soil is associated with the Dandridge, Needmore, and Tellico soils, and other phases of Litz loam. Most of the areas are in the Dandridge-Needmore and the Tellico-Neubert soil associations northeast of Etowah.

Profile description (an uneroded profile that represents only a small part of the total area):

0 to 3 inches, brownish-gray (dark grayish brown when moist) loose loam or fine sandy loam.
3 to 10 inches, yellow or pale-yellow loose loam grading to fine sandy clay loam.
10 to 24 inches, yellow to strong-brown friable but moderately firm clay loam.
24 to 32 inches, variegated pale-yellow, strong-brown, and yellowish-red friable but firm clay loam; yellowish or brownish partly disintegrated calcareous sandstone or shaly sandstone at depths of 1½ to 4 feet.

A large acreage of this soil has been eroded and has a plow layer of brownish-yellow friable loam or fine sandy loam. Below this layer is the yellow firm but friable clay loam of the subsoil. Approximately half the total acreage has been severely eroded, and in these the plow layer is yellow to strong-brown firm but friable clay loam. Gullies are common in places, and some are too deep to be easily obliterated. Stone fragments occur in places. The areas associated with the Tellico soils have a somewhat redder subsoil, and the eroded areas are redder throughout both the plow layer and the subsoil.

This soil is rather low in fertility and organic matter and is strongly acid. It is permeable and has a fair moisture-holding capacity. Because of the somewhat strong slopes and in places the shallow depth to bedrock, runoff develops quickly during rains. Consequently, erosion is a real hazard on cultivated tracts and other areas not protected by close-growing vegetation.

Use suitability.—About 15 percent of this soil is under cutover deciduous forest. The rest has been cleared and cropped, and much of it is now in unimproved pasture or is idle. A small acreage has reverted to pine forest. The rather limited acreage is used chiefly for corn and lespedeza.

This soil is poorly suited to crops because of strong slopes, shallow depth to bedrock, and low fertility. When the soil is used in a crop rotation, erosion is difficult to control. Much of the acreage can be used as pasture if it is substantially fertilized and limed and is kept in pasture vegetation that will protect the soil from erosion. In general, gullies form more easily on this soil than on finer textured soils having similar slope gradients. Many of the most severely eroded areas can well be used for forest. For further discussion of use and management, see group 21 in the section, Use and Management of Soils.

Litz loam, steep phase (25 to 60 percent slopes) (Lo).—This light-colored, well-drained soil is shallow to calcareous sandstone. It differs from the uneroded parts of the hilly phase mainly in having stronger slopes and shallower depth to bedrock. There are a few rock outcrops. This soil is widely distributed, chiefly in the Tellico-Neubert soil association northeast from Etowah. Some areas may occur in the Dandridge-Needmore association.

Profile description:

0 to 3 inches, brownish-gray (dark grayish brown when moist) loose loam or fine sandy loam.
3 to 8 inches, yellow or pale-yellow loose loam grading to fine sandy clay loam.
8 to 16 inches, yellow to strong-brown friable but moderately firm clay loam.
16 to 24 inches, variegated pale-yellow, strong-brown, and yellowish-red friable but firm clay loam; yellowish or brownish partly disintegrated calcareous sandstone or shaly sandstone at depths of 1 to 2 feet.

This soil is low in fertility and organic matter. It is strongly acid. The soil is permeable, and the deeper parts have a fair moisture-holding capacity. As a result of the strong slopes, however, runoff accumulates where there is not a good vegetative cover.

Use suitability.—A very great part of this soil is under cutover deciduous forest. The strong slopes, rather shallow depth to bedrock, and low fertility make it poor for crops and pasture. Some of the less steep, deeper parts on north-facing slopes may be made fairly productive of pasture if adequately fertilized and limed. Because of the strong slopes, however, the application of these materials, especially lime, is difficult. For further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Litz loam, eroded steep phase (25 to 60 percent slopes) (Lm).—This soil consists of areas of the steep phase that have been cropped and consequently are eroded. Practically all areas have lost much of the surface layer; some have lost so much material that the plow layer now consists of the strong-brown clay loam subsoil material. Gullies occur in many places, and some are difficult to obliterate. Bedrock is at depths of ½ to 2 feet, and rock outcrops are common in places. Much of this soil is associated with the Tellico soils in the Tellico-Neubert soil association. Most of it is in the Tellico-Neubert area northeast from Etowah.

The soil is low in fertility and organic matter and is strongly acid. It is permeable and has good internal drainage, but the shallow depth to bedrock and the clayey soil material greatly limit the amount of moisture it can absorb and retain. As a result, runoff develops rather rapidly, and the soil as a whole is rather droughty. Tilth of the plow layer is poor.

Use suitability.—All of this soil has been cleared and cropped. Much is now idle or has reverted to pine forest. The rest is largely in unimproved pasture. Pasture vegetation is not of high quality and has a low carrying capacity.

The soil is poor for crops or pasture because of steep slopes, shallow depth to bedrock, unfavorable tilth, and low fertility. All areas can well be allowed to revert to pine forest. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Litz loam, rolling phase (5 to 12 percent slopes) (Ln).—This is a light-colored, well-drained soil. It occurs at moderately shallow depths over calcareous sandstone. It differs from the uneroded parts of the hilly Litz loam soils in having a smoother surface and a somewhat greater depth to bedrock. Internal drainage is good. The soil occupies rather narrow ridgetops above stronger slopes of Litz, Tellico, or Dandridge soils. Practically all of the acreage is in the Tellico-Neubert and the Dandridge-Needmore soil associations northeast of Etowah.

Profile description:

0 to 4 inches, brownish-gray (dark grayish brown when moist) loose loam or fine sandy loam.
4 to 12 inches, yellow or pale-yellow loose loam grading to fine sandy clay loam.
12 to 26 inches, yellow to strong-brown friable but moderately firm clay loam.
26 inches +, variegated pale-yellow, strong-brown, and yellowish-red friable but firm clay loam; yellowish or brownish partly disintegrated calcareous sandstone or shaly sandstone at depths of 1½ to 4 feet.

The first inch of the surface layer is darker and higher in organic matter than the rest of the layer. The subsoil layers are much thinner than usual where bedrock is within 18 to 24 inches of the surface.

The surface layer is low in fertility and organic matter and is medium to strongly acid. It is permeable and water infiltrates easily. The lower sublayers are more slowly permeable, but they are easily penetrated by plant roots and absorb moisture fairly well. The capacity for holding moisture for plants is moderate.

Use suitability.—All of this soil is under cutover deciduous forest. It is suitable for many crops, including those requiring tillage. Some small tracts, however, are rather inaccessible because they are associated with steep Tellico and Litz soils. Where good management is practiced, moderately short rotations can be used. Corn, tobacco, and some truck crops are suitable row crops. Small grains and most hay and pasture crops produce well where the soil is adequately fertilized and limed. Some care is required to restrain erosion on cultivated areas. In general, the more exacting legumes and grasses do not produce so well as on some of the more fertile soils. For a further discussion of use and management, see group 11 in the section, Use and Management of Soils.

Litz loam, eroded rolling phase (5 to 12 percent slopes) (Ll).—This soil differs from the rolling phase chiefly in having been cultivated. As a result it has lost a considerable amount of soil material through erosion. It is widely distributed throughout the Tellico-Neubert and the Dandridge-Needmore soil associations northeast of Etowah.

The 5-inch plow layer varies greatly in texture and consistence. In the less eroded areas it is grayish-brown heavy loam; in the more eroded areas it is strong-brown rather firm but friable clay loam. Small gullies are common on the steeper parts of the idle areas. Most of them, however, can be obliterated by deep tillage or a small amount of filling. Some sandstone fragments occur on the surface and in the soil in places.

This soil has low fertility and very little organic matter. It is strongly acid. The tilth is somewhat unfavorable, because of the clayey plow layer and the low content of organic matter. Internal drainage is medium. Moisture infiltrates slowly, however, and runoff develops rapidly during rains. Most of the soil is droughty.

Use suitability.—All of this soil has been cleared and cropped. About half is now used for crops, chiefly corn, small grains, and some hay. There is a small acreage of tobacco. Probably 20 percent has developed a volunteer pine forest, and the rest is in unimproved pasture or is idle. The fertility is not maintained at a very high level in most places, and crop yields generally are not high.

The less eroded parts of this soil are fairly well suited to tilled crops. Some of the more severely eroded areas, however, are not suitable for cultivation because of poor tilth, low moisture supply, and great susceptibility to erosion. Small grains and some hay crops are among the well suited crops. If the areas are to be kept productive, they will require substantial applications of fertilizer and lime and some particular attention to control of runoff. Most areas, except in the most severely eroded parts, can support fairly desirable pasture if they are adequately fertilized. For a further discussion of use and management, see group 11 in the section, Use and Management of Soils.

Litz stony loam, very steep phase (60+ percent slopes) (Lx).—This soil differs from Litz loam, steep phase, chiefly in having stronger slopes and shallower depth to bedrock. The soil material is more than 1 foot thick in only a few places. Many rock outcrops occur, and in places they form low cliffs.

This soil is associated with Tellico and Dandridge soils in the Tellico-Neubert and the Dandridge-Needmore soil associations northeast of Etowah.

The 3- to 4-inch surface layer is grayish-brown loam or fine sandy loam that contains various amounts of stone fragments. The subsoil is predominantly yellow or strong-brown friable clay loam. It is underlain by partly disintegrated sandy bedrock.

This soil is low in fertility and has only a small amount of organic matter in the surface layer. In most parts it is medium acid. The shallow depth to bedrock greatly limits the capacity of the soil to absorb moisture.

Use suitability.—Practically all of this soil is under cutover deciduous and pine forest. The very strong slopes and shallow depth to bedrock make this soil poor for crops or pasture. It can produce forest, but access is difficult because of the very strong slopes and stoniness. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Mines, pits, and dumps (1 to 60+ percent slopes).—This miscellaneous land type consists of mines and pits, from which rock or barite ore has been removed, and the dumps around them. Many of these mines and pits are now active. The dumps consist largely of waste from these mines and pits. All of the material is rough and unsuitable for either crops or pasture. In some places it is bare rock, and in others it is a loose mixture of clayey material and rock fragments. In a few places the material is predominantly clay and silt that has been washed out on the bottom lands. Even these areas are unsuitable for plant growth. Most of this land type is in the Dewey-Fullerton-Emory and the Fullerton-Clarksville-Greendale soil associations. For a discussion of use and management, see group 23 in the section, Use and Management of Soils.

Monongahela silt loam (1 to 4 percent slopes) (Ma).—This is an imperfectly drained light-colored soil on stream terraces that, for the most part, are from 5 to 15 feet above the adjacent flood plains. It consists of alluvium originating from limestone, shale, and sandstone. The surface is nearly level to gently undulating. Most of this soil occurs in small areas along Rogers and Spring Creeks; a few tracts are along some of the larger streams of the county.

Profile description:

0 to 7 inches, very pale brown or pale-brown floury silt loam.
7 to 18 inches, pale-yellow to yellow firm but friable clay loam or silty clay loam.
18 to 24 inches, mottled light-gray and yellow, with some brown specks, firm rather compact silty clay; below this depth strongly mottled and in most places very firm blocky clay; bedrock (in most places shale) 5 to 15 feet below surface.

In places the surface layer is silt loam and the layer at 7 to 18 inches is more friable and more nearly a loam than the layer described above as occurring at this depth. A few small poorly drained patches that are predominantly gray to depths of 12 to 14 inches are included.

This soil is low in fertility and organic matter. It is strongly acid. Internal drainage is slow, but the surface soil is friable and absorbs moisture well. The material below 18 inches is very slowly permeable to both roots and water. As a result of the relatively shallow depth to clayey material, some parts of the soil are rather droughty during the driest part of the growing season. Much of it, however, has fairly favorable moisture relations.

Use suitability.—Most of this soil has been cleared and cropped. The chief crops are corn, small grains, and lespedeza. There is a small acreage of tobacco. A considerable acreage is in pasture, and a small part is idle. Some fertilizer is used for corn, small grains, and tobacco, and lime has been applied to much of the area. Crop yields are not high.

The number of suitable tilled crops is limited by the low fertility and impaired internal drainage. In general, small grains, hay, and pasture crops are among those suited, but on the lower parts of this soil even the small grains are damaged by winterkilling. Soybeans and corn are among the more productive crops. Tobacco is not very well suited to much of the soil. Such crops as alfalfa and potatoes are poorly suited. Among the grasses and legumes, timothy, bluegrass, lespedeza, and red clover are suitable, but good stands and high yields require heavy fertilization and liming. Under proper management, bluegrass and whiteclover are productive as pasture. For a further discussion of use and management, see group 5 in the section, Use and Management of Soils.

Needmore silty clay loam, eroded undulating phase (2 to 5 percent slopes) (Nb).—This light-colored, well-drained soil is moderately shallow to calcareous shale. Practically all of it has been eroded. Internal drainage is medium. This soil occupies the smooth ridgetops in the Needmore-Dandridge and the Dandridge-Needmore soil associations.

Profile description:

0 to 5 inches, pale-yellow or yellowish-gray friable silty clay loam; contains a few soft shale fragments; layer is dark grayish-brown silt loam in the few uneroded areas still under forest.
5 to 18 inches, yellow or yellowish-brown firm but friable silty clay loam grading to more clayey material with depth.
18 to 24 inches +, mottled or splotched yellowish-gray, brownish-yellow, and yellowish-brown rather tough silty clay; calcareous shale bedrock at depths of 1½ to 4 feet.

In many places the relatively hard dark-gray shale bedrock is commonly known as black shale. In other places the bedrock is lighter colored, and the upper foot or so is soft and leached of its lime. A large amount of shale fragments occur in some parts of the plow layer and may outcrop in a few spots. There are a few small gullies, but they can be obliterated in most places by deep tillage or by filling.

This soil is not high in fertility and has a low content of organic matter. Most parts are slightly acid to alkaline, although some are medium acid. The surface soil in most places is friable and permeable. The shallow depth to the clayey subsoil, however, greatly retards percolation of water and restricts the moisture-holding capacity of the soil. As a result, runoff develops rapidly during rains and the moisture supply is soon exhausted during the drier parts of the growing season.

Use suitability.—Nearly all of this soil has been cleared and cropped. At present about 60 percent is used for corn, small grains, and lespedeza, and 25 percent for pasture. A small part is in miscellaneous crops, and about 10 percent is idle. Corn and small grains are commonly fertilized, but lime is not required in most areas. Crop

yields are fair to low except where management is very good.

This soil is suitable for tilled crops. Alfalfa and tobacco are not very productive because of the limited moisture supply in the soil. Generally, the less alkaline, more friable soils that are deeper to bedrock are better suited to tobacco. Potatoes are poorly suited because of the shallow depth to firm calcareous subsoil. Moderately long rotations are suited, and small grains and legumes and grasses for hay and pasture are among the more productive crops. Where adequate fertilization and liming are practiced, such pasture plants as whiteclover and bluegrass produce well. Red clover is one of the better suited hay crops. For a further discussion of use and management, see group 12 in the section, Use and Management of Soils.

Needmore silty clay loam, eroded rolling phase (5 to 12 percent slopes) (Na).—This soil differs from the eroded undulating phase chiefly in degree of slope. It is the most extensive of the Needmore soils. Most of the areas make up a major part of the Needmore-Dandridge soil association. The rest are in the Dandridge-Needmore association and occur on relatively narrow ridgetops in association with more strongly sloping Dandridge soils.

A large part of the acreage has been eroded, and as a result the 5-inch plow layer consists of a mixture of original surface-layer and subsoil materials. It is grayish-yellow friable silty clay loam. Below this is yellow or yellowish-brown firm but friable silty clay loam that grades with depth to silty clay. Calcareous shale bedrock is at depths ranging from 1 to 3 feet. A small acreage has not been eroded, and the 6-inch surface layer is pale yellow (the first inch is darker) friable silt loam. Shale fragments occur throughout much of the plow layer. There are a few shallow gullies, but most of them can be filled by tillage.

The fertility of this soil is not high, and the plow layer contains very little organic matter. The soil is medium to strongly acid. The plow layer varies widely in tilth. In places, it is friable and easily worked; but in the more eroded parts, it is somewhat firm and has poor tilth. Because of the shallow depth to the shaly subsoil, infiltration of water is retarded, and the moisture-holding capacity is limited. Runoff develops rapidly during rains.

Use suitability.—A small part of this soil is under cutover deciduous forest, but the greater part has been cleared and cropped. About 40 percent is used for pasture, and most of the rest for crops, chiefly corn, small grains, and hay. A small acreage is idle. Row crops and small grains receive some fertilizer, but generally yields are not high.

This soil is suitable for some tilled crops, but relatively long rotations and substantial fertilization are required to maintain fair productivity. The production of those crops requiring a long growing season is restricted by the limited moisture supply. In general, fall-sown small grains are among the more suitable crops. Stands of the more desirable legumes and grasses for pasture are not difficult to establish where liming and adequate fertilization have been practiced. In many places this soil is best suited to permanent pasture. For a further discussion of use and management, see group 13 in the section, Use and Management of Soils.

Needmore silty clay loam, severely eroded rolling phase (5 to 12 percent slopes) (Nc).—This phase consists of rolling areas of Needmore silty clay loam that have been so eroded that practically all of the original surface soil and, in places, part of the subsoil have been lost. The plow layer consists of yellow or yellowish-brown firm but friable silty clay loam. The subsoil is similar to that of Needmore silty clay loam, eroded undulating phase. Bedrock is at depths ranging from ½ to 2 feet. In the more eroded areas, the plow layer may be silty clay rather than silty clay loam, and patches of shale are exposed in places. Shallow gullies are common, especially in uncultivated areas.

This soil is low in fertility and organic matter. Much of it is medium acid. As a result of the very slow infiltration of water and low moisture-holding capacity, runoff develops very quickly during rains, and the soil is droughty. The tilth of the plow layer is unfavorable, and in places bedrock shale interferes with cultivation. Where tillage is necessary, however, this shale can be broken sufficiently by heavy tillage implements to make planting and cultivation feasible.

Use suitability.—All of this soil has been cleared and cropped. Now, much is idle, and practically all the rest is in unimproved pasture. Although the quality of the grazing varies greatly, the carrying capacity of pasture is restricted by the low fertility and droughtiness of the soil.

The shallow depth to bedrock, unfavorable moisture relations, and low fertility make this soil poorly suited to crops. If properly fertilized and seeded, the soil can produce reasonably good pasture. For a further discussion of use and management, see group 21 in the section, Use and Management of Soils.

Neubert loam (1 to 5 percent slopes) (Nd).—This moderately well to well drained reddish soil consists of local alluvium washed chiefly from Tellico soils. The parent rock is calcareous sandstone or shaly sandstone. Most of the acreage lies as narrow strips along the drainageways in the Tellico-Neubert soil association.

Profile description:

0 to 15 inches, reddish-brown to dark reddish-brown friable loam.
15 to 36 inches +, reddish-brown to red layer, generally somewhat firmer than the layer above; texture grades to clay loam; bedrock at depths of 3 to 12 feet.

The texture and color vary in both layers. In places, the surface layer is fine sandy loam, whereas in others it is silt loam. The texture of the sublayers also varies. In some areas the material below a depth of 24 inches is mottled reddish brown, yellow, and gray.

This is a moderately fertile soil and has a fair content of organic matter. It is medium to slightly acid. The tilth is good, and the soil has a fairly high moisture-holding capacity. The deep subsoil is moist much of the time. During heavy rains parts of the soil are temporarily flooded, but not so much that the crops are greatly damaged. Most of the soil can be cultivated over a wide range of moisture conditions.

Use suitability.—Much of this soil has been cleared and cropped. The only areas still under forest are in the extreme upper reaches of the drainageways in the steeper parts of the Tellico-Neubert soil association. Corn occupies about a fourth of the acreage, hay a fourth, and pasture a fourth. A small amount is in small grains and tobacco. Some fertilization is practiced, and yields are moderate to high. Some areas are used intensively for crops.

The smooth surface, favorable tilth, good moisture supply, and favorable response to fertilization make this soil desirable for cultivation. Where adequately fertilized, it can be used intensively for row crops. This soil is suited to a wide variety of crops, including vegetables, tobacco, and alfalfa, although the less well-drained parts are not well suited to tobacco, alfalfa, or potatoes, and good stands of alfalfa may not persist for many years without reseeding. This soil supports good stands of the more desirable legumes and grasses for pasture if it is adequately fertilized. Its favorable moisture relations make it valuable as pasture during the drier parts of the growing season. For a further discussion of use and management, see group 3 in the section, Use and Management of Soils.

Ooltewah silt loam (0 to 2 percent slopes) (Oa).—This is an imperfectly drained soil consisting of local alluvium washed from more fertile soil developed over limestone. Most of the areas occur in sinkholes and are small. They have little or no surface drainage, and excess water is removed through subterranean channels. A great part of this soil is in the Dewey-Fullerton-Emory and the Decatur-Dewey-Emory soil associations..

Profile description:

0 to 14 inches, light-brown or brown mellow silt loam.
14 to 20 inches, mottled brown, gray, and pale yellow, friable silt loam or silty clay loam.
20 to 30 inches +, mottled light-gray, yellow, and dark-brown firm but friable silty clay loam; bedrock limestone at depths of 5 to 12 feet.

The color of the surface layer ranges from light brown to yellowish red, and the texture from loam to silty clay loam. These variations depend on the nature of the parent soil and the soil layer from which the material was washed. Areas consisting of recent deposits of Dewey subsoil material are yellowish-red silty clay loam, whereas areas consisting of recent deposits of Fullerton surface soil material are light-brown loam or silt loam. In some places the material below a depth of 30 inches is silty clay.

This is a fertile soil, and much of it has a moderate amount of organic matter in the surface layer. It is medium acid. The tilth is good, but slow drainage delays tillage, especially in spring. The upper 14 inches of the soil are permeable, but slow internal drainage limits root development during the wetter parts of the growing season.

Use suitability.—Practically all of this soil has been cleared and is now used for crops and pasture. Corn and hay are the chief crops. Although fertilization is not practiced to a great extent, crop yields generally are fairly high.

This soil is well suited to intensive use for some crops. Its high fertility, good tilth, smooth surface, and abundant moisture supply through much of the growing season make it particularly well suited to such row crops as corn and soybeans. It is also well suited to such hay crops as red clover, lespedeza, timothy, and orchardgrass. Alfalfa and potatoes do not produce well, and much of the acreage is not well enough drained to allow good yields of tobacco. Almost all of the area is temporarily covered with water following heavy rains, and this is a hazard to crops. This soil is particularly desirable for pasture because of its high fertility and relatively good moisture supply during the drier parts of the growing season. For a further discussion of use and management, see group 3 in the section, Use and Management of Soils.

Pace silt loam, undulating phase (1 to 5 percent slopes) (Pc).—This moderately well-drained soil consists of colluvium and local alluvium washed chiefly from Fullerton and Clarksville soils. The Pace soils differ from the Greendale chiefly in being older and occupying higher positions. This undulating phase occurs on gently sloping foot slopes below higher areas of Fullerton and Clarksville soils and above strips of Greendale soils along the drainageways. It is widely distributed throughout much of the Fullerton-Clarksville-Greendale and the Clarksville-Fullerton soil associations. There are a few areas of this soil in the Dewey-Fullerton-Emory soil association.

Profile description:

0 to 8 inches, pale-brown to brown very friable silt loam.
8 to 24 inches, yellowish-brown firm but friable silty clay loam.
24 to 48 inches +, mottled yellow, gray, and dark-brown firm rather brittle or compact silty clay loam with much chert; cherty limestone bedrock at depths of 5 to 12 feet.

Most areas have some chert throughout the entire soil mass, and an appreciable part of the acreage contains sufficient chert to interfere with cultivation. In some areas, especially those adjacent to Fullerton and Dewey loam types, the texture, particularly of the surface layer, is more sandy. In these areas the 8-inch surface layer is loam or fine sandy loam. The mottled material in places is at a depth greater than 24 inches.

This soil is moderately fertile and has a fair amount of organic matter. It is medium to strongly acid. The plow layer has good tilth. The soil is quite permeable to moisture, but the subsoil is firm enough to retard percolation. The capacity for holding moisture available to plants is moderate, and moisture relations generally are favorable.

Use suitability.—Most of this soil has been cleared and cultivated. At present corn occupies about 20 percent, lespedeza and red clover 20 percent, and small grains 10 percent. About 25 percent is in pasture, and a small part is under forest. Fertilizer is used for row crops and small grains, and lime has been applied to much of the acreage. Tobacco and alfalfa receive heavy applications of fertilizer.

This soil is well suited to pasture and to many crops, including alfalfa, tobacco, and truck crops. Moderately short rotations can be used if the fertility is kept moderately high, although some care is required to restrain erosion. Favorable moisture relations make high yields possible for practically all crops, but substantial fertilization and liming are necessary. The more desirable legumes and grasses for pasture produce well, but good stands cannot be maintained unless the fertility is increased to a high level. For a further discussion of use and management, see group 5 in the section, Use and Management of Soils.

Pace silt loam, rolling phase (5 to 12 percent slopes) (Pb).—This soil differs from the undulating phase mainly in slope. It is associated with Fullerton and Clarksville soils.

The 6- or 7-inch surface layer is pale-brown or brown silt loam or cherty silt loam. The subsoil to a depth of about 20 inches is yellowish-brown firm to friable silty clay loam that, in places, contains a considerable amount of chert. The mottled firm and rather compact cherty silty clay loam subsoil is similar to that of the undulating phase. Bedrock is at depths ranging from 4 to 10 feet. Some

chert occurs throughout most of the soil. The upper inch of the surface layer is darker and higher in organic matter than the rest of the surface layer.

This is a moderately fertile soil, but its content of organic matter is not high. It is medium to strongly acid. Moisture infiltrates the surface layer easily but is somewhat retarded in the subsoil. The moisture-holding capacity of this soil is moderate. Because the slopes are rather strong and the subsoil somewhat retards infiltration of moisture, runoff develops fairly rapidly during rains.

Use suitability.—Most of this soil is under cutover deciduous forest. It is suited to most crops commonly grown, but it needs moderately long rotations for protection against erosion. It is capable of producing good pasture, but substantial amounts of lime and fertilizer are needed to maintain good stands. For a further discussion of use and management, see group 15 in the section, Use and Management of Soils.

Pace silt loam, eroded rolling phase (5 to 12 percent slopes) (Pa).—This soil differs from the undulating phase chiefly in degree of slope and erosion losses. It is widely distributed throughout the Fullerton-Clarksville-Greendale, the Dewey-Fullerton-Emory, and the Clarksville-Fullerton soil associations.

The 5-inch plow layer consists of grayish-yellow or yellowish-brown silt loam or cherty silt loam. In the more eroded parts, the texture is silty clay or cherty silty clay loam. The underlying subsoil is similar to that of the undulating phase, and bedrock, chiefly cherty limestone, is at depths ranging from 4 to 10 feet.

This soil is moderately fertile and responds well to amendments. It is medium to strongly acid and has a low content of organic matter. Tilth is fair to good, depending upon the amount of more friable surface soil lost through erosion. An appreciable part of the acreage has sufficient chert to interfere with cultivation. The soil absorbs moisture moderately well, and moisture relations are fair to good. Where the subsoil is exposed or makes up a great part of the plow layer, the moisture relations are unfavorable and tilth is poor. Runoff develops fairly rapidly on much of the acreage. Erosion is therefore a decided hazard on the more sloping parts.

Use suitability.—All of the acreage has been cleared and cropped. Now more than half is in crops, predominantly corn and hay. About 25 percent is used for pasture, and the rest either is idle or has reverted to forest. Some fertilizer and lime are used. Crop yields are moderate.

This soil is moderately well suited to many crops and to pasture. Because of its sloping surface and somewhat retarded infiltration of moisture, moderately long rotations are required to control erosion. Under good management a 4-year rotation is adequate. Substantial applications of fertilizer and adequate liming are needed to maintain fairly good stands of legumes and grasses for pasture. The soil is somewhat more droughty than the smoother less eroded Pace soils, and pastures dry out sooner in the drier part of the grazing season. For a further discussion of use and management, see group 15 in the section, Use and Management of Soils.

Prader and Melvin silty clay loams (0 to 2 percent slopes) (Pd).—The Prader and Melvin soils are mapped together because they are difficult to distinguish and are mixed in many areas. The Melvin areas are predominantly from material originating from limestone. The Prader areas are from material derived from limestone, shale, or sandstone, or from a mixture of them. All areas of these soils are nearly level, poorly drained, and subject to overflow. Most of them occupy depressions in the bottom lands. This mapping unit is widely distributed throughout the county along the larger streams, especially those in the shale and limestone valleys.

Profile description of Prader silty clay loam:

0 to 12 inches, gray, finely mottled with brown, friable silty clay loam.
12 to 40 inches +, gray, mottled with dark-brown and pale-yellow, firm silty clay loam; bedrock limestone or shale at depths of 4 to 15 feet.

The surface layer in some places grades to silt loam and in others to loam. In the areas along many of the creeks, the surface layer is slightly acid to neutral, but those tracts along Sewee Creek, the Hiwassee River, and the small streams flowing from the Lehew-Montevallo soil association are slightly to medium acid. The tracts along the small streams have mostly a loam texture.

This complex of soils has moderate fertility and fair to good tilth. Both internal and surface drainage are very slow. During the winter, most of the areas are waterlogged.

Profile description of Melvin silty clay loam:

0 to 6 inches, brownish-gray to grayish-brown friable silty clay loam with some gray and very dark-brown mottlings.
6 to 20 inches, gray, mottled with dark brown and pale yellow, firm silty clay loam or silty clay.

Use suitability.—A large part of these soils has been cleared and is used for pasture. Pasture in most places is of poor quality.

Most areas are suitable for pasture, but under normal conditions are not suited to crops because of very slow drainage. Artificial drainage will make these soils more productive of pasture and tilled crops. Overflow is a decided hazard to crops and damages pasture during the grazing season, as it generally leaves a deposit of fine sediments. For a further discussion of use and management, see group 22 in the section, Use and Management of Soils.

Purdy and Tyler silt loams (0 to 2 percent slopes) (Pe).—This mapping unit occurs on stream terraces or alluvial benches in stream valleys. It consists of yellowish-gray poorly drained areas of Tyler silt loam and gray very poorly drained areas of Purdy silt loam. These soils consist of mixed alluvium originating chiefly from shale, sandy rock, and limestone. The surface is nearly level, and internal drainage is very slow. The separate areas are small and are widely distributed over the county along the larger streams. Most areas are from 5 to 15 feet above the adjacent bottom lands.

Profile description of Tyler silt loam:

0 to 8 inches, brownish-gray or pale-yellow friable silt loam.
8 to 18 inches, mottled gray, yellow, and brown firm (somewhat plastic when wet) silty clay loam.
18 to 36 inches +, predominantly gray, mottled with pale-yellow and brown, very firm (plastic when wet) silty clay; bedrock, chiefly shale, at depths of 4 to 12 feet.

Profile description of Purdy silt loam:

0 to 8 inches, gray or light-gray silt loam.
8 to 14 inches, light-gray, mottled with yellow and dark brown, firm silty clay loam.
14 inches +, gray, compact plastic clay; some yellow and dark-brown mottlings; in places this layer is at a depth of 8 inches.

The soils of this complex have very low fertility and very little organic matter. They are medium to strongly acid. In most places the surface layer is friable, but in a few the tilth is not very good. Moisture infiltrates slowly because internal drainage is greatly retarded by the compact nature of the subsoil. During winter most of the areas are waterlogged, or they may be partly inundated. On the other hand, during the driest parts of the growing season these areas are droughty because of their low moisture-holding capacity.

Use suitability.—Much of the acreage of this complex has been cleared and some of it has been cultivated. A great part is used as unimproved pasture that is mostly of poor quality and low carrying capacity. Corn and lespedeza are the chief crops. Little fertilization is practiced, and yields are low.

The poor drainage and low fertility make these soils poorly suited to crops. They are capable of producing some pasture but need artificial drainage and heavy fertilization to make them productive. Some areas, if adequately drained, properly fertilized, and limed, are fairly productive of corn, lespedeza, redtop, soybeans, and some legumes and grasses for pasture. For a further discussion of use and management, see group 22 in the section, Use and Management of Soils.

Ramsey stony fine sandy loam, steep phase (25 to 60 percent slopes) (Rb).—This is a light-colored excessively drained stony sandy soil. The parent rock is predominantly quartzite or sandstone. The soil occurs on the slopes of Starr Mountain, for the most part directly below rather broad strips of Stony very steep land, Ramsey soil material.

Profile description:

0 to 6 inches, grayish-brown or pale-brown loose stony fine sandy loam or stony sandy clay loam; an appreciable amount of organic matter in first inch of this layer.
6 to 15 inches, yellowish-brown or strong-brown friable stony loam.
15 inches +, friable sandy loam that is more yellowish than layer above; contains many sandstone and quartz fragments; bedrock sandstone or quartzite at depths of ½ to 2½ feet.

Rock outcrops in a few places, and many large loose rocks several feet in diameter occur.

This soil is low in fertility and organic matter and is strongly acid. Tillage is impractical because of the many rock fragments. The soil is permeable, but its shallowness greatly limits its capacity for holding moisture available to plants.

Use suitability.—Practically all of this soil is occupied by cutover deciduous forest. It is very poorly suited to crops and pasture because of its steep slope, stoniness, and shallow depth to bedrock. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Ramsey stony fine sandy loam, hilly phase (12 to 25 percent slopes) (Ra).—This soil differs from the steep phase chiefly in having less slope and greater depth to bedrock. The abundant stones prevent cultivation. Internal drainage is moderately rapid, and runoff is rapid. Practically all of this soil occurs on the upper slopes and ridge crests of Starr Mountain.

Use suitability.—All except about 20 acres of this soil is under cutover deciduous forest. Its stoniness and shallow depth to bedrock make it poorly suited to crops and pasture. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Rockland, limestone material (3 to 50 percent slopes) (Rc).—This land type consists of areas that are predominantly limestone outcrops and loose limestone fragments. Most of the areas are small and are associated chiefly with Talbott, Dewey, Decatur, and Farragut soils. There is a small amount of clayey soil material in places, but because of its shallow depth to bedrock and limited extent it does not support enough vegetation for pasture. The forest vegetation is predominantly cedars and a short or scrubby growth of deciduous trees. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Sequatchie fine sandy loam, undulating phase (1 to 5 percent slopes) (Sb).—This brown, well-drained sandy soil occurs on low terraces or alluvial benches along the major streams. The parent material consists of mixed alluvium originating chiefly from sandstone, quartzite, shale, and some limestone in places.

Profile description:

0 to 8 inches, pale-brown or yellowish-brown loose fine sandy loam.
8 to 28 inches, brownish-yellow or yellowish-brown firm but friable sandy clay loam.
28 inches +, brownish-yellow friable but firm, fine sandy clay or fine sandy clay loam; bedrock at depths of 5 to 15 feet.

The lower subsoil in many places is more sandy than the layer above. On the other hand, in places the material below a depth of 30 inches is mottled yellow and gray clay loam.

This is a moderately fertile soil and has some organic matter in the surface layer. It is medium to strongly acid. Internal drainage is medium to moderately rapid. This soil has a fair capacity for holding moisture available to plants. Because it is permeable and occupies low colluvial benches, it has a moisture supply favorable for the deeper rooted crops.

Use suitability.—Practically all of this soil has been cleared and cropped. A great part of it now is cultivated. Row crops, such as corn, tobacco, and cotton, are commonly grown, as well as small grains and hay. Little of this soil is idle. Fertilizer is used regularly for row crops, especially tobacco and cotton, and lime has been applied to much of the acreage. Yields are moderate.

This is one of the most desirable soils of the county for crops because of its smooth surface, permeability, favorable moisture relations, and response to fertilization. It is suited to many crops, including tobacco, cotton, truck crops, and alfalfa. It can be used intensively for row crops where the fertility is maintained. Although productive of legumes and grasses for pasture, it is less well suited to these than some of the more fertile silt loam soils. For a further discussion of use and management, see group 6 in the section, Use and Management of Soils.

Sequatchie fine sandy loam, eroded rolling phase (5 to 20 percent slopes) (Sa).—This soil differs from the undulating phase chiefly in having stronger slopes and considerable erosion losses. In places the plow layer is a mixture of subsoil and surface soil materials. In these areas the 5-inch plow layer consists of yellowish-brown heavy fine sandy loam or sandy clay loam. The subsoil is yellowish-brown or strong-brown friable clay loam that in some places grades to more clayey material and in others grades to

sandier beds. Bedrock is at depths ranging from 3 to 12 feet.

The fertility is not high, and the soil is medium to strongly acid. It is permeable, however, and, except in the more eroded parts, has good tilth. It has a fair moisture-holding capacity, and much of it, because of its permeability and position on low stream benches, has favorable moisture relations for the deeper rooted crops.

Use suitability.—Most of this soil has been cleared and is now used for crops and pasture. Corn, tobacco, and cotton are the chief row crops; other crops are small grains and hay.

This soil is suited to many kinds of crops. Because of its moderately strong slopes, it requires fairly long rotations in which small grains and legumes and grasses predominate. Such crops as tobacco and potatoes are well suited, but they cannot be grown at frequent intervals. This soil can produce fairly good pasture but is less well suited than many of the more fertile silt loam soils. For a further discussion of use and management, see group 8 in the section, Use and Management of Soils.

Sequoia silt loam, undulating phase (2 to 5 percent slopes) (Sd).—This is a moderately well drained soil of moderate depth to shaly material. It contains a few thin lenses of limestone. Much of this soil resembles the Talbott soils in the upper 16 to 20 inches. It differs from them chiefly in having shaly material below this depth rather than plastic silty clay that developed from limestone. This soil is associated chiefly with Litz soils and in many places occurs on smooth low ridgetops adjacent to slopes occupied by Litz soils. Most of it is in the Sequoia-Litz-Cotaco soil association.

Profile description:

0 to 6 inches, light-brown friable silt loam.
6 to 16 inches, reddish-yellow firm silty clay loam.
16 to 30 inches, weakly mottled yellowish-red, yellow, and gray very firm silty clay.
30 inches +, a mixture of yellowish and yellowish-red silty clay soil material that contains weak partly disintegrated yellow and brown shale fragments; leached or acid shale bedrock at depths of 2½ to 4 feet.

In forested areas that have never been cleared the first inch of the surface layer is dark grayish-brown because it has a high content of organic matter. The subsoil in many places is yellowish brown rather than reddish yellow. The two sublayers vary in thickness; in places they may not extend to a depth of more than 20 inches. In many places a few shale fragments occur in the lower part of the 16- to 30-inch layer.

This soil is moderately fertile but is low in organic matter. It is medium to strongly acid. The surface layer is permeable and has good tilth, but the subsoil is slowly permeable. Internal drainage is adequate for all crops. Moisture relations are relatively favorable, although the moisture-holding capacity is less than for many of the more productive soils, such as Emory silt loam and Cotaco silt loam.

Use suitability.—Practically all of this soil is under cutover deciduous forest. Its smooth surface, favorable tilth, and ability to respond to proper fertilization make it well suited to most general farm crops, including alfalfa and tobacco. Some of the more permeable well-drained soils are better suited to truck crops. Moderately short rotations can be used, but substantial and consistent fertilization is needed to produce high yields. This soil is suited to practically all of the more desirable legumes and grasses for hay and pasture if its fertility is kept at a high level. For further discussion of use and management, see group 12 in the section, Use and Management of Soils.

Sequoia silty clay loam, eroded undulating phase (2 to 5 percent slopes) (Sf).—This soil differs from Sequoia silt loam, undulating phase, chiefly in having lost an appreciable amount of its surface soil through erosion. It is one of the more extensive of the Sequoia soils and is widely distributed throughout the Sequoia-Litz-Cotaco soil association. It occurs on the broader ridgetops above slopes occupied by eroded rolling Litz and Sequoia soils.

The 5-inch plow layer consists of yellowish-brown or brownish-yellow silty clay loam. The subsoil material is similar to that of the undulating phase. Shale bedrock is at depths ranging from 2 to 3 feet.

This soil is not high in fertility and is low in organic matter but it responds well to proper management, including adequate fertilization. It is medium to strongly acid. Tilth of the plow layer is fairly good but is somewhat less favorable than that of the silt loam type. Also moisture infiltrates more slowly, and as a result runoff develops more quickly during rains. This soil is a little more droughty than the uneroded undulating areas of Sequoia silty clay loam because of its moderate moisture-holding capacity.

Use suitability.—All of this soil has been cleared and cropped. A great part of the acreage is now used for crops, chiefly corn, small grains, lespedeza, red clover, and alfalfa. Row crops and small grains are fertilized to some extent, and alfalfa commonly receives a heavy application of fertilizer and some lime. Yields are moderate.

This soil is suited to practically all general farm crops and tobacco. It is not well suited to truck crops, chiefly because of its tilth and poor moisture relations. With proper fertilization, productivity can be kept relatively high under moderately long rotations consisting of a row crop, a small grain, and 1 or 2 years of a legume-and-grass hay. Good stands of the more desirable legumes and grasses for pasture can be maintained without great difficulty for several years. For a further discussion of use and management, see group 12 in the section, Use and Management of Soils.

Sequoia silt loam, rolling phase (5 to 12 percent slopes) (Sc).—This soil differs from the undulating phase mainly in slope. In most places the surface layer is thinner and the depth to bedrock is less. The separate tracts are small and occur in the Sequoia-Litz-Cotaco soil association.

The 4- or 5-inch surface layer is light-brown friable silt loam. Below this, to a depth of about 12 inches, is reddish-yellow or yellowish-brown firm silty clay. This material grades to variegated or mottled yellowish-red, yellow, and gray very firm silty clay. Leached or acid shale bedrock is at depths ranging from 2 to 2½ feet. There are a few shale fragments throughout much of the subsoil. In the acreage under forest, the first inch of the surface layer is dark grayish brown because of the higher content of organic matter.

This soil is moderately fertile, but its content of organic matter is not high. It is medium to strongly acid. The surface layer has good tilth and is permeable. The subsoil, however, greatly retards percolation of moisture, although roots of most plants penetrate it fairly well.

Use suitability.—Practically all of this soil is under cut-

over deciduous forest. It is suitable for most general farm crops and pasture but is unsuited to intensive use for row crops and truck crops because of its strong slope and rather shallow depth to the heavy subsoil. Where at all feasible, this soil can be used in moderately long rotations consisting chiefly of small grains and legumes and grasses for hay and pasture. Under proper management, it responds well to fertilization and liming. It is capable of supporting good stands of legumes and grasses for pasture but is rather droughty during the drier parts of the growing season because of limited moisture-holding capacity. For a further discussion of use and management, see group 13 in the section, Use and Management of Soils.

Sequoia silty clay loam, eroded rolling phase (5 to 12 percent slopes) (Se).—This soil has lost a considerable part of the original surface soil through erosion. It is one of the more extensive of the Sequoia soils and occupies large areas on slopes of low ridges in the Sequoia-Litz-Cotaco soil association.

The 5-inch plow layer consists of yellowish-brown or brownish-yellow silty clay loam. The subsoil is predominantly reddish-yellow or yellowish-brown firm silty clay. It grades with depth to mottled reddish-yellow, yellow, and gray very firm silty clay that contains various amounts of partly disintegrated shale fragments. Leached or acid shale bedrock is at depths ranging from 1½ to 2 feet. Patches on the more exposed parts of slopes that have lost all of the surface soil through erosion have a plow layer of reddish-yellow or yellowish-brown firm silty clay.

This soil is not high in fertility and has little organic matter. The tilth is somewhat unfavorable, especially in the more eroded patches. Because of the slope and the clayey subsoil material that retards infiltration, runoff develops quickly during rains. The capacity for holding moisture for plants is low, and, as a result, the soil is rather droughty during the drier parts of the growing season.

Use suitability.—All of this soil has been cleared and cropped. Corn occupies about 15 percent, small grains 10 percent, hay 25 percent, and pasture 25 percent. Much of the rest is idle. Some fertilizer is used for row crops and small grains, and lime has been applied to a great part of the acreage. Crop yields are not high.

This soil is suitable for most of the general field crops, but its strong slopes and slow permeability make it unsuited to intensive use or to truck crops. Under careful management and adequate fertilization, small grains and the more desirable legumes and grasses, including alfalfa, are productive. Droughtiness, however, greatly limits the productivity of crops requiring a long growing season and causes pasture to dry up early during the drier parts of the grazing period. For a further discussion of use and management, see group 13 in the section, Use and Management of Soils.

Sequoia silty clay, severely eroded rolling phase (5 to 12 percent slopes) (Sg).—This soil consists of areas that have lost all of the surface soil and, in places, part of the subsoil through erosion. Much of it occurs in small tracts or in narrow strips on slopes of low ridges that are occupied by smoother Sequoia soils. It is mostly in the Sequoia-Litz-Cotaco soil association.

The plow layer consists of reddish-yellow or yellowish-brown firm silty clay, and the underlying material grades to variegated or mottled reddish-yellow, yellow, and gray very firm silty clay. Bedrock shale is at depths ranging from ½ to 1½ feet, and in places the shaly material outcrops. Shallow gullies commonly occur in the more sloping areas, but most of them can be filled in by deep tillage.

This soil is low in fertility and has unfavorable tilth. Because of very slow moisture infiltration and low moisture-holding capacity, the soil is very droughty. Runoff develops quickly during rains, and erosion is a great hazard on cultivated areas.

Use suitability.—All of this soil has been cleared and cropped. Much of it is now idle. Some is used as unimproved pasture, and a very small part is cropped. Little fertilization is practiced, and yields are low.

The unfavorable tilth, poor moisture relations, and great susceptibility to erosion make this soil poorly suited to crops. If properly fertilized and seeded, it is capable of producing fair pasture, but droughtiness greatly restricts grazing. This soil can be made more productive by breaking the shaly material through deep tillage, but this requires heavy machinery and is expensive. For a further discussion of use and management, see group 21 in the section, Use and Management of Soils.

Staser and Huntington silt loams (0 to 2 percent slopes) (Sh).—This mapping unit is a mixture of brown well-drained Staser and Huntington silt loam soils on the bottom lands. The areas consisting of alluvium that originated from limestone, shale, or sandstone, or from a mixture of them, are Staser silt loam. Those consisting of alluvium that originated chiefly from limestone are Huntington silt loam. These soils are nearly level. They are associated with Hamblen and Lindside silt loams on the bottom lands along the larger streams. Practically all of the areas are subject to overflow.

Profile description of Staser silt loam:

0 to 30 inches, yellowish-brown or brown friable silt loam.
30 inches +, brownish-yellow, mottled with some gray and brown, friable silt loam; mottling increases with depth; bedrock shale or limestone at depths of 4 to 15 feet.

Profile description of Huntington silt loam:

0 to 20 inches, brown or dark-brown very friable silt loam.
20 to 48 inches, somewhat lighter brown silt loam or silty clay loam; mottled material below; bedrock at depths of 4 to 15 feet.

In some areas there is a darker brown layer at depths ranging from 8 to 20 inches; it is an older surface layer that has been buried. In most places gray mottlings are common below depths of 30 to 35 inches. There are a few areas that have a more reddish cast because their material includes alluvium washed from Tellico soils. The areas along the Hiwassee River have mica flakes throughout their profile. They contain an appreciable amount of alluvium washed from highly micaceous soils in the mountain regions to the east of McMinn County. In general the areas along Rogers Creek, Little Sewee Creek, and the Hiwassee River have a lighter brown color than those along Chestuee, Oostanaula, and Conasauga Creeks.

Staser and Huntington silt loams have high fertility and a moderate amount of organic matter. The areas along Little Sewee Creek and the Hiwassee River are medium to slightly acid. Some other areas are slightly acid to neutral. Most areas have very good tilth and are permeable both to roots and moisture. The capacity for holding moisture available to plants is high on these soils, and generally moisture conditions are good throughout much of

the drier part of the year. The soils are subject to flooding, however, and field operations are frequently postponed in the spring because of excessive moisture.

Use suitability.—These soils are very well suited to intensive use for row crops because of their smooth surface, high fertility, and good tilth. Corn and soybeans are among the better suited row crops. Some areas are productive of cotton and tobacco, but flooding is a hazard to high-value crops. Lespedeza and all of the more desirable legumes and grasses for hay and pasture produce very well without intensive management, but stands of alfalfa cannot be maintained through flood periods. Because of the high fertility and relatively favorable moisture supply, pasture grows during much of the drier part of the grazing season. For a further discussion of use and management, see group 1 in the section, Use and Management of Soils.

Stony very steep land, Ramsey soil material (slopes greater than 60 percent) (Sn).—This land type occurs on high positions on the very steep slopes of Starr Mountain. It consists of a mixture of grayish-brown or brownish-yellow fine sandy loam and abundant quartzite and sandy rock fragments. Bedrock outcrops in many places and is seldom farther from the surface than 1 foot. Some outcrops are cliffs. All of this land type has a rather thin cover of deciduous and pine forest. It is of little or no value for either crops or pasture. For a discussion of use and management, see group 23 in the section, Use and Management of Soils.

Stony rolling land, Talbott soil material (2 to 12 percent slopes) (Sl).—This land type consists of sloping to hilly areas where limestone outcrops and loose rock prevent tillage. The soil material, however, supports an appreciable amount of grass. The areas are locally known as limestone rockland or glady land. Most of them are associated with Talbott soils in the limestone valleys.

The limestone fragments and outcrops occupy from 10 to about 50 percent of the surface. Between the rocks is brown or reddish-brown silty clay loam material that continues to a depth of about 3 inches. Below this is reddish-yellow silty clay similar to the subsoil of Talbott soils.

The soil material is relatively high in fertility but is medium acid. It has unfavorable tilth and slow moisture infiltration. The clayey soil material and shallow depth to bedrock greatly limit the moisture-holding capacity.

Use suitability.—A few small patches where the soil material is deeper and rocks are less abundant are cleared and cropped. Most of the rest has been cleared but is used as permanent pasture.

The stoniness makes this land type poorly suited to crops, although some patches can be tilled by hand implements. Most of the areas support a good stand of bluegrass and whiteclover, that can be improved by lime and some fertilization. Most of the soil material is droughty during the drier parts of the growing season. For a further discussion of use and management, see group 19 in the section, Use and Management of Soils.

Stony hilly land, Talbott soil material (12 to 25 percent slopes) (Sk).—This land type contains so many limestone outcrops and loose rocks that tillage is not feasible. However, it has enough soil material to support some grass. The areas differ from the Stony rolling land, Talbott soil material, in having stronger slopes and, in general, more rock exposures. Like Stony rolling land, these areas are locally known as limestone rockland or glady land. Most of them are associated with other stony land types and Talbott soils in the limestone valleys.

The soil material is predominantly brown or reddish-brown silty clay loam to a depth of about 3 inches. In most places reddish-yellow silty clay similar to the subsoil of Talbott soils occurs below this depth.

The soil material of this land type is relatively high in fertility and is medium acid. It has unfavorable tilth and slow moisture infiltration. Its clayey nature and shallow depth to bedrock greatly limit its capacity for holding moisture available to plants.

Use suitability.—Some of the acreage is cleared and used for pasture, but very little, if any, is cultivated. That part of the surface occupied by soil material, when properly fertilized, can support a good stand of the more desirable legumes and grasses for pasture. The carrying capacity, however, is limited by the relatively low moisture supply. For a further discussion of use and management, see group 19 in the section, Use and Management of Soils.

Stony steep land, Talbott soil material (25+ percent slopes) (Sm).—This land type consists of steep areas in which limestone outcrops and loose fragments are so abundant as to prevent feasible tillage. It differs from the Stony rolling land, Talbott soil material, in having much stronger slopes and a greater abundance of rock outcrops and loose rock fragments. Because the soil material is clayey and shallow to bedrock, it has a very low capacity for holding moisture available to plants. The areas are small and are associated with other stony land types and Talbott soils in the limestone valleys.

Use suitability.—Most of this land type is covered by a scrubby forest of cedar and oak. It is poorly suited either to crops or pasture because of the extensive limestone outcrops and the droughtiness of the soil material. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Talbott silty clay loam, eroded undulating phase (2 to 5 percent slopes) (Tb).—This is a moderately well drained to well drained reddish soil of the limestone valleys. It has a firm subsoil and is moderately shallow to clayey limestone. The surface layer is similar to that of the Dewey soils, but the subsoil is firmer and more clayey, and the depth to bedrock is somewhat less. This soil occurs in narrow tracts along the east side of some of the limestone valleys. Most of it is in the Dewey-Fullerton-Emory soil association.

Profile description:

0 to 6 inches, brown to dark reddish-brown somewhat firm silty clay loam.
6 to 15 inches, reddish-yellow to yellowish-red firm (plastic when wet) silty clay.
15 to 32 inches, yellowish-red sticky plastic clay with some mottlings, especially in lower part.
32 inches +, yellowish-red, with yellow and gray mottlings, tough very plastic silty clay; limestone bedrock at depths of 2½ to 8 feet; few limestone outcrops.

The surface layer in the least eroded parts is more nearly brown silt loam. A great part of the acreage, however, has been eroded to the extent that the plow layer now consists of some original surface soil intermixed with subsoil material. This 6-inch plow layer is as described in the profile description. In some places the mottled layer is within 2 feet of the surface.

This is a moderately fertile soil and has a fair amount of

organic matter. It is medium to strongly acid. The surface layer is moderately permeable, but the subsoil is slowly permeable and has a limited capacity for holding moisture for plants. Because runoff water develops quickly during rains, the soil is subject to some erosion except on the very smoothest parts.

Use suitability.—Practically all of this soil has been cleared and cropped. At present corn occupies about 25 percent, hay, chiefly lespedeza, 25 percent, and small grains 10 percent. The rest is mostly in pasture. Commercial fertilizers are commonly used for corn and small grains, and relatively heavy applications are used for tobacco and alfalfa. Yields are moderate.

This soil is well suited to many of the general farm crops, especially small grains and the more desirable legumes and grasses for hay. It is less well suited to truck crops. Root crops, such as potatoes, are not well suited because the heavy firm subsoil does not permit proper root development. If the soil is properly fertilized and seeded, good stands of the more desirable legumes and grasses, such as alfalfa, orchardgrass, whiteclover, and bluegrass, can be expected. As a result of the limited moisture-holding capacity, those areas with a shallower depth to the clayey subsoil are rather droughty during the drier parts of the growing season. For a further discussion of use and management, see group 12 in the section, Use and Management of Soils.

Talbott silty clay loam, eroded rolling phase (5 to 12 percent slopes) (Ta).—This soil occurs in association with other Talbott soils in the limestone valleys. Most of it lies along the east edge of the Dewey-Fullerton-Emory soil association. It differs from the eroded undulating phase chiefly in slope. In general the depth to the clayey subsoil is less, and some exposed patches of subsoil occur. In these areas the plow layer consists of yellowish-red firm plastic silty clay. Short gullies are common in places, but most of them are very shallow and can easily be obliterated. Bedrock limestone is at depths ranging from 2 to 6 feet.

This soil is moderately fertile and has a fair amount of organic matter. It is medium to strongly acid. As a result of the shallow depth to the clayey subsoil and slow infiltration of moisture, runoff water accumulates quickly during rains. Much of the soil is droughty, and the tilth is somewhat unfavorable. The moisture conditions under which the soil can be plowed are restricted, and the more eroded parts are difficult to cultivate even under the most favorable conditions.

Use suitability.—All of this soil has been cleared and cropped. Now, approximately half is used for corn, lespedeza, and small grains. Most of the rest is in pasture. Some fertilizer is used for row crops and small grains, and much of the acreage has been limed. Crop yields are moderate.

This soil is suitable for most general farm crops, but the moderately strong slopes, slow infiltration rate, and rapid accumulation of runoff water create an erosion hazard. In general, moderately long rotations, consisting of small grains, legumes and grasses for hay, and infrequent row crops are suitable. If adequately fertilized and limed, the more desirable legumes and grasses, including alfalfa, are productive. Yields and the carrying capacity of pasture, however, are restricted because the rather low moisture supply greatly limits plant growth during the drier parts of the growing season. For a further discussion of use and management, see group 13 in the section, Use and Management of Soils.

Talbott silty clay, severely eroded rolling phase (5 to 12 percent slopes) (Tc).—This soil has lost practically all of the original surface soil and, in places, part of the subsoil through erosion. Most of the soil occurs on slopes in small tracts intricately associated with other Talbott soils. Areas are mainly along the east edge of the Dewey-Fullerton-Emory soil association.

The plow layer consists of yellowish-red or reddish-yellow firm plastic silty clay. The yellowish-red, mottled with gray and yellow, silty clay subsoil is at depths ranging from 12 to 24 inches. Bedrock limestone is at depths of 1½ to 5 feet. Small gullies are common, but most of them can be crossed by heavy machinery or filled by mechanical means.

This soil is low in fertility and is medium to strongly acid. Runoff develops very quickly during rains because the clayey nature of the entire profile greatly retards infiltration. As a result, cultivated areas of this soil are quickly denuded of the loose material by runoff, although in places the soil material is not easily eroded. Tilth is very poor. The small capacity for holding moisture available to plants makes the soil very droughty.

Use suitability.—All of this soil has been cleared and cropped. Now, a small part is cropped, but a very large part either is used as unimproved pasture or is idle. Little fertilization is practiced. Yields are very low.

The low moisture supply, poor tilth, and erosion hazard on cultivated areas make this soil poorly suited to crops. If properly fertilized and seeded, it is capable of supporting a good stand of the more desirable legumes and grasses for pasture. The carrying capacity, however, is greatly limited by the lack of available moisture; plants cease growing in the early part of the drier periods. For a further discussion of use and management, see group 19 in the section, Use and Management of Soils.

Tellico loam, rolling phase (5 to 12 percent slopes) (Tl).—This is a well-drained soil underlain by calcareous sandstone. It is distinguished by its friable and permeable nature. Most of it occurs in relatively narrow irregular strips on the crests of rather high ridges, the slopes of which are occupied by hilly and steep Tellico soils. Most of the acreage is in the Tellico-Neubert soil association northeast of Etowah.

Profile description:

0 to 5 inches, reddish-yellow loam.
5 to 20 inches, dark-red or dark reddish-brown friable but somewhat firm sandy clay or sandy clay loam.
20 to 40 inches +, red or dark-red, grading to lighter red, friable but moderately firm, sandy clay or sandy clay loam; calcareous sandstone bedrock at depths of 3 to 7 feet.

The surface layer in places is lighter colored, or more nearly a brownish yellow. In forested areas the first inch of the surface layer is darker colored because of the content of organic matter. The texture of this forested soil grades to fine sandy loam. The bedrock in many places consists of weak-structured or partly disintegrated reddish-brown and yellow sandy shale.

The fertility of the unforested areas is moderate, and there is not much organic matter in the surface layer. The soil is medium to strongly acid. It is permeable to both roots and moisture, and infiltration is more rapid than in

the average soils that lie over limestone. The capacity for holding moisture is moderately high, and internal drainage is medium.

Use suitability.—Practically all of this soil is under cutover deciduous forest. There are pines in places.

Because it is friable, the soil has good tilth and is particularly well suited to root crops and other crops requiring intensive cultivation. It can be tilled over a relatively wide range of moisture conditions, and weeds are more easily controlled than on some of the finer textured soils. It is especially well suited to winter legumes and early vegetables, because it tends to warm sooner in the spring than is usual for soils in the county. It is well suited to many crops and can be used for a rotation of moderate length. Although not so productive of the more desirable legumes and grasses as some of the more fertile silty soils, it can produce good pasture if properly fertilized. For a further discussion of use and management, see group 8 in the section, Use and Management of Soils.

Tellico loam, eroded rolling phase (5 to 12 percent slopes) (Th).—This soil differs from the rolling phase chiefly in having lost an appreciable amount of soil material through erosion. It is widely distributed throughout the Tellico-Neubert soil association. Practically all of it occurs on ridgetops, the slopes of which are occupied by hilly and steep Tellico and Litz soils.

The plow layer now consists of a mixture of the original surface soil and subsoil material and in most places is reddish-yellow loam or clay loam. Some patches on the more exposed parts of the slopes have lost all of the surface layer and have a plow layer of red friable but firm clay loam. The subsoil is red or reddish-brown friable clay loam. Calcareous sandstone or shaly sandstone bedrock is at depths ranging from 3 to 7 feet.

This soil is moderately low in fertility and low in organic matter. It is medium to strongly acid. The plow layer is permeable, but the subsoil is sufficiently firm to retard infiltration somewhat. Generally, however, it is permeable to moisture and roots. Internal drainage is moderate. The tilth of the plow layer varies according to the amount of subsoil material included; it ranges from moderate to good. Most of this soil can be cultivated under a relatively wide range of moisture conditions. The capacity for holding moisture available to plants is moderate.

Use suitability.—Practically all of this soil has been cleared and cropped, and now corn, lespedeza, and pasture occupy a great part. Some special crops are grown, such as tobacco and cotton. Yields are moderate. Most of the row crops are fertilized to some extent.

Because of favorable tilth and tendency to warm early in the spring, this soil is well suited to winter legumes and truck crops, especially root crops and early vegetables. It is also suited to corn, small grains, and the more desirable legumes and grasses for hay and pasture. Rotations of moderate length and some erosion control are required. For a further discussion of use and management, see group 8 in the section, Use and Management of Soils.

Tellico clay loam, severely eroded rolling phase (5 to 12 percent slopes) (Te).—This phase consists of areas from which erosion has removed practically all of the original surface soil and, in places, part of the subsoil. Most of the areas are small tracts on the more sloping parts of the ridgetops. They are closely associated with the other rolling phases of the Tellico soils and are widely distributed over the Tellico-Neubert soil association.

The 5-inch plow layer consists of red firm but friable sandy clay loam or clay loam that is identical to the upper subsoil. Below a depth of about 20 inches is red, grading to lighter red, sandy clay or sandy clay loam. Calcareous sandstone or shaly sandstone bedrock is at depths ranging from 1½ to 5 feet.

Small gullies are common in many places, especially in those areas that have not been cultivated for several years. Most of the gullies, however, can easily be obliterated.

This soil is low in fertility and organic matter. It is strongly acid. The tilth is rather unfavorable, and infiltration of moisture is retarded by the clayey nature of the entire soil mass. Roots penetrate the soil rather easily, however, and internal drainage is medium. The capacity for holding moisture available to plants is not very high. As a result the soil is rather droughty during the drier parts of the growing season.

Use suitability.—All of this soil has been cleared and cropped. Now, about 60 percent either is idle or used as unimproved pasture. Some has reverted to pine forest, and a small part is used for crops. Little fertilization is practiced, and yields for crops or pasture are low.

This soil is suitable for crops requiring tillage, but its unfavorable tilth and limited capacity for holding moisture available to plants greatly restrict the range of suitable and productive crops. In general, the soil requires rather intensive measures of rejuvenation and is limited chiefly to small grains and legumes and grasses for hay and pasture. All areas are susceptible to erosion if cultivated. Consequently, the best practice probably is seeding many of the areas to permanent pasture. For a further discussion of use and management, see group 16 in the section, Use and Management of Soils.

Tellico loam, hilly phase (12 to 25 percent slopes) (Tk).—This friable soil overlies calcareous sandstone. It differs from the rolling phase chiefly in having a shallower depth to bedrock and stronger slopes. The areas are not large and are widely distributed throughout the Tellico-Neubert soil association.

Profile description:

0 to 4 inches, reddish-yellow loam.
4 to 18 inches, dark-red or dark reddish-brown friable but somewhat firm sandy clay or sandy clay loam.
18 to 36 inches +, red or dark-red, grading to lighter red, friable but firm, sandy clay or sandy clay loam; calcareous sandstone or partly disintegrated shaly sandstone bedrock at depths of 2 to 6 feet.

The first inch of the surface layer is darker colored because of the content of organic matter. In places there may be a few rock outcrops.

This soil is moderately fertile and is low in organic matter. It is medium to strongly acid. The surface layer is permeable to both roots and moisture, and the subsoil, though somewhat firmer, absorbs moisture well and is very permeable to roots. Internal drainage is medium. The tilth of the surface layer is good, and the soil warms up comparatively early in spring.

Use suitability.—Practically all of this soil is under cutover deciduous forest. It is suited to tilled crops, but it will not tolerate intensive use because it is strongly sloping. Truck crops are suited to this friable permeable soil, but they can be grown successfully only if they are sep-

arated by long intervals in which close-growing crops are grown. Corn, small grains, and many of the legumes and grasses are suitable crops. Because this soil is very erodible, particular care is needed to restrain runoff. If properly fertilized and seeded, the soil is productive of legumes and grasses for pasture. For a further discussion of use and management, see group 18 in the section, Use and Management of Soils.

Tellico loam, eroded hilly phase (12 to 25 percent slopes) (Tg).—This soil has lost an appreciable part of the original surface layer through erosion. It is widely distributed throughout the Tellico-Neubert soil association.

The plow layer in most places now consists of a mixture of original surface soil and subsoil material and is predominantly yellowish-red rather friable loam or sandy clay loam. The subsoil is red friable sandy clay loam or sandy clay. Bedrock of calcareous sandstone or shaly sandstone is at depths ranging from 2 to 6 feet. On the more exposed parts of the slopes there are patches where all of the original surface soil has been lost and the plow layer consists of red friable but firm sandy clay loam.

This soil is moderately fertile, low in organic matter, and strongly acid. Moisture infiltrates fairly rapidly, although it is somewhat more retarded than in the uneroded phase. The soil has a fair to good capacity for holding moisture available to plants. It is droughty, but somewhat less so on the steeper north-facing slopes than on those facing south. The plow layer has relatively favorable tilth and can be cultivated under a fairly wide range of moisture conditions. As a result of the strong slopes, runoff develops rather rapidly during rains.

Use suitability.—All of this soil has been cleared and cropped. At present about 15 percent is used for corn, 5 percent for small grains, 10 percent for hay, and nearly half for unimproved pasture. About 10 percent is idle, and a like amount has reverted to pine forest. Some fertilization is practiced, but yields normally are not high.

This soil is suited to many crops, but, because of the strong slopes, long rotations are needed to maintain productivity. Under average conditions, small grains and the more desirable legumes and grasses for hay and pasture are among the better suited crops. Practically all of the row crops produce well but cannot be grown at frequent intervals. For a further discussion of use and management, see group 18 in the section, Use and Management of Soils.

Tellico clay loam, severely eroded hilly phase (12 to 25 percent slopes) (Td).—This soil differs from Tellico loam, hilly phase, chiefly in having lost practically all of the surface soil and, in places, part of the subsoil. It occurs on the slopes of high ridges of the Tellico-Neubert soil association.

The plow layer consists of red friable but firm clay loam or sandy clay loam. It is underlain by similar material that grades to a lighter red. Calcareous sandstone or shaly sandstone bedrock is at depths ranging from 1 to 4 feet. Gullies, some of which are deep, occur in many places. There are some rock outcrops, especially along the lower slopes.

This soil is low in fertility and organic matter and is strongly acid. It has poor tilth, and moisture does not infiltrate rapidly. Because of the low moisture-holding capacity, the soil is droughty.

Use suitability.—All of the acreage has been cleared and cropped. About half is now in unimproved pasture, parts are idle, and approximately 20 percent has reverted to pine forest. Small acreages of corn, lespedeza, and small grains are grown. Little fertilizer is used, and crop yields are low.

The strong slopes, unfavorable moisture conditions, and poor tilth make this soil poorly suited to tilled crops. If properly fertilized and seeded, most of the soil can produce fairly good pasture, although the carrying capacity is limited by droughtiness. For a further discussion of use and management, see group 19 in the section, Use and Management of Soils.

Tellico loam, steep phase (25 to 60 percent slopes) (Tm).—This soil differs from the hilly phase chiefly in having stronger slopes and, in most places, less depth to bedrock. Depths to bedrock range from 1 to 3 feet, and outcrops are common. The soil is widely distributed throughout the Tellico-Neubert soil association.

The soil has medium internal drainage, moderately low fertility, and low organic-matter content. It is medium to strongly acid and is permeable to roots and moisture. Although the soil holds moisture fairly well, its shallowness restricts the moisture-holding capacity. The south-facing slopes are rather droughty; those facing north are somewhat less so.

Use suitability.—Practically all of this soil is under cut-over deciduous forest, though pines are intermixed in places. This soil is poorly suited to crops and pasture because of strong slopes, shallow depth to bedrock, and susceptibility to erosion. Areas that must be used for pasture require heavy fertilization and careful management to control erosion. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Tellico clay loam, severely eroded steep phase (25 to 60 percent slopes) (Tf).—This soil differs from Tellico loam, hilly phase, chiefly in having stronger slopes and in having lost considerable soil material through erosion. So much of the surface soil has been lost that the plow layer consists entirely of subsoil material. This soil is widely distributed throughout the Tellico-Neubert soil association.

The surface layer is red, firm, friable clay loam or sandy clay that grades to lighter red material with depth. Calcareous sandstone or shaly sandstone bedrock is at depths ranging from 1 to 3 feet. Rock outcrops are common in places, and some are several feet deep and difficult to obliterate or stabilize.

The soil is low in fertility and organic matter and is medium to strongly acid. Moisture infiltrates rather slowly, because of the firm clayey nature of the surface layer and subsoil. The limited moisture-holding capacity makes the soil droughty. The north-facing slopes are probably somewhat less droughty than those facing south.

Use suitability.—All of this soil has been cleared and cropped. An appreciable part has reverted to pine forest, and much of the rest is in unimproved pasture or is idle. Little or no fertilizer is used.

The strong slopes, poor tilth, and shallow depth to bedrock make this soil poorly suited to crops or pasture. Areas that must be used for pasture require heavy fertilization, some liming, proper seeding, and careful management to avoid damage by runoff. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Tellico stony loam, very steep phase (60+ percent slopes) (Tn).—This is a very steep friable soil. It occupies the steepest parts of the long slopes of the higher ridges in the Tellico-Neubert soil association northeast from Etowah.

The surface soil, extending to a depth of 6 inches, is reddish-brown very friable stony loam. Below this layer is red, friable, sticky clay loam or sandy clay loam. Calcareous sandstone or shaly sandstone bedrock occurs at a depth of less than 2 feet, and outcrops are common.

This soil is moderately fertile and contains some organic matter but is strongly acid to medium acid. It is permeable to moisture and roots, but the very shallow depth to bedrock greatly restricts its capacity for holding moisture for plants.

Use suitability.—Practically all of this soil is under cutover deciduous forest. The soil is poorly suited to crops or pasture because of its very strong slopes, shallow depth of soil material, and numerous rock outcrops. It is unsuitable even for forest because it is steep and stony. For a further discussion of use and management, see group 23 in the section, Use and Management of Soils.

Waynesboro loam, eroded undulating phase (2 to 5 percent slopes) (Wc).—This is a well-drained friable soil consisting of mixed alluvium. It occurs on the smoothest parts of some of the higher alluvial benches. Most areas of the soil are from 25 to 100 feet above the adjacent flood plains; some of the largest are along the Hiwassee River and Conasauga Creek. The entire acreage is associated with Cumberland and Holston soils. The parent material generally consists of a mixture of sediments originating from limestone, shale, and sandstone. Those areas on alluvial benches along the Hiwassee River contain an appreciable amount of material originating from micaceous rock of the mountainous section east of McMinn County. Much of the acreage has been so eroded that the plow layer now consists of a mixture of the original surface soil and subsoil material.

Profile description:

0 to 5 inches, yellowish-brown to reddish-yellow friable heavy loam.
5 to 9 inches, reddish-yellow very friable clay loam.
9 to 36 inches, red or dark-red friable but firm clay loam.
36 inches+, red sandy clay; somewhat lighter colored than layer above and has some yellowish streaks or splotches; firm but moderately friable; limestone or shale bedrock at depths of 4 to 20 feet.

A small acreage has not been eroded materially and has an 8-inch surface layer of yellowish-brown to brown friable loam. Below this, to a depth of 12 inches, is reddish-yellow very friable clay loam. Some cobbles occur in areas in the Hiwassee River valley but they do not interfere greatly with cultivation. In places the subsoil is more nearly silty clay than sandy clay. A small part of this soil has a decidedly light-colored (yellowish-gray to very pale brown) 5- to 8-inch surface layer.

This moderately fertile soil has a moderate amount of organic matter in the surface layer. It is medium to strongly acid. This soil is permeable to roots and moisture and has medium internal drainage. It has a moderately high capacity for holding moisture available to plants. The surface layer has good tilth and can be cultivated under a fairly wide range of moisture condition.

Use suitability.—Practically all of the acreage has been cleared and cultivated. Now, most of it is used for corn, small grains, lespedeza, tobacco, and cotton. Some alfalfa is grown. Moderately heavy fertilization is practiced for the row crops and small grains. Alfalfa, tobacco, and cotton receive rather heavy applications. Lime has been applied to much of the acreage. Crop yields are moderately high.

This soil is well suited to all of the general farm crops, including alfalfa and various truck crops. It responds well to proper fertilization and is suited to moderately short rotations, although the more sloping parts are subject to some erosion. The more desirable pasture legumes and grasses, if properly fertilized, maintain a good stand and have a high carrying capacity. For a further discussion of use and management, see group 6 in the section, Use and Management of Soils.

Waynesboro loam, eroded rolling phase (5 to 12 percent slopes) (Wb).—This soil differs from the eroded undulating phase chiefly in slope. It occurs on moderately high stream terraces that are from 30 to 100 feet above the adjacent flood plains. Much of the acreage is in the valleys of the Hiwassee River and Conasauga Creek and is associated with Holston and Cumberland soils.

The 5-inch surface layer in most places is yellowish-brown to reddish-yellow heavy loam and consists of a mixture of the original surface soil and subsoil materials. The subsoil is similar to that of the eroded undulating phase. Bedrock is at depths ranging from 3 to 16 feet. A few areas are virtually uneroded and have a 6-inch surface layer of yellowish-brown to brown loam. On the other hand, patches on the more exposed parts of the slopes have lost a great part of the surface layer and now have a plow layer consisting of reddish-yellow or red firm but friable sandy clay loam. Cobbles and gravel hinder cultivation in a few places in the Hiwassee River valley. A small part of the soil has a decidedly light-colored surface layer ranging from yellowish gray to a very pale brown. This layer is from 5 to 8 inches thick.

This is a moderately fertile soil with some organic matter in the surface layer. The soil is medium to strongly acid. It is permeable to moisture and roots, and internal drainage is medium. Because the firm subsoil retards infiltration, runoff water accumulates fairly rapidly during rains. The capacity for holding moisture available to plants is moderately high.

Use suitability.—Practically all of this soil has been cleared and cropped, and a great part is now used for corn, small grains, lespedeza, alfalfa, tobacco, and cotton. Some fertilization is practiced, and lime has been used on much of the acreage. Crop yields are moderate.

This soil is well suited to general farm crops and some truck crops. It is, however, somewhat less desirable for truck crops than some of the more friable soils. Fairly long rotations are needed, as erosion is active on the moderately strong slopes when the soil is cultivated. The more exacting legumes and grasses will maintain good stands if adequately fertilized, and they have a fairly high carrying capacity as pasture. For a further discussion of use and management, see group 8 in the section, Use and Management of Soils.

Waynesboro loam, eroded hilly phase (12 to 25 percent slopes) (Wa).—This phase differs from the eroded undulating phase chiefly in slope but it also occurs mostly in areas more eroded and shallower to bedrock. Practically

all areas occur on high stream terraces along the Hiwassee River and Conasauga Creek.

The 5-inch surface layer is reddish-yellow friable loam or clay loam. Below this layer is red or dark-red friable but firm clay loam. Limestone or shale bedrock is at depths ranging from 2 to 8 feet. An appreciable part of the soil has lost all of the original surface layer and has a plow layer consisting of reddish-yellow or red friable but firm clay loam. There are many shallow gullies in places, and in some areas where the alluvium is several feet thick, a few deep gullies. Some cobbles and gravel occur in a few areas but not in sufficient quantity to interfere greatly with tillage. In a small part of the acreage the surface soil is yellowish gray and the subsoil ranges from light red to yellow.

This soil is moderately fertile and is medium to strongly acid. The content of organic matter and the tilth vary according to the amount of friable surface soil material lost through erosion. Where practically all of it has been removed, the tilth is poor and moisture relations are unfavorable.

Use suitability.—Almost all of this soil has been cleared and cultivated. Much of it is used as pasture, and a small part is idle. Probably 25 percent is in crops, chiefly corn and hay. Some fertilizer is used for row crops, and lime has been applied to some of the acreage. Yields are not high.

This soil is suitable for crops and pasture, but because of its strong slope and susceptibility to erosion, it needs long rotations and a good plant cover as much of the time as feasible. If adequately fertilized and properly seeded, most of the acreage is capable of producing good pasture. The more eroded parts are less productive of pasture because of droughtiness. For a further discussion of use and management, see group 17 in the section, Use and Management of Soils.

Whitesburg silt loam (1 to 4 percent slopes) (Wd).—This imperfectly drained soil consists of local alluvium from adjacent soils of the Dandridge series. In many respects Whitesburg silt loam is similar to Cotaco silt loam. The parent rock of the Whitesburg soil material, however, is calcareous shale, whereas that of the Cotaco soil material is predominantly acid shale. Whitesburg silt loam occurs in gently sloping strips along the drainageways, chiefly in the Dandridge-Needmore and the Needmore-Dandridge soil associations.

Profile description:

0 to 12 inches, light-brown to brown friable silt loam.
12 to 22 inches, pale-yellow or light brownish-yellow, mottled with gray and brown, friable silty clay loam; becomes finer textured with depth.
22 to 40 inches, mottled light olive-gray, yellow, and brown, firm silty clay; calcareous shale at depths of 3 to 8 feet.

The surface layer may be as thick as 18 inches in places. In some areas material from Tellico soil is intermixed with this soil and the soil profile has a more reddish cast.

The surface layer has good tilth and a fair amount of organic matter. The soil has moderate fertility and is medium acid to slightly alkaline. The upper 12 to 18 inches in most places is permeable, and the subsoil has a great capacity for holding moisture available to plants.

Use suitability.—Much of the acreage has been cleared and cropped. Now, corn is grown on a great part, and mixed legume-and-grass hay is the second in acreage. Some tobacco, small grains, and alfalfa are grown on the better drained parts. Little fertilization is practiced, and lime is not so commonly used as on soils of the upland derived from limestone or acid shale.

This soil is well suited to intensive use because it is not erosive, has favorable moisture relations, and is easily worked. It is very well suited to corn, soybeans, and the more exacting legumes and grasses for hay and pasture. Crops like alfalfa and potatoes do not produce so well as on better drained soils. The very good moisture relations favor this soil for pasture because the vegetation grows for a longer time during the drier periods than is usual on soils of the upland. For a further discussion of use and management, see group 4 in the section, Use and Management of Soils.

Wolftever silt loam, undulating phase (1 to 5 percent slopes) (We).—This moderately well drained brown soil on low stream terraces consists of mixed alluvium derived chiefly from shale and limestone. It is characterized by a firm, rather tight, subsoil that is mottled at a depth of about 24 inches. The separate areas are small and are associated with soils of the first bottoms along the larger creeks.

Profile description:

0 to 5 inches, light-brown to light yellowish-brown silt loam.
5 to 20 inches, light yellowish-brown firm to very firm silty clay loam.
20 to 36 inches, mottled brownish-yellow, gray, and brown firm silty clay loam or silty clay; bedrock at depths of 4 to 12 feet.

Spots on stronger slopes have lost the original surface soil, and here the very firm silty clay loam subsoil makes up a great part of the plow layer. The areas along the Hiwassee River contain a considerable amount of mica flakes and have a more friable subsoil.

This soil is moderately fertile and has a moderate content of organic matter. It is medium to strongly acid. The tilth ranges from very good to fair; the more clayey areas have less favorable tilth. The surface soil absorbs moisture rather rapidly, but the subsoil retards percolation. In some places the subsoil is sufficiently firm to be somewhat resistant to roots. The capacity of this soil for holding moisture available to plants depends on the compactness of the soil and the thickness of the more permeable surface soil; it ranges from moderately high to low.

Use suitability.—Practically all of this soil has been cleared and cultivated. It is used for corn, hay, and small grains. Some fertilization is practiced, and lime has been applied to most of the acreage.

This is a fairly desirable soil for crops, and under proper management and fertilization, productivity can be kept high. It is suited to many crops, including alfalfa. The more desirable legumes and grasses, such as red clover, orchardgrass, bluegrass, and white clover, produce well where adequately fertilized and limed. For a further discussion of use and management, see group 7 in the section, Use and Management of Soils.

Use and Management[5] *of Soils*

The better farmers of McMinn County are interested in using and managing their soils so that the best growing conditions for crops are obtained for an indefinite period at a minimum cost. That is, they are interested in the highest practical yields that can be maintained. Some farmers are now practicing good soil management, and their crop yields are much higher than the county average. In general, these farmers are following such basic management practices (*5*) as:

1. The use of good crop varieties that are adapted to the county.
2. The use of a suitable rotation—one that makes the best use of the water on the land. Generally this will include (a) a legume for nitrogen maintenance, (b) a tilled crop for weed control, (c) a deep-rooted crop to obtain subsoil nutrients and to increase permeability, and (d) pasture, meadow, or green manure to maintain organic matter and good tilth.
3. Return of barnyard or green manure to the soil in order to maintain a supply of nitrogen and fresh organic matter.
4. Application of limestone, phosphorus, nitrogen, or potassium, or any combination of these materials where needed. (See county agent about testing soil before lime or fertilizer is added.)
5. Preparation of the seedbed with reasonable care and use of the better practices for time and rate of planting.
6. Practice of suitable measures for controlling weeds, insects, and diseases.

Although these basic practices will apply to all the soils of the county, the soil mapping units do differ in varying degrees in their use suitability and management requirements. In order to avoid repetition in the discussion of use and management, however, the soils similar in those characteristics particularly important in their management are discussed together in this section.[6] The soils within each group may be similar or they may vary somewhat in productivity for certain crops and in response to improved management practices. Tables list the soils of each management group and show their expected average acre yields of principal crops and pasture under two levels of management. Present use and management and suggested management are discussed for each group of soils.

The yields in columns A of these tables are to be expected under the present management. The yields in columns B are to be expected under the suggested management, which is the higher level of management practiced by a few of the better farmers and thought to be feasible under present economic conditions. Since the crop yields are averages expected over a period of years, yields higher than those given for the high level of management (columns B) are not uncommon. They can be obtained in favorable seasons, especially if heavier fertilization than is now thought feasible is practiced. Also, expected yields may greatly change in the future as new crop varieties and cultural practices are introduced or as new plant diseases or insect pests appear. To raise the yields from those given in columns A to those in columns B will generally require at least two rotation cycles under the high level of management.

For most groups, management requirements for both permanent pasture and crops requiring tillage are discussed. Generally, each group contains soils that have similar management requirements for pasture as well as for tilled crops. Two or more groups may have similar management requirements for pasture, but each group has management requirements for tilled crops that distinguish it from the other groups.

The soils in management groups 1 through 18 are considered suitable for tilled crops. However, in some of these groups tilled crops may be safely grown only in long rotations in which small grains or grasses are on the soil most years. The soils of management groups 19 through 22 are considered poorly suited to crops, but suited to permanent pasture. Those soils in management group 23 are considered suitable for forest only.

Much information about the proper management of soils and crops, especially regarding specific problems on the farm, is available from the county agricultural agent. Through his office, farmers also can have samples of their soils analyzed by the University of Tennessee Soil Testing Laboratory at Nashville to determine soil requirements for phosphorus, potassium, and lime. Additional information on soil and crop management is being accumulated continuously and made available to farmers through bulletins and circulars prepared by the Tennessee Agricultural Experiment Station and Tennessee College of Agriculture Extension Service at Knoxville, Tenn.

Management Group 1

Management group 1 consists of imperfectly drained to well drained soils on bottom lands. These level soils are subject to overflow and receive deposits of sediments when inundated. Their natural fertility is high, and they are not very acid. The content of organic matter is moderate. The soil material is permeable to a depth of several feet, and moisture conditions are favorable for most crops. Tilth is good to very good. That of the silty clay loams, however, is somewhat less favorable than that of the silt loams and fine sandy loam. All of these soils are considered good to excellent for crops and pasture.

The soils of management group 1 and the yields of principal crops that can be expected from each under two levels of management are given in table 6.

Present use and management.—In great part, the soils of group 1 are cleared and used rather intensively. Corn is the most common crop. Hay and pasture crops are also grown, but less extensively. A systematic rotation is not ordinarily practiced, although some farmers may follow corn with a small grain or hay. In general, small

[5] The term "soil use" refers to broad farm uses such as (1) for crops that require tillage, (2) for permanent pasture, and (3) for forests. The term "soil management" refers to (1) choice and rotation of crops, (2) application of soil amendments, such as lime, commercial fertilizers, manure, and crop residues, (3) tillage practices, and (4) engineering practices for the control of water on the soil.

[6] It is recognized that some of the suggestions for management practices for the various soils may not be feasible for all farmers in the county under present conditions. Each farm has circumstances peculiar to itself. Some of these circumstances may dictate combinations of management practices different from those indicated in this section but better suited to the particular conditions of the farm.

TABLE 6.—*Soils of management group 1: Expected average acre yields of the principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management. Blank spaces indicate either crop is not grown under the management specified or soil is unsuited to its production]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Hamblen and Lindside silt loams [2]	40	60			1. 4	1. 9					115	150
Hamblen fine sandy loam [2]	30	50	11	20	1. 0	1. 7					90	125
Hamblen and Lindside silty clay loams [2]	35	55			1. 3	1. 8					105	135
Staser and Huntington silt loams	47	70			1. 3	1. 8	2. 4	3. 1			120	150

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

[2] Yields in columns A can be expected without artificial drainage; those in columns B can be expected under adequate drainage.

grains are subject to lodging and damage by floodwaters. Moderate fertilization is practiced by most farmers.

Use suitability and suggested management.—These soils are well suited to intensive use for crop production, but their use suitability is limited by susceptibility to flooding. Some of the soils are further limited in use by imperfect drainage. All are well suited to corn and lespedeza. They are less suited to alfalfa, although this crop is grown successfully in some places. Red clover apparently is well suited. Tobacco yields well on the better drained members of this group, but overflow during the growing season is disastrous to this crop. It is not well suited to the imperfectly drained soils. Such truck crops as cabbage, beans, and potatoes are suited to the better drained members.

Although the adapted row crops can be grown with success almost continuously, a rotation is desirable. A corn-hay rotation is well suited, especially on the imperfectly drained soils. A corn-wheat-red clover rotation is suited to the well-drained soils where winter overflow is not a hazard. Winter legumes, such as crimson clover, plowed under as green manure in the spring, should prove beneficial, especially where corn is grown several years in succession. Vegetable crops are considered suitable for this soil, and soybeans can be substituted for the corn.

Although good crop yields are obtained without amendments, some fertilization is required to maintain high yields under intensive use. Moreover, response of these soils to fertilization is good because they have adequate water-holding capacity to produce high yields where there is an abundant supply of plant nutrients. Crops can be expected to respond well to a liberal use of phosphorus. A moderate amount of potassium may benefit many crops. Nitrogen fertilizer may be needed where row crops are grown in a rotation that does not include legumes. Phosphorus and, in places, lime are required to establish and maintain a good stand of red clover. High-value crops, such as tobacco and cabbage, may justify heavy applications of a complete fertilizer.

Special tillage or cropping practices for maintenance of good tilth or for water control are not generally necessary. The silty clay loams, however, are inclined to become cloddy when worked under unfavorable moisture conditions. In general, tilth is easily maintained on the sandy loam and silt loam types, and these soils can be tilled over a relatively wide range of moisture conditions. Field operations are delayed longer by wet conditions on the imperfectlly drained soils of this group. Erosion is no hazard, although in a few places scouring of stream banks or deposition of sandy material may lower the productivity. Diversion ditches may be useful in some areas to prevent excessive amounts of material from washing onto this soil from the adjacent upland slopes. The suitability range and general productivity of the imperfectly drained members probably can be increased in many places by artificial drainage. The advisability of drainage and the kind of drains to use on any particular area will depend on many factors. These include cost, feasibility of drainage from an engineering standpoint, and the kinds, extent, and use suitability of other soils on the farm.

The high fertility and favorable moisture conditions make these soils especially well suited to pasture. A good stand of high-quality grass and legumes is not difficult to maintain. Because of the favorable moisture conditions, grass grows better on the soils of this group during the drier parts of the growing season than on most soils of the upland. Good management for pasture may include application of lime and phosphorus and the control of grazing so as to maintain a good stand of the more desirable plants. In this respect it is just as important to keep the vegetation sufficiently grazed as not to overgraze it. Undergrazed areas allow an accumulation of unpalatable and other unfavorable pasture plants. In many places proper grazing can be supplemented by mowing excess herbage and weeds.

Management Group 2

Bruno loamy fine sand is the only member of management group 2. It is a very sandy soil on bottom lands and has an undulating or gently billowy surface. It is subject to overflow, although most of the areas are slightly higher than the associated finer textured bottom-land soils. Internal drainage is very rapid, but the water table in many places is within reach of the deeper rooted crops. Natural fertility is low, and the reaction is medium acid to neutral.

The yields of principal crops that can be expected under two levels of management from the soil of management group 2 are given in table 7.

TABLE 7.—*Soils of management group 2: Expected average acre yields of the principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management. Blank spaces indicate either crop is not grown under the management specified or soil is unsuited to its production]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Bruno loamy fine sand	15	30	------	------	0. 5	0. 8	------	------	------	------	15	45

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

Present use and management.—Much of this soil has been cleared and used for corn and pasture. A small total acreage of hay crops, including some alfalfa, is grown. Fertilization is not heavy.

Use suitability and suggested management.—The smooth surface, rapid permeability, and good tilth favor this soil for intensive use. The low fertility makes heavy fertilization necessary if the soil is used intensively. Because the soil is very loose and sandy, heavy machinery is somewhat difficult to manipulate. Otherwise field operations of all kinds, and particularly tillage, are easy. Amendments containing all plant nutrients are required, preferably in small but frequent applications. Some truck crops, for example, melons and early vegetables, are especially well suited to this soil; and where fertility is maintained, they can be grown many years in succession. Corn and soybeans can be expected to produce well if adequately fertilized. Small grains, hay crops, and pasture are not so well suited, but on the more favorable and especially less droughty areas bermudagrass develops a good cover. This soil is not subject to erosion, and weedy growth is very easily controlled.

Management Group 3

Management group 3 consists of nearly level and gently sloping soils derived from local alluvium. The soils occur at the heads of drainageways and as narrow strips along them. All except the Ooltewah soil have adequate internal drainage for all crops commonly grown. The Ooltewah soil is imperfectly drained and is therefore more limited in range of suitability. All of the soils are moderate to high in fertility and slightly to moderately acid. They are permeable and deep to bedrock. These soils differ from those of management group 1 chiefly in being less subject to flooding. They have good tilth, favorable moisture relations, and are subject to erosion only along the channels of the drainageways, where bank cutting may take place at times. These are among the most productive and desirable soils of the county.

The soils of management group 3 and the yields of principal crops that can be expected from each under two levels of management are listed in table 8.

Present use and management.—Practically all of the acreage of these soils is cleared and used for crops. Corn, small grains, and some hay crops occupy a great part. Red clover and lespedeza are among the more common hay crops. Some alfalfa is grown. Tobacco is an important crop on all the soils except the Ooltewah, but it is grown less extensively than the other crops. Some fertilization is practiced. Corn and tobacco are heavily fertilized.

Use and suitability and suggested management.—Because these soils are fertile, easily worked, and are not very erosive, they are suited to intensive use. A wide variety of crops can be grown. Ooltewah silt loam, however, is not suited to tobacco or alfalfa.

Where some fertilization is practiced, such row crops as corn and tobacco may be grown several years in succession. In most places, however, a 2- or 3-year rotation is a part of good management. Lime and phosphorus

TABLE 8.—*Soils of management group 3: Expected average acre yields of the principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management. Blank spaces indicate either crop is not grown under the management specified or soil is unsuited to its production]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Emory and Abernathy silt loams	40	60	15	22	1. 2	1. 7	2. 2	3. 0	1, 600	2, 000	120	150
Emory silt loam	47	70	18	26	1. 2	1. 8	2. 4	3. 1	1, 700	2, 100	120	150
Neubert loam	42	63	16	24	1. 0	1. 7	2. 3	3. 0	1, 700	2, 100	110	145
Ooltewah silt loam	40	60	14	20	1. 2	1. 7	------	------	------	------	105	135

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

are especially needed for legume-and-grass hay and pasture crops. The response to potassium can be expected to be good. Boron also is needed for alfalfa. Where row crops are grown continuously, nitrogen fertilizer will be beneficial. Where short rotations that include the more desirable legumes are used, nitrogen fertilizer may not be required. Good tilth is easily maintained. Special practices to control erosion are necessary in very few places.

Because good stands of high-quality grazing vegetation are not difficult to maintain, these soils are especially desirable for pasture. Their good moisture supply makes them favorable for midsummer grazing, as vegetation thrives during the dry periods longer than on most of the upland soils.

Management Group 4

Management group 4 consists of very gently sloping soils derived from local alluvium. They occur along drainageways and are permeable and deep to bedrock. Greendale cherty silt loam has enough chert to interfere somewhat with cultivation. The soils of this group differ from those of group 3 chiefly in having a lower natural fertility. They differ also in parent material. The soils of group 4 consist of material derived from shale, sandy rock, and cherty limestone; whereas the soils of group 3 consist of material derived predominantly from high-grade limestone.

All the soils of group 4 are medium to strongly acid. On the whole they have good tilth; and when they are properly fertilized, their productivity is not difficult to maintain.

The soils of management group 4 and the yields of principal crops that can be expected from each under two levels of management are shown in table 9.

Present use and management.—A great part of the acreage of these soils has been cleared and is now used for crops and pasture. Corn is the chief crop, and bluegrass and whiteclover make up most of the pasture vegetation. Alfalfa, small grains, and tobacco are also grown. Some areas of these soils are used almost continuously for corn. In some places corn is rotated with small grains; in others, pasture is allowed to remain for considerable periods. Fertilization is not heavy.

Use suitability and suggested management.—Because of their smooth surface, favorable tilth, good permeability, and relatively great depth to bedrock, the soils of management group 4 are well suited to intensive use. Corn and legume-and-grass mixtures for hay and pasture are well suited. The better drained soils, as the Barbourville and Greendale, are suited to many kinds of crops, including tobacco, alfalfa, and certain truck crops.

High yields require heavy fertilization. Although continuous row crops may be grown, it is considered good management to use a short rotation that includes the more desirable legumes. Tilth is easily maintained, and special practices for controlling runoff water normally are not required.

All of these soils are productive of pasture where adequately fertilized. Lime, potassium, and phosphorus are all generally deficient. Like the soils of management groups 1 and 3, the moisture relations of these soils are more favorable for midsummer grazing than those of most of the upland soils. Slow internal drainage shortens their winter grazing season, but good stands of fall-sown grains and legumes are more easily obtained than on many of the soils of the uplands.

Management Group 5

The soils of management group 5 are friable and permeable in the upper 1½ to 2 feet, but below this the material is much firmer and has impaired internal drainage. Bedrock is at depths of 3 to 10 feet or more. Fertility is moderate to low, and the content of organic matter is low. These soils are medium to strongly acid. Their capacity for holding moisture available to plants is moderately high. Tilth is good, but field operations on the Monongahela and Leadvale soils are delayed by wetness following prolonged rains. Runoff is difficult to control only where it comes directly onto areas of the Pace and Leadvale soils from adjoining higher lying slopes.

The soils of management group 5 and the yields of principal crops that can be expected from each unde two levels of management are given in table 10.

TABLE 9.—*Soils of management group 4: Expected average acre yields of the principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management. Blank spaces indicate either crop is not grown under the management specified or soil is unsuited to its production]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Barbourville loam	28	50	13	20	0.8	1.6	2.3	2.9	1,200	1,700	75	120
Cotaco loam [2]	25	48	10	18	.7	1.5	------	------	------	------	75	120
Cotaco silt loam [2]	30	50	13	20	.8	1.6	------	------	------	------	85	150
Greendale cherty silt loam	25	48	11	20	.9	1.7	2.2	2.9	1,100	1,500	75	105
Greendale silt loam	32	55	15	24	1.1	1.9	2.5	3.2	1,600	2,100	95	145
Whitesburg silt loam	35	55	14	21	1.1	1.9	------	------	------	------	110	150

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

[2] Yields in columns A can be expected without artificial drainage; those in columns B can be expected under adequate drainage.

TABLE 10.—*Soils of management group 5: Expected average acre yields of the principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in Columns B are to be expected under the suggested management. Blank spaces indicate either crop is not grown under the management specified or soil is unsuited to its production]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Leadvale silt loam, undulating phase	22	44	11	18	0. 8	1. 5			1, 000	1, 400	65	120
Monongahela silt loam [2]	20	35	11	18	. 8	1. 5					65	120
Pace silt loam, undulating phase	25	52	13	23	1. 0	1. 6	2. 4	3. 0	1, 300	1, 700	80	120

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

[2] Yields in columns A can be expected without artificial drainage; those in columns B can be expected under adequate drainage.

Present use and management.—A great part of the acreage is used mainly for corn, small grains, hay, and pasture. Lespedeza is the most common hay crop. Fertilization is not heavy, but lime has been used on much of the acreage.

Use suitability and suggested management.—The smooth surface, ability to respond to proper fertilization, fairly high water-supplying capacity, and ease of tillage and conservation make these soils well suited to intensive use. They are suited to most general farm crops except alfalfa. Because of slow internal drainage, the Monongahela soil in general is not well suited to such crops as potatoes. A 3-year rotation of corn, a small grain, and red clover is well suited. Because of low fertility, these soils require heavy fertilization with all plant nutrients, lime, and organic matter if they are to produce high yields. Good tilth is easily maintained on the Pace soils, but tillage of most areas of the Monongahela and Leadvale soils when too wet will cause clodding.

These soils require fertilization, especially with phosphorus and lime, for successful production of pasture. Properly seeded and fertilized, bluegrass, fescue, and Ladino clover or white clover make good permanent pasture. The more slowly drained parts are not well suited to winter pasture crops. They are colder and hold excess moisture longer than some soils of the uplands.

Management Group 6

Brown well-drained soils on old local alluvial slopes and stream terraces are in management group 6. Most of them have firm but permeable subsoils. Among the soils of this group, the Cumberland have the firmest subsoils and the Sequatchie the most permeable. All of them have at least a moderate depth to bedrock, in most places a depth greater than 5 or 6 feet. The surface of the soils is smooth, the gradient in but few places exceeding 5 percent. The surface layers are friable and have good tilth. The natural fertility is, on the whole, moderate to high. The content of organic matter is moderate. All of the soils of this group are medium to strongly acid. Their capacity for holding moisture available to plants is moderate to high, and runoff is not difficult to control.

The soils of management group 6 and the yields of principal crops that can be expected from each under two levels of management are given in table 11.

TABLE 11.—*Soils of management group 6: Expected average acre yields of the principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Alcoa loam, eroded undulating phase	36	60	15	25	1. 0	1. 7	2. 6	3. 6	1, 500	1, 900	85	125
Cumberland silt loam, undulating phase	40	65	18	27	1. 2	1. 8	2. 9	3. 6	1, 600	2, 000	95	140
Cumberland silty clay loam, eroded undulating phase	38	60	16	26	1. 1	1. 7	2. 8	3. 5	1, 500	1, 900	90	130
Etowah silt loam, undulating phase	35	55	15	24	1. 0	1. 6	2. 6	3. 4	1, 400	1, 800	85	130
Hayter loam, undulating phase	36	58	15	23	1. 1	1. 7	2. 7	3. 4	1, 400	1, 800	85	125
Hermitage silt loam, undulating phase	38	60	16	25	1. 1	1. 7	2. 8	3. 5	1, 500	1, 900	90	130
Sequatchie fine sandy loam, undulating phase	34	55	14	23	1. 0	1. 6	2. 6	3. 4	1, 400	1, 800	65	105
Waynesboro loam, eroded undulating phase	35	55	14	23	. 9	1. 6	2. 5	3. 4	1, 400	1, 800	80	125

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

Present use and management.—Practically all the acreage in management group 6 is cleared, and a great part is used for crops, chiefly corn, hay, and small grains. Some crop rotation is practiced, but in places row crops are grown several years in succession. Some areas are used for pasture for 2 or 3 years.

Use suitability and suggested management.—Relatively high fertility, good tilth, favorable moisture relations, and smooth surface make these soils suitable for moderately intensive use. In general, a 3- to 4-year rotation consisting of a row crop, a small grain, and 1 or 2 years of hay or pasture is well suited. Practically all the crops commonly grown are adapted to these soils, and they are among the best soils of the county for alfalfa.

These soils respond well to fertilization because of their favorable moisture relations and are capable of producing high yields under a high level of management. Good tilth is not difficult to maintain. However, on the more eroded parts of the Cumberland, Waynesboro, and Hermitage soils some care must be taken to avoid the cloddy condition caused by plowing when the soil is too wet. Runoff water causes some erosion on the more sloping parts where row crops are used several years in succession For this reason, close-growing crops should occupy the soils much of the time. In addition, field operations on the contour may restrain the development of runoff channels.

These soils are capable of supporting good stands of permanent and winter pasture where their fertility is kept at a high level. Phosphorus and lime are necessary amendments for mixed grass-and-legume pasture. Although moisture relations for these soils are not so favorable as for soils of groups 1 and 3, they are adequate to maintain a high carrying capacity throughout much of the growing season. Because of rapid drainage of excess water from the surface soil, these soils are among the more suitable for winter grazing. On these fertile soils, pastures as well as cultivated crops are infested with weeds. In pastures, periodic mowing will do much to suppress undesirable plants.

Management Group 7

The soils of management group 7 differ from those of management group 6 chiefly in having firmer subsoils. All have brown surface layers, and except for the Wolftever soil, have red subsoils. All are well drained, and all except the Wolftever soil are upland soils. Depths to bedrock range from about 1½ to 4 feet for the Farragut soil to 5 to 20 feet for the Dewey and Decatur soils. The soils of this group are fertile and have a moderate content of organic matter. They are moderately to strongly acid. The surface is undulating, the gradient in but few places exceeding 5 percent. Tilth of the plow layer is moderately favorable.

The soils of management group 7 and the yields of principal crops that can be expected from each under two levels of management are given in table 12.

Present use and management.—All of the acreage of these soils has been cleared, and a great part is used for crops. Corn, small grains, and mixed legume-and-grass hay crops predominate. Tobacco is a common cash crop. A small part is used for pasture for short periods. Very little is idle. Some fertilization is practiced, and lime has been applied to much of the acreage. Tobacco receives relatively large quantities of fertilizer. Short rotations prevail, and in some places row crops are grown for 2 or 3 years in succession.

Use suitability and suggested management.—In general, the soils of management group 7 are well suited to the general farm crops commonly grown. With the exception of the Wolftever soil, they are among the best soils of the county for alfalfa and the other more desirable legumes and grasses for hay and pasture. Rotations lasting 3 or 4 years are suitable. Where row crops are grown more frequently than 1 in 3 or 4 years, particular care should be taken to keep the more sloping parts of the soil under a cover crop during the winter months.

All of these soils respond to fertilization. Lime and phosphorus are among the most needed plant nutrients, but many crops also respond to potassium. Good tilth is not particularly difficult to maintain. Nevertheless, preparation of a seedbed suitable for such crops as crimson clover, wheat, oats, and other fall-sown grains, grasses, and clovers requires more care on these soils than on the more permeable friable soils. Because of their higher clay content, more power is needed to cultivate these soils than the more loamy types. The Farragut and Decatur soils are especially subject to puddling or clodding if cultivated when moist. When these soils are thoroughly dry, cultivation is especially difficult on the more eroded parts. Where feasible, field operations, especially on the more sloping parts, should be according to the contour.

TABLE 12.—*Soils of management group 7: Expected average acre yields of the principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Decatur silty clay loam, eroded undulating phase	38	60	16	26	1.1	1.7	2.8	3.5	1,500	1,900	90	130
Dewey clay loam, eroded undulating phase	36	58	15	25	1.0	1.6	2.7	3.4	1,500	1,900	85	130
Dewey silty clay loam, eroded undulating phase	36	58	15	25	1.0	1.6	2.7	3.4	1,500	1,900	85	130
Farragut silty clay loam, eroded undulating phase	35	56	15	24	1.0	1.6	2.7	3.4	1,400	1,800	80	125
Wolftever silt loam, undulating phase	25	45	11	20	.9	1.4	2.1	2.6	1,200	1,600	65	110

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

The firm subsoils cause these soils to be somewhat slowly permeable, and consequently runoff develops quickly. Care therefore should be taken to keep close-growing vegetation on the soils much of the time to restrain runoff.

All of these soils produce good quality permanent pasture of legumes and grass, but fertilization, especially with phosphorus and lime, is necessary for good stands. Where the fertility is brought to a high level, the carrying capacity of these soils is high when they are used for pasture. However, it is somewhat lower than for the soils of groups 1 and 3 because of the less favorable moisture relations during the drier parts of the grazing season.

These soils are suited to winter pasture crops; although in the drier fall season, a good stand is more difficult to establish than on some of the more friable well-drained soils. Furthermore, the winter periods when the soils of this group are too wet for grazing last a little longer than on the more friable loamy soils.

Management Group 8

Management group 8 consists of yellowish-brown to reddish well-drained soils with a rolling surface. Their subsoils are firm but friable and moderately permeable. These soils are moderately deep or deep to bedrock. They are at least moderately fertile and are medium to strongly acid. They have a fairly high moisture-holding capacity. Much of their acreage has lost an appreciable amount of the original surface soil through erosion.

The soils of management group 8 and the yields of the principal crops that can be expected from each under two levels of management are given in table 13.

Present use and management.—Much of the land has been cleared and cultivated. A large part of the acreage is now used for crops grown in moderately short rotations. Corn, hay, small grains, and pasture predominate. Tobacco is an important crop but is grown less extensively. Only a small acreage is idle. Some fertilization is practiced, and much of the acreage has been limed.

Use suitability and suggested management.—The rolling surface and firm subsoil make these soils somewhat susceptible to erosion. Moderately long rotations (4 to 6 years) are needed to keep the soil material stable. A row crop, such as corn or tobacco, followed by a small grain and 3 or 4 years of mixed legume-and-grass hay is suitable. All of these soils need organic matter. They respond to complete fertilization, and all need lime at intervals of 6 to 8 years. Fairly high fertility is not difficult to maintain.

Favorable tilth is maintained without great difficulty, although the eroded phases, if cultivated when too wet, puddle and clod fairly easily. Subsoiling may be valuable for increasing the moisture-absorbing capacity of the soils that have heavier subsoils.

Where feasible, field operations should be done according to the contour, and stripcropping may be useful. In some places, terracing may be worthwhile, but in many places a system of management that maintains close-growing vegetation much of the time is adequate.

All of these soils are productive of permanent pasture, but particularly need lime and phosphorus to produce good stands of the more desirable grazing plants. Potassium and, in establishing a stand, nitrogen may be expected to give substantial responses. After a good pasture is established, occasional mowing to remove weedy and excess growth will help maintain grazing of high quality. Winter pasture crops, such as crimson clover and oats, produce well where the fertility is high. Because the slopes are strong, runoff is a real hazard when the soil is being cultivated and when the crop is young.

Management Group 9

Management group 9 consists of red well-drained soils with a rolling surface. All are eroded sufficiently to have surface layers with a silty clay loam texture. These are among the most fertile soils of the uplands and have a moderate content of organic matter. They are medium to strongly acid. The Dewey and Decatur soils are deep to bedrock limestone, and the Farragut soil is moderately deep to bedrock shale. Most of these soils have good moisture-holding capacity. Their surface layers contain more clay than those of management group 8.

The soils of management group 9 and the yields of the principal crops that can be expected from each under two levels of management are given in table 14.

TABLE 13.—*Soils of management group 8: Expected average acre yields of the principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Alcoa loam, eroded rolling phase	30	52	13	22	0.8	1.5	2.3	3.0	1,200	1,600	70	115
Bolton silt loam, eroded rolling phase	29	50	13	22	.9	1.5	2.4	3.1	1,200	1,600	70	115
Cumberland silty clay loam, eroded rolling phase	30	52	15	25	1.0	1.6	2.6	3.3	1,300	1,700	75	125
Etowah silty clay loam, eroded rolling phase	30	50	13	22	.9	1.5	2.4	3.1	1,200	1,600	70	115
Hermitage silt loam, eroded rolling phase	30	52	15	25	1.0	1.6	2.6	3.3	1,300	1,700	75	125
Sequatchie fine sandy loam, eroded rolling phase	30	52	13	22	.9	1.5	2.4	3.1	1,200	1,600	55	95
Tellico loam, eroded rolling phase	28	50	13	22	.8	1.5	2.3	3.0	1,200	1,600	70	115
Tellico loam, rolling phase	30	50	14	22	.9	1.5	2.3	3.0	1,200	1,600	70	115
Waynesboro loam, eroded rolling phase	29	50	13	22	.8	1.5	2.3	3.0	1,200	1,600	70	115

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

TABLE 14.—*Soils of management group 9: Expected average acre yields of the principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Decatur silty clay loam, eroded rolling phase	32	55	15	25	1.0	1.6	2.7	3.4	1,400	1,800	80	125
Dewey clay loam, eroded rolling phase	30	52	15	24	1.0	1.6	2.6	3.3	1,300	1,700	75	125
Dewey silty clay loam, eroded rolling phase	30	52	15	24	1.0	1.6	2.6	3.3	1,300	1,700	75	125
Farragut silty clay loam, eroded rolling phase	30	50	14	22	1.0	1.6	2.5	3.2	1,200	1,600	75	120

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

Present use and management.—All the soils of management group 9 have been cleared and cultivated: Now, a great part of the acreage is used for crops. Corn, hay, and small grains predominate; tobacco is an important cash crop. A part of the acreage of these soils is used for pasture grown in rotation with tilled crops. Crop yields on much of the acreage are fairly high, and a fairly high level of management is practiced. Some areas, however, are not kept highly productive.

Use suitability and suggested management.—Like the soils of group 8, these soils are suited to moderately long rotations (4 to 6 years). Row crops (corn, tobacco, and soybeans), small grains, and the more desirable legume-and-grass hay crops are well suited. All of the soils of this group respond well to fertilization, especially with organic matter, phosphorus, and lime. Their subsoils have slower permeability than those of group 8. Consequently runoff is more of a hazard and more careful management is required than for soils of group 8. Wherever feasible, field operations should be according to the contour and a close-growing vegetation should be maintained a great part of the time. Stripcropping may be advisable in places, and terraces may help to prevent erosion losses in some management systems.

Favorable tilth is more difficult to maintain on these soils than on soils of several of the other groups. Cultivation of these soils when too wet should be particularly avoided. The range in moisture conditions under which tillage is practical is not wide. Tilth can be improved by use of organic matter and perhaps lime.

These soils are especially productive of high-quality pasture vegetation where the fertilization and lime requirements are met. Bluegrass, bermudagrass, orchardgrass, white clover, Ladino clover, and lespedeza grow well and they are easily maintained where weedy growth is restrained by mowing. Moisture relations are not so favorable for pasture vegetation as in the soils of groups 1 and 3. They are sufficiently favorable, however, to maintain grazing of high carrying capacity through much of the growing season. Winter pasture crops are fairly well suited. But the less favorable tilth, the erosion hazard during preparation and seeding, and the slower rate of drainage during the winter grazing season make these soils somewhat less favorable for crops than the smoother more permeable soils.

Management Group 10

The soils of management group 10 are light-colored and well-drained and have a smooth or undulating surface. The surface layers have good tilth, and the subsoils absorb and retain moisture well. All of these soils are moderately deep or deep to bedrock. They are moderately low in fertility, low in organic matter, and medium to strongly acid.

The soils of management group 10 and the yields of the principal crops that can be expected from each under two levels of management are given in table 15.

TABLE 15.—*Soils of management group 10: Expected average acre yields of principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Fullerton loam, eroded undulating phase	25	50	12	21	0.9	1.5	2.3	2.8	1,100	1,500	60	115
Fullerton silt loam, eroded undulating phase	25	50	13	21	.9	1.5	2.3	2.9	1,100	1,500	65	120
Holston loam, eroded undulating phase	22	48	11	20	.8	1.5	2.1	2.6	1,000	1,400	60	110
Holston loam, undulating phase	24	50	12	22	.9	1.6	2.2	2.6	1,100	1,500	60	115
Jefferson loam, undulating phase	24	50	12	21	.9	1.6	2.2	2.6	1,100	1,500	60	115

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

Present use and management.—Practically all the acreage of these soils is used for crops. Some small areas are still under natural forest. A small part is idle. Corn, small grains (mainly wheat), and hay are the chief crops. Probably one-fifth of the acreage is used for pasture. Tobacco is important as a cash crop, although its total acreage is not great. Corn and small grains are fertilized to some extent, and tobacco receives large applications of mixed fertilizer. Fields being prepared for alfalfa receive lime, some fertilizer, especially phosphorus, and moderate applications of manure if it is available. Most pastures are not managed at a high level.

Use suitability and suggested management.—The soils of management group 10 are suited to intensive use. Where the fertility is maintained, they can be used under a 2- or 3-year rotation. A rotation consisting of row crops, such as corn, tobacco, or soybeans, followed by a small grain and 1 or 2 years of mixed legume-and-grass hay is suitable. Red clover, lespedeza, and orchardgrass are among the better suited hay crops. Alfalfa is also suited but requires heavier applications of fertilizer to maintain a good stand and keep up high yields. Boron is generally needed for alfalfa. Moderately heavy fertilization, including organic matter and lime, is necessary for all crops. Fertilization must be consistently maintained because plant nutrients are rapidly leached from these soils. Good tilth is not difficult to maintain, and, on the whole, tillage can be carried on over a fairly wide range of moisture conditions.

These soils are not so capable of maintaining a good stand of high-quality legumes and grasses for pasture as the more fertile soils of groups 1, 3, and 7. Substantial applications of complete fertilizer, especially of phosphorus, and enough lime to correct acidity are needed to maintain good stands of whiteclover, bluegrass, and orchardgrass. Mowing at intervals to remove brushy and weedy growth and excess herbage will help maintain pasture of high quality. Where the fertility is brought to a high level, these soils are well suited to winter pasture crops. Their friable nature favors good seedbed preparation, and excess moisture does not delay grazing so much as on finer textured soils.

Management Group 11

The soils of management group 11 are somewhat excessively drained and have an undulating to rolling surface. They are moderate to low in fertility and low in organic matter. The Dandridge soils are not acid in most places and have calcareous shale at depths ranging from less than 1 foot to 2 or 3 feet. The other soils of this group are medium to strongly acid. Erosion has greatly lowered productivity on much of the acreage of this group. The soils absorb moisture well, but the capacity for holding moisture is limited by the shallow depth to bedrock.

The soils of management group 11 and the yields of the principal crops that can be expected from each under two levels of management are given in table 16.

Present use and management.—Four-fifths of the acreage in management group 11 has been cleared and cropped. Probably one-half to two-thirds of this either is idle or is used as unimproved pasture. Lespedeza and corn are the chief crops. Small grains, chiefly wheat, are grown on a small part. There is some alfalfa where especially good management has been practiced.

Use suitability and suggested management.—The soils of management group 11 are suited to tilled crops. However, because of their shallow depth to bedrock and predominantly rolling surface, they require long rotations consisting chiefly of close-growing crops, such as small grains and hay and pasture crops. Where it is not necessary to use the soils for corn or other row crops, a rotation consisting of a fall-sown small grain and 3 or 4 years of legume-and-grass hay is suited. All the soils need organic matter, nitrogen, and phosphorus, and all but the Dandridge require lime. It may be that not much potassium is required for the Dandridge, Litz, and Lehew-Montevallo soils. For most of these soils a fairly high level of fertility, when once obtained, is not difficult to maintain under good management.

With proper fertilization, red clover and timothy or orchardgrass yield fairly well. Good stands of alfalfa can be obtained on the better parts where the fertility is brought to a high level, but yields are limited by the rather low capacity for holding moisture available to

TABLE 16.—*Soils of management group 11: Expected average acre yields of principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management. Blank spaces indicate either crop is not grown under management specified or soil is unsuited to its production]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Apison loam, eroded rolling phase	22	38	11	20	0.9	1.4	1.6	2.1	1,000	1,400	55	90
Dandridge shaly silt loam, eroded rolling phase	18	30	10	19	.8	1.4	1.8	2.2	------	------	55	95
Dandridge silt loam, rolling phase	20	32	10	19	.8	1.4	1.8	2.3	------	------	60	95
Lehew-Montevallo loams, rolling phases	16	25	9	18	.6	1.1	1.4	1.8	------	------	40	80
Lehew-Montevallo shaly loams, eroded rolling phases	14	22	8	17	.5	1.0	1.3	1.7	------	------	35	80
Litz loam, eroded rolling phase	15	25	8	18	.6	1.2	1.5	2.1	------	------	40	90
Litz loam, rolling phase	17	28	9	18	.7	1.3	1.7	2.2	------	------	45	90
Litz shaly silt loam, eroded undulating phase	18	30	10	19	.8	1.4	1.9	2.4	------	------	55	95
Litz silt loam, rolling phase	17	27	9	18	.7	1.3	1.7	2.2	------	------	45	90

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

plants. Fall-sown small grains and winter pasture crops are especially suited because they grow during the season when moisture is more abundant. Good stands and high yields require good seedbed preparation and adequate fertilization.

Good tilth is easily maintained. Tillage is difficult, however, especially in the more eroded parts, because of the great amounts of shale in the plow layer and the shallow depth to bedrock shale. Where the bedrock does not contain hard rock, it may be practical to disrupt the shale by heavy tillage to increase the depth of permeable material suitable for root development.

Runoff is a real hazard because water accumulates quickly during rains, and the loss of a small amount of soil material is of great consequence to soils so shallow to bedrock. Field operations should be according to the contour, and stripcropping may be feasible on the longer slopes. Terracing is impractical because of the shallow depth to bedrock. The maintenance of a vigorous close-growing vegetation is probably the most effective way to restrain erosion.

All of these soils are suited to permanent pasture. Desirable pasture is easier to establish on the Dandridge than on the other soils. Phosphorus appears to be the chief requirement of the Dandridge soils. When it is added in sufficient quantities, white clover, Ladino clover, bluegrass, and orchardgrass are not difficult to establish. The carrying capacity is restricted by the low moisture-holding capacity of the Dandridge soils, and growth of vegetation is soon affected by dry weather.

Management Group 12

The soils of management group 12 have an undulating or smooth surface. They have firm or compact subsoils and a moderate depth (2½ to 8 feet) to bedrock shale or limestone. Although percolation is much retarded, these soils have adequate internal drainage for all common field crops. The plow layer ranges from friable to firm. The fertility and organic-matter content are moderate to low, and the reaction is medium to strongly acid. The capacity for holding moisture available to plants is moderate.

The soils of management group 12 and the yields of principal crops that can be expected from each under two levels of management are given in table 17.

Present use and management.—A great part of the acreage in management group 12 has been cleared and cultivated. Corn, lespedeza, red clover, and small grains are the chief crops. Some alfalfa is raised. Tobacco is grown as a cash crop in places. Only a small portion of these soils is idle. Some pasture is grown in rotation with other crops. Not much organic matter is put on the soils, but most areas are moderately fertilized, and much of the acreage has been limed.

Use suitability and suggested management.—The soils in management group 12 are moderately well suited to crops requiring tillage and can be used in a rotation of moderate length (3 to 4 years). A rotation consisting of a row crop, such as corn or tobacco, a small grain, and 1 or 2 years of hay is suitable. In general, it is well to keep even these smooth soils covered by close-growing vegetation as long as feasible. Because of the rather low fertility, substantial fertilization is needed to maintain high productivity. Nitrogen, phosphorus, and lime are especially needed, and much of the acreage of these soils may respond well to potassium. All of these soils benefit from applications of organic matter, either from manure or from legumes and grasses turned under.

The maintenance of good tilth requires some attention, because the silty clay loam plow layer limits the range of moisture conditions under which the soils can be worked. The more clayey parts puddle and form clods easily if tilled when too moist. Additions of organic matter will improve the tilth. The permeability of the underlying material is thought to be improved by growing deep-rooted legumes, such as alfalfa, sweetclover, and sericea lespedeza.

These soils are not greatly susceptible to erosion. Runoff, however, develops on the more sloping parts because of the slowly permeable subsoil. Maintenance of a good plant cover will aid greatly in restraining runoff. Where the soils must be cultivated much of the time, field operations according to the contour are advisable for the more sloping parts. The shallow depth to the compact subsoil material and bedrock is probably unfavorable for terracing. Subsoiling of those soils shallow to shale may increase the capacity of the soils for holding moisture available to plants and deepen the root zone.

All of these soils are suited to pasture. Properly fertilized, especially with phosphorus and lime, the more desirable legumes and grasses produce good pasture of a moderately high carrying capacity. Moisture relations are relatively favorable for pasture, although plant growth is greatly restrained during the drier parts of the grazing season. These soils are suited to winter grazing crops,

TABLE 17.—*Soils of management group 12: Expected average acre yields of principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Needmore silty clay loam, eroded undulating phase	24	45	13	22	0.9	1.5	2.4	2.9	900	1,300	65	100
Sequoia silt loam, undulating phase	25	45	14	23	1.0	1.6	2.5	3.0	1,000	1,400	70	105
Sequoia silty clay loam, eroded undulating phase	24	45	13	22	.9	1.5	2.4	2.9	900	1,300	65	100
Talbott silty clay loam, eroded undulating phase	25	48	14	23	1.0	1.6	2.6	3.1	1,000	1,400	75	110

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

but they stay too wet longer than the less eroded Fullerton and Tellico soils and therefore do not withstand trampling so well.

Management Group 13

The soils of management group 13 differ from those of management group 12 chiefly in having a rolling rather than an undulating surface. In general, the plow layer is finer textured, and the subsoil material is exposed in patches. Like the soils of group 12, these soils have firm or moderately compact subsoils and a moderate depth (1½ to 6 feet) to shale or limestone bedrock. Percolation is retarded, but internal drainage is adequate for general farm crops. The capacity for holding moisture available to plants is limited. The tilth of the plow layer of these soils is less favorable than that of most silt loam soils. Natural fertility is moderate to low, and the reaction is medium to strongly acid. The content of organic matter is low.

The soils of management group 13 and the yields of principal crops that can be expected from each under two levels of management are given in table 18.

Present use and management.—Practically all the acreage of management group 13 has been cleared and cropped. Corn, hay, and small grains occupy practically all the cropped acreage. A small amount of tobacco and alfalfa is grown. Probably a quarter of the acreage of these soils is now used for pasture or is idle. Part of the pasture has been improved by seeding and fertilization.

Use suitability and suggested management.—These soils have a restricted range in suitability, chiefly because of their immoderately strong slope, slow permeability, and moderate depth to bedrock. Truck crops, especially root crops, are not suited, and row crops should be grown infrequently. Under most conditions, rotations lasting 5 to 6 years are required in order to keep the soils under close-growing crops a great part of the time. A rotation of corn, a small grain, and 3 to 5 years of mixed legumes and grasses for hay or pasture is suitable. Where the fertility is brought to a relatively high level, the more desirable legumes and grasses, such as alfalfa, red clover, orchardgrass, timothy, bluegrass, and white clover, are suitable. These soils are fairly well suited to winter pasture crops, but erosion is a hazard during preparation of the seedbed, and grazing is restricted during periods of excess moisture because of the clayey surface layer. Substantial amounts of organic matter and fertilizer, including lime, are necessary to keep the soils productive.

Particular care is required to keep the soils in good tilth, especially the more eroded parts, because of the rather clayey plow layer. The range of moisture conditions under which tillage can be carried on without detriment to tilth is narrow. Fall plowing may improve unfavorable tilth, because the soil clods are thus exposed to freezing and thawing during winter. The erosion hazard, however, is increased by this practice.

These soils are subject to damage by runoff, because of slow moisture percolation and strong slopes. Field operations should always be according to the contour, and a protective plant cover should be maintained as much of the time as possible. Stripcropping may be feasible on the longer slopes, but the compact subsoil and the rather shallow depth to bedrock are not favorable for terracing.

These soils are suitable for permanent pasture and are capable of supporting a good stand of the more desirable legumes and grasses if their fertility is brought to a relatively high level. Their rather clayey nature and shallow depth, however, limit their capacity for holding moisture. Consequently, vegetation ceases to grow early in the drier parts of the grazing season.

Management Group 14

Management group 14 consists of light-colored rolling soils on the tops of cherty ridges. They are permeable and are deep to cherty limestone bedrock. All have some chert throughout their entire depth, and some have enough to interfere with tillage. The subsoils are firm but permeable. These soils are low in fertility and organic matter and are medium to strongly acid. They have a moderate capacity for holding moisture available to plants. The soils of management group 14 and the yields of principal crops that can be expected from each under two levels of management are given in table 19.

Present use and management.—Probably 20 percent of the acreage in management group 14 is under native forest. The rest has been cleared and cultivated. Corn, small grains, and hay occupy a great part, and lespedeza is the chief hay crop. Some tobacco and cotton and a little alfalfa are grown. A large acreage is in unimproved pasture or idle. Systematic rotations are common in

TABLE 18.—*Soils of management group 13: Expected average acre yields of principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management. Blank spaces indicate either crop is not grown under the management specified or soil is unsuited to its production]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Needmore silty clay loam, eroded rolling phase	20	36	10	19	0.7	1.3	2.1	2.6	------	------	55	90
Sequoia silt loam, rolling phase	22	38	11	20	.8	1.5	2.3	2.8	800	1,200	60	95
Sequoia silty clay loam, eroded rolling phase	20	36	10	19	.8	1.4	2.1	2.6	------	------	55	90
Talbott silty clay loam, eroded rolling phase	23	40	12	21	.9	1.5	2.4	2.9	900	1,300	65	100

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

TABLE 19.—*Soils of management group 14: Expected average acre yields of principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management. Blank spaces indicate either crop is not grown under the management specified or soil is unsuited to its production]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Clarksville cherty silt loam, eroded rolling phase	15	35	8	17	0.5	1.3	------	------	900	1,300	30	65
Clarksville cherty silt loam, rolling phase	15	38	8	17	.5	1.4	------	------	900	1,300	30	65
Fullerton cherty silt loam, eroded rolling phase	20	45	9	19	.6	1.4	2.0	2.6	1,000	1,400	50	95
Fullerton cherty silt loam, rolling phase	20	45	10	19	.7	1.4	2.1	2.7	1,000	1,400	45	90
Fullerton loam, eroded rolling phase	24	48	11	20	.8	1.4	2.2	2.7	1,100	1,400	55	105
Fullerton loam, rolling phase	25	50	12	21	.9	1.5	2.3	2.8	1,100	1,500	60	110
Fullerton silt loam, eroded rolling phase	24	48	11	20	.8	1.4	2.2	2.7	1,100	1,400	55	105
Fullerton silt loam, rolling phase	25	50	12	21	.9	1.5	2.3	2.8	1,100	1,500	60	110

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

some areas but do not prevail. Some fertilizer is used for row crops, especially the cash crops, and some is used for small grains. Lime has been applied to much of the acreage.

Use suitability and suggested management.—All the soils of management group 14 are suited to tilled crops and pasture. Many crops are suitable, including truck crops, tobacco, and cotton. The Clarksville soils are not so well suited to alfalfa and the more exacting legumes and grasses as the more fertile well-drained Dewey, Decatur, and Cumberland soils. They are better suited to the less exacting legumes and grasses, such as lespedeza, fescue, and redtop.

Rotations of moderate length can be used on the soils of this group if their fertility is brought to a high level. A rotation consisting of corn or some other row crop, followed by a small grain and 1 or 2 years of legume and grass hay, is suitable.

Because of the low fertility of these soils, very substantial amounts of fertilizer are needed to produce high yields. The soils can be expected to respond to heavy applications of complete fertilizer, lime, and organic matter. Productivity is not difficult to maintain after fertility has been raised to a moderately high level. It is not practical to keep the productivity of these soils at so high a level as that for the Decatur and Dewey soils. This is especially true of the Clarksville soils.

Good tilth is not difficult to maintain on soils of this management group. The only exceptions are a few of the more eroded patches. Inasmuch as these soils have good internal drainage, periods unfavorable for tillage because of the moisture content are not as long as for many other soils, such as those for groups 12 and 13.

These soils are suited to both permanent pasture and winter pasture, but liming and very substantial fertilization with all of the plant nutrients are required. Although permanent pasture of high quality is somewhat more difficult to maintain than on soils of several other groups, such as those of groups 1, 3, and 9, good grazing of moderately high carrying capacity can be obtained. Moisture relations are moderately favorable for pasture plants. During the drier parts of the growing season, however, pasture plants cease to grow and become dry. These soils are favorable for winter grazing because they have friable surface layers and good internal drainage. They are less subject to damage by trampling than are the finer textured soils.

Management Group 15

Management group 15 consists of light-colored permeable soils moderately deep to bedrock. They have a rolling surface and, except for the Leadvale and Pace soils, have good internal drainage. The natural fertility of these soils is rather low, and their content of organic matter is low. They are medium to strongly acid. Internal drainage of the Leadvale and Pace soils is somewhat retarded, but it is adequate for most of the common field crops except perhaps alfalfa. The Pace soils have somewhat better internal drainage than the Leadvale.

The soils of management group 15 and the yields of principal crops that can be expected from each under two levels of management are given in table 20.

Present use and management.—A very great part of the acreage of management group 15 has been cleared and cultivated. More than half of it is used now for crops and one-fourth for pasture. A small part is idle. Row crops and small grains are fertilized to some extent, and much of the acreage has been limed.

Use suitability and suggested management.—The soils of management group 15 are suited to tilled crops but, because of their moderately strong slopes, they require rotations of moderate length. A rotation consisting of corn or some other row crop, a small grain, and 2 years of hay or pasture is suited. On the more sloping parts, somewhat longer rotations may be advisable. Red clover, lespedeza, orchardgrass, and timothy are among the most suitable of the legumes and grasses for hay. Because the Jefferson and Holston soils have more uniformly good internal drainage, they are probably better suited to truck crops than the Pace and Leadvale soils. Alfalfa can be expected to produce fairly good yields on the better drained soils, but its yields on the Leadvale soil are restricted by the impaired internal drainage. All of these

TABLE 20.—*Soils of management group 15: Expected average acre yields of principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management. Blank spaces indicate either crop is not grown under the management specified or soil is unsuited to its production]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Holston loam, eroded rolling phase	20	40	9	17	0. 6	1. 4	1. 9	2. 4	900	1, 400	50	90
Jefferson fine sandy loam, rolling phase	18	37	7	16	. 5	1. 3	1. 8	2. 3	900	1, 400	30	60
Jefferson loam, eroded rolling phase	18	40	8	17	. 7	1. 4	1. 9	2. 4	900	1, 400	30	65
Jefferson loam, rolling phase	20	40	9	17	. 8	1. 5	1. 9	2. 4	900	1, 400	30	65
Jefferson stony fine sandy loam, rolling phase	14	35	7	15	. 4	1. 2	1. 7	2. 2	800	1, 300	30	60
Leadvale silt loam, eroded rolling phase	20	40	10	17	. 7	1. 4	------	------	900	1, 400	55	110
Pace silt loam, eroded rolling phase	22	42	11	20	. 8	1. 5	2. 0	2. 5	1, 100	1, 600	65	115
Pace silt loam, rolling phase	23	45	12	21	. 9	1. 5	2. 2	2. 7	1, 200	1, 600	70	115

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

soils require heavy fertilization with organic matter and lime.

Except on areas where the subsoil has been exposed by erosion, the soils of this group generally have good tilth that is fairly easily maintained. They can be cultivated under a moderately wide range of moisture conditions, except where the subsoil makes up a great part of the plow layer. Stoniness interferes materially with cultivation of Jefferson stony fine sandy loam, rolling phase.

All the soils of management group 15 are capable of producing fairly good permanent pasture. They are, however, less productive of the more exacting legumes and grasses than the more fertile soils. Moisture conditions for pasture plants are only moderately favorable, and pasture vegetation dries relatively early during dry periods. Most of the acreage is well suited to winter pasture crops. These soils are less well suited to crimson clover than the more fertile soils, but all of the commonly grown winter grazing crops yield well where the fertility is brought to a high level. The friable loamy surface soil and good internal drainage make these soils more capable of withstanding trampling under moist winter conditions than the finer textured soils.

Management Group 16

Management group 16 consists of red soils that have a rolling surface and have been severely eroded. The surface layers are silty clays or clay loams, moderate to low in fertility, and low in organic matter. They are firm and compact and, accordingly, have very unfavorable tilth. The subsoils are also firm but are moderately thick over bedrock and are moderately well drained internally. They are medium to strongly acid.

The soils of management group 16 and the yields of principal crops that can be expected from each under two levels of management are given in table 21.

Present use and management.—All the acreage in management group 16 has been cleared and cropped. Part of it is now cropped, but much is used as unimproved pasture or is idle.

Use suitability and suggested management.—The suitability of the soils of management group 16 for crops requiring tillage is greatly limited by their unfavorable tilth, slow permeability, moderately strong slope, and low content of organic matter. Where feasible, these soils should be kept under a close-growing permanent vegetation much of the time, and only very long rotations

TABLE 21.—*Soils of management group 16: Expected average acre yields of principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management. Blank spaces indicate either crop is not grown under the management specified or soil is unsuited to its production]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Alcoa clay loam, severely eroded rolling phase	12	33	6	15	0. 5	1. 0	1. 3	1. 9	------	------	35	80
Decatur silty clay, severely eroded rolling phase	15	37	7	18	. 6	1. 2	1. 3	2. 2	------	------	40	85
Dewey silty clay, severely eroded rolling phase	15	35	7	16	. 5	1. 1	1. 3	2. 1	------	------	40	85
Tellico clay loam, severely eroded rolling phase	12	33	6	15	. 5	1. 0	1. 3	1. 9	------	------	35	80

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

should be used. A rotation consisting of small grain followed by several years of legume-and-grass hay and pasture is well suited. However, the limited capacity of these soils to hold moisture available for plants makes it difficult at times to establish a good close-growing cover of legumes and grasses. Fairly high productivity can be obtained by substantial applications of fertilizer, lime, and especially organic matter.

Good tilth is very difficult to maintain, but additions of organic matter and the use of deep-rooted legumes along with grasses will help. Fall plowing will improve the tilth, but these soils should not be left free of vegetation through the winter season. Erosion is a real hazard, and particular care is required to restrict runoff. A vigorous legume-and-grass cover is probably the most practical means of controlling erosion. All field operations should be according to the contour, and stripcropping may be practical under some circumstances. Terracing is not practical for controlling erosion on soils so compact as these.

The soils of this management group are capable of supporting a grazing vegetation of high quality where adequately fertilized. The carrying capacity for pasture, however, is not high because the low capacity of these soils for holding moisture restricts plant growth during the drier parts of the grazing season. The soils are much less productive of winter pasture than the more friable fertile soils. Furthermore, their clayey surface layer puddles easily if they are trampled when wet, and they frequently are wet during winter.

Management Group 17

Management group 17 consists of red well-drained hilly soils that are deep to bedrock. The surface layers are friable to moderately firm, and the subsoils are firm but permeable. These soils have moderate to high fertility and moderate organic-matter content. They are medium to strongly acid. Most of them absorb moisture at a moderate rate, but the Decatur and Dewey soils, especially the Decatur, absorb it more slowly. Runoff accumulates at a moderate to rapid rate, and is accelerated greatly by the strong slopes. All of these soils have a high moisture-holding capacity, although patches where the subsoil is exposed have a low capacity. The soils of management group 17 and the yields of principal crops that can be expected from each under two levels of management are given in table 22.

Present use and management.—All the acreage of the soils of management group 17 has been cleared and cultivated. Now a great part is in hay and pasture. Small parts are used for row crops and small grains. Some fertilization is practiced, and much of the acreage has been treated with lime. Some farmers think that subsoiling is a worthwhile way of improving the water absorption of these soils.

Use suitability and suggested management.—Mainly because of the strong slope and erosion hazard, the soils of management group 17 are limited to long rotations consisting chiefly of small grains and hay and pasture crops. Where feasible, the rotations can well consist entirely of small grains and legume-and-grass hay and pasture crops. These soils require careful management, even where close-growing crops are grown a great part of the time. Adequate use of complete fertilizer and lime and organic matter is required to build up and maintain a high level of fertility and to grow a vigorous plant cover to restrain erosion. All of the more exacting and desirable legumes and grasses, including alfalfa, orchardgrass, bluegrass, Ladino clover, and white clover, are suited. Where acreage is required for row crops, a close-growing crop for winter cover should follow the row crop. Field operations should always be according to the contour, and care should be taken to prevent surface water from collecting in channels. Stripcropping may be feasible, but terraces on such steep land are impractical.

Maintenance of good tilth requires particular care because the plow layer in most places contains sufficient clay to cause the soil to puddle if cultivated when moist.

Pasture is well suited to these soils, and permanent pasture may be their best use on many farms. The common winter pasture crops are less well suited because they require seedbed preparation each fall. Permanent pastures on these soils, when properly fertilized and limed, are capable of supporting a good stand of high-quality vegetation, including such plants as bluegrass, orchardgrass, Ladino clover, and white clover. The capacity of the soils of this group for holding moisture for plants is moderate, and the carrying capacity for pasture is high. These soils dry out rather rapidly, however, during the drier periods of the growing season. In general, grazing vegetation continues growing longer during dry periods on the north-facing slopes than on the south-facing slopes.

TABLE 22.—*Soils of management group 17: Expected average acre yields of principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Alcoa loam, eroded hilly phase	20	40	11	19	0.7	1.3	2.2	2.9	900	1,700	60	100
Bolton silt loam, eroded hilly phase	23	43	13	22	.8	1.5	2.4	3.1	1,000	1,800	65	110
Decatur silty clay loam, eroded hilly phase	25	45	14	23	.9	1.5	2.5	3.2	1,100	1,800	70	110
Dewey clay loam, eroded hilly phase	23	43	13	22	.8	1.5	2.4	3.1	1,000	1,800	65	110
Dewey silty clay loam, eroded hilly phase	23	43	13	22	.8	1.5	2.4	3.1	1,000	1,800	65	110
Waynesboro loam, eroded hilly phase	19	38	10	18	.6	1.2	2.1	2.8	900	1,700	55	95

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

Management Group 18

Management group 18 is made up of hilly soils of moderate to low fertility that are deep to bedrock. These soils are permeable, although their subsoils are moderately firm. They absorb moisture well and have a moderate moisture-holding capacity. They have a low content of organic matter and are medium to strongly acid. Some of these soils have stones that interfere materially with tillage.

The soils of management group 18 and the yields of principal crops that can be expected from each under two levels of management are given in table 23.

Present use and management.—Some of the acreage in management group 18 is under cutover deciduous natural forest, some is cropped, and the rest is used chiefly as unimproved pasture. A considerable acreage is idle. Corn and hay are the predominant crops. Lespedeza is the chief hay crop. Not much fertilization is practiced, except for row crops. Lime has been applied to some of the acreage.

Use suitability and suggested management.—Because of the strong slope and erosion hazard, these soils are unsuitable for frequent growing of row crops. Where at all feasible, very long rotations can well be used. A rotation consisting entirely of close-growing crops, such as a small grain followed by several years of hay or pasture, is well suited. These soils are much less productive of the more exacting legumes and grasses than the soils of the Decatur and Dewey series, but such plants as red clover and orchardgrass produce well where the fertility is kept high. Heavy applications of organic matter and all the plant nutrients, including lime, are required to maintain high productivity.

Tilth of most of the acreage in management group 18 is good. Stones in the cherty and stony phases, however, interfere materially with cultivation. Furthermore, some eroded patches where the plow layer now consists largely of clayey subsoil material have poor tilth. In general, however, these soils can be worked over a moderately wide range of moisture conditions. Runoff is a very great hazard on these soils. Consequently, long rotations of close-growing crops and other careful management are required to restrain erosion. Ditches develop rapidly where water has accumulated in channels because of field operations. All field operations should be according to the contour, and in places diversion ditches will aid in restraining accumulation of water. On some of the longer slopes, stripcropping may be feasible. Terracing is not practical on slopes as strong as those common to these soils.

A great part of the acreage of these soils can well be used for permanent pasture, but substantial fertilization is needed to obtain good stands. All the soils particularly need lime. Moisture relations are moderately favorable for pasture plants, but vegetation commonly ceases to grow during the drier parts of the grazing season. Generally in dry periods vegetation continues growing on the north-facing slopes for a longer time than on the south-facing slopes. The permeable friable surface soils and good drainage of the soils of this group are favorable for winter pasture crops, but the strong slopes make frequent seeding hazardous.

Management Group 19

The soils of management group 19 are red, well drained to excessively drained, and predominantly rolling to hilly. They either have been severely eroded or have a naturally clayey compact surface layer with numerous limestone outcrops. The original surface soils of the eroded phases have been largely removed, and as a result the plow layers consist of very firm clay loam or silty clay. Depth to bedrock ranges widely. The soils are slowly permeable and have moderate to excessive drainage. They are medium to strongly acid. Because of their rather low capacity for holding moisture available to plants, they dry out quickly during dry periods.

The soils of management group 19 and the yields of principal crops that can be expected from each under two levels of management are given in table 24.

TABLE 23.—*Soils of management group 18: Expected average acre yields of principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management. Blank spaces indicate either crop is not grown under the management specified or soil is unsuited to its production]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Clarksville cherty silt loam, eroded hilly phase	14	33	7	15	0.5	1.2			800	1,200	25	60
Clarksville cherty silt loam, hilly phase	15	35	7	16	.5	1.2			850	1,200	27	60
Fullerton cherty silt loam, eroded hilly phase	17	36	8	17	.5	1.3	1.8	2.4	900	1,300	35	90
Fullerton cherty silt loam, hilly phase	18	36	9	17	.6	1.3	1.9	2.5	900	1,300	40	90
Fullerton loam, eroded hilly phase	19	38	10	18	.7	1.3	2.0	2.6	900	1,300	45	100
Fullerton loam, hilly phase	20	38	10	18	.7	1.3	2.1	2.6	900	1,300	50	100
Fullerton silt loam, eroded hilly phase	19	38	10	18	.7	1.3	2.0	2.6	900	1,300	45	100
Fullerton silt loam, hilly phase	20	38	10	18	.7	1.3	2.1	2.6	900	1,300	50	100
Jefferson stony fine sandy loam, hilly phase	12	25	6	14	.4	1.1					25	55
Tellico loam, eroded hilly phase	20	40	11	19	.7	1.3	2.2	2.9	900	1,700	60	100
Tellico loam, hilly phase	21	42	12	19	.7	1.3	2.3	2.9	1,000	1,700	65	100

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

TABLE 24.—*Soils of management group 19: Expected average acre yields of principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management. Blank spaces indicate either crop is not grown under the management specified or soil is unsuited to its production]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Alcoa clay loam, severely eroded hilly phase	------	------	5	14	0. 3	0. 9	1. 1	1. 8	------	------	30	70
Bolton silt loam, eroded steep phase	------	------	------	------	------	------	------	------	------	------	50	85
Decatur silty clay, severely eroded hilly phase	------	------	8	14	. 4	1. 0	1. 2	2. 0	------	------	35	75
Dewey silty clay, severely eroded hilly phase	------	------	8	14	. 4	1. 0	1. 2	2. 0	------	------	35	75
Stony hilly land, Talbott soil material	------	------	------	------	------	------	------	------	------	------	20	45
Stony rolling land, Talbott soil material	------	------	------	------	------	------	------	------	------	------	35	70
Talbott silty clay, severely eroded rolling phase	13	25	5	14	. 4	1. 0	1. 2	2. 0	------	------	35	80
Tellico clay loam, severely eroded hilly phase	------	------	5	14	. 3	. 9	1. 1	1. 8	------	------	30	70

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

Present use and management.—All of the acreage of the severely eroded phases has been cleared and cultivated at some time. Much of it is now used for pasture, and some is idle. A small portion is used for such crops as corn, small grains, and hay. Yields are low, and not much fertilization is practiced. Lime has been applied to parts. Most of the pasture is unimproved. Much of the stony land types is cleared, but very little has been under cultivation. Practically all of it is used for pasture, and little or no fertilization or liming has been done.

Use suitability and suggested management.—The strong slopes and compact clayey plow layer make the severely eroded phases of the soils of management group 19 poorly suited to crops. Furthermore, it is impractical to use the land types for crops because of their stoniness. Under prevailing conditions, the severely eroded phases are not very productive of pasture. All of the soils of this group, however, are capable of supporting good stands of high-quality pasture if properly fertilized, limed, and seeded. It may not be necessary to seed the stony land types, but they can be expected to respond to amendments, especially lime and phosphorus. The low water-holding capacity, however, limits the carrying capacity of all the soils of this group, because grazing vegetation dries out rather quickly during dry periods. Favorable moisture conditions prevail longer during dry periods on the north-facing slopes of the steeper areas than on the south-facing slopes. Runoff water tends to accumulate in channels. For this reason, special attention can well be given to stabilizing any existing gullies.

Areas of the severely eroded phases that must be used for crops require very careful management. They are difficult to work, and the conservation of soil material and of good tilth are major problems. If at all feasible, row crops should not be grown at any time, and rotations, therefore, should consist of fall-sown small grains and legume-and-grass hay and pasture crops.

Management Group 20

Management group 20 consists of light-colored, well to excessively drained cherty soils with rolling and hilly relief. They have been so severely eroded that the plow layers consist of the compact clayey material of the subsoils. In some areas there is enough chert to interfere greatly with cultivation. The natural fertility of these soils is low, and the content of organic matter is very low. The reaction is medium to strongly acid. The soil material is slowly permeable. Tilth is very unfavorable, and the capacity for holding moisture available to plants is small.

The soils of management group 20 and the yields of principal crops that can be expected from each under two levels of management are given in table 25.

Present use and management.—All of the acreage of management group 20 has been cleared and cultivated at some time. Little of it now is being farmed under a high level of management. At present much is idle or used as unimproved pasture. Grazing vegetation is not of high quality, and its carrying capacity is low. Some areas have reverted to forest, chiefly pine.

Use suitability and suggested management.—The compact clayey surface soil and the rolling to hilly relief make these soils poorly suited to crops. If adequately fertilized, limed, and seeded, the soils of this group are capable of producing substantial amounts of good grazing. They are not so well suited to the more exacting legumes and grasses as some of the more fertile soils. Such pasture plants as lespedeza, fescue, and redtop may be better suited in many places than bluegrass and whiteclover. The very limited moisture-holding capacity greatly restricts the periods of good grazing. These soils are not well suited to winter grazing crops. Areas that must be cultivated require very careful management, and only rotations consisting entirely of close-growing crops are suitable.

Management Group 21

The soils of management group 21 are light colored, shallow to shale bedrock, and rolling to steep. Some of the soils of this group are relatively free of shale fragments in the first 4 or 5 inches of the surface layer, but the rest are shaly throughout the soil material. Shale outcrops are common in the eroded phases. The natural fertility

TABLE 25.—*Soils of management group 20: Expected average acre yields of principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management. Blank spaces indicate either crop is not grown under the management specified or soil is unsuited to its production]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Fullerton cherty silty clay loam, severely eroded rolling phase	10	27	5	14	0.4	1.0	1.2	1.8	------	------	35	80
Fullerton silty clay loam, severely eroded hilly phase	------	------	4	13	.3	.9	1.1	1.8	------	------	30	70
Fullerton silty clay loam, severely eroded rolling phase	11	30	5	15	.4	1.0	1.2	1.9	------	------	35	80

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

of these soils is moderate to low, the content of organic matter is low, and the moisture-holding capacity generally is low. The Dandridge soils range from slightly acid to alkaline, and the other soils are medium to strongly acid.

The soils of management group 21 and the yields of principal crops that can be expected from each under two levels of management are given in table 26.

Present use and management.—Part of the acreage of these soils is under deciduous cutover forest. Some of the cleared acreage is used for hay and corn, but a great part is in unimproved pasture or is idle. Bluegrass and whiteclover make up an appreciable part of the cover on the more productive parts. Broomsedge, briers, and brushy growth prevail in the less favorable places.

Use suitability and suggested management.—The soils of this management group are poorly suited to crops because of their shallow depth to bedrock. Shallowness in combination with the slope makes them very susceptible to damage through erosion. On this group of soils, tilled crops, especially those requiring a long growing season, do not give high yields. If crops must be grown, fall-sown small grains are probably among the better suited because they mature before the drier parts of the growing season. They also have value for winter grazing, but the use of the acreage for this purpose is restricted because frequent tillage for seedbed preparation on the more sloping parts is not feasible. Fair stands of alfalfa can be established on some of the acreage. The total yields, however, will be greatly limited by lack of adequate moisture during the drier parts of the growing season.

Most of the acreage of these soils is capable of supporting a moderate amount of grazing. The quality of the grazing ranges from fair to very good, depending upon the nature of the soil and the fertilization. Under natural conditions, the Dandridge soils commonly produce some bluegrass and whiteclover. This vegetation can be maintained on most of these soils under proper management, chiefly adequate fertilization. Mowing excess herbage and weedy growth will improve the quality of the grazing. The limited moisture-holding capacity causes much of the acreage to be droughty. Consequently, the periods during which pasture vegetation grows and is palatable are much more restricted than on the soils with favorable moisture relations.

TABLE 26.—*Soils of management group 21: Expected average acre yields of principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management. Blank spaces indicate either crop is not grown under the management specified or soil is unsuited to its production]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Dandridge shaly silt loam, eroded hilly phase	17	27	8	17	0.7	1.3	1.6	2.1	------	------	45	85
Dandridge shaly silt loam, eroded steep phase	------	------	------	------	------	------	------	------	------	------	35	70
Dandridge silt loam, hilly phase	18	28	8	17	.8	1.4	1.7	2.2	------	------	50	85
Dandridge silt loam, steep phase	------	------	------	------	------	------	------	------	------	------	40	75
Litz loam, eroded hilly phase	14	23	7	16	.5	1.1	1.4	1.9	------	------	35	80
Litz shaly silt loam, eroded hilly phase	14	23	7	16	.5	1.1	1.4	1.9	------	------	35	80
Litz shaly silt loam, eroded rolling phase	15	25	8	18	.6	1.2	1.5	2.0	------	------	40	90
Litz silt loam, hilly phase	15	24	8	17	.6	1.2	1.6	2.1	------	------	40	80
Needmore silty clay loam, severely eroded rolling phase	11	23	5	13	.3	.9	1.1	1.8	------	------	30	75
Sequoia silty clay, severely eroded rolling phase	11	23	5	13	.3	.9	1.1	1.8	------	------	30	75

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

TABLE 27.—*Soils of management group 22: Expected average acre yields of principal crops under two levels of management*

[Yields in columns A are those to be expected without the benefit of artificial drainage; those in columns B are those to be expected under adequate drainage. Blank spaces indicate either crop is not grown under the drainage specified or soil is unsuited to its production]

Soil	Corn		Wheat		Lespedeza		Alfalfa		Tobacco		Pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Guthrie silt loam	------	32	------	------	0. 4	1. 2	------	------	------	------	30	65
Prader and Melvin silty clay loams	------	40	------	------	. 6	1. 8	------	------	------	------	40	110
Purdy and Tyler silt loams	------	32	------	------	. 4	1. 2	------	------	------	------	30	65

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

Management Group 22

Management group 22 consists of poorly drained soils that occupy low positions on the bottom lands and stream terraces and the floors of sinks in the limestone valleys and cherty ridges. These soils have nearly level surfaces and poor surface and internal drainage. The natural fertility for most of them is moderate or low, and the reaction ranges from strongly acid to alkaline. All of them are deep to bedrock.

The soils of management group 22 and the yields of principal crops that can be expected from each under two levels of management are given in table 27.

Present use and management.—Much of the acreage of management group 22 has been cleared, but only small areas have been cultivated. At present a large part is used for pasture, and a small part for corn and hay. A few areas have been improved to some degree by artificial drainage. Crop yields are low on these soils under ordinary management.

Use suitability and suggested management.—Under natural drainage these soils are poorly suited to crops, and much of their acreage is not very productive of pasture. Their chief requirement is improved drainage. Areas that have been artificially drained sufficiently to make them suitable for cultivation can be made productive of certain crops if adequately fertilized and limed and supplied with organic matter. Corn and soybeans are among the better suited row crops for artificially drained areas, and lespedeza, alsike clover, red clover, fescue, and timothy are among the better suited legume-and-grass hay crops.

Substantial fertilization and liming and proper seeding can improve the grazing on these soils somewhat. Where the soils are adequately drained and fertilized, however, the more desirable grasses and legumes can be grown and a high carrying capacity maintained. Most of the soils tend to dry out quickly during dry periods. This undesirable characteristic can be remedied considerably by increasing the content of organic matter and using deep-rooted legumes, such as sericea lespedeza, to improve the permeability of the subsoil.

The practicability of artificial drainage depends on several factors. Some of these are (1) the possibility of obtaining an adequate outlet for drainage water, (2) the permeability of the soil, (3) the cost of installing the drainage system weighed against the value of the increased production, and (4) the need for additional cultivated acreage on the farm.

Management Group 23 [7]

The soils of management group 23 have some undesirable characteristic or combination of characteristics, such as shallow depth to bedrock, stoniness, steep slope, or low fertility, that largely precludes their use either for crops or pasture. On most farms they are probably best used for forest. Most of them are low in fertility but may vary greatly in other characteristics.

The soils of management group 23 and the yields of principal crops that can be expected from each under two levels of management are given in table 28.

Present use and management.—About 40 percent of the acreage of the soils of management group 23 is under native cutover forest. About 2,600 acres of this is on Starr Mountain in Cherokee National Forest. The forest in Cherokee National Forest is protected from fire and grazing, and good cutting or harvesting practices are used. Elsewhere in the county little is done to safeguard the forests.

Practically all of the acreage not under native cutover forest has been cleared and cropped at some time. Much of this has been abandoned and either has reverted to forest by natural seeding or has been planted to trees. Virginia and shortleaf pines predominate on these revegetated areas, but some parts have been reforested by natural seeding with locust. Additional abandoned cropland continues to be revegetated by trees, and small acreages are being planted chiefly to pine. Areas of these soils still farmed are used chiefly for corn and hay, and for pasture. Management is at a low level, and yields are low.

Use suitability and suggested management.—These soils are unsuited to row crops. Their unfavorable characteristics in general limit them to forest. The more desirable tracts can be used for pasture, small grains, or hay on farms where there is a great need for pasture or crop acreage. Areas so used are very exacting in their management and can be expected to give high yields only in exceptional places. Maintaining fertility and adequate

[7] Most of the material for this section was prepared by G. B. Shivery, Extension Forester, College of Agriculture, University of Tennessee.

TABLE 28.—*Soils of management group 23: Expected average acre yields of principal crops under two levels of management*

[Yields in columns A are to be expected under present management; those in columns B are to be expected under the suggested management. Blank spaces indicate either crop is not grown under the management specified or soil is unsuited to its production]

Soil	Wheat		Lespedeza		Alfalfa		Pasture	
	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Clarksville cherty silt loam, eroded steep phase							20	55
Clarksville cherty silt loam, steep phase							25	60
Fullerton cherty silt loam, eroded steep phase							35	70
Fullerton cherty silt loam, steep phase							35	75
Fullerton cherty silty clay loam, severely eroded hilly phase	4	13	0.3	0.9	1.1	1.8	30	70
Fullerton cherty silty clay loam, severely eroded steep phase							20	50
Gullied land, acid shale material								
Gullied land, calcareous shale and sandstone materials								
Gullied land, limestone material								
Lehew-Montevallo loams, hilly phases	6	15	.4	.9			35	75
Lehew-Montevallo shaly loams, eroded hilly phases	5	14	.3	.8			30	70
Lehew-Montevallo shaly loams, eroded steep phases								
Lehew-Montevallo shaly loams, steep phases								
Litz loam, eroded steep phase							30	70
Litz loam, steep phase							35	75
Litz shaly silt loam, eroded steep phase							30	70
Litz silt loam, steep phase							35	75
Litz stony loam, very steep phase								
Mines, pits, and dumps								
Ramsey stony fine sandy loam, hilly phase							20	40
Ramsey stony fine sandy loam, steep phase								
Rockland, limestone material								
Stony steep land, Talbott soil material								
Stony very steep land, Ramsey soil material								
Tellico clay loam, severely eroded steep phase							20	60
Tellico loam, steep phase							40	80
Tellico stony loam, very steep phase								

[1] Cow-acre-days is the number of days 1 acre will graze a mature animal (cow, horse, or steer) without injury to the pasture.

moisture for plants, restraining runoff, and carrying on field operations are among the difficult problems involved in using these soils for crops.

Radical change in forest management will be required to halt the progressive deterioration of the forest resources on these soils. A greater value must be placed on the potential crop of sawtimber. The chief forest management requirements are (1) fire control, (2) grazing control, and (3) proper harvesting methods.

Fire control is important not only to protect the trees but to protect the forest litter that helps to maintain soil porosity and restrain runoff.

Grazing is a serious deterrent to forests, chiefly because the young replacement growth is killed by browsing. Moreover, trampling caused by much grazing compacts the soil and destroys the humus. As a result the soil is less porous and moisture absorption is restricted. According to Indiana experiments, grazing of woodland without supplemental feeding did not pay under intensities of 2, 4, or 6 acres per animal unit, as the animals deteriorated during a 6-month season (*2*). Most forest land in this county is not of much value for grazing.

Under proper harvesting methods, desirable trees are left on the land under conditions suitable for vigorous growth. Important in woodland improvement is the removal of cull and weed trees—those that are unsound, crooked, short, bushy topped, slow growing, and of species that have little or no commercial value. This practice leaves the straight, tall, and well-crowned trees that are free of defects to grow more rapidly into crop timber. Much of the inferior timber removed from farm woodland can be used for fuel and pulpwood. Selective cutting includes cutting the better trees according to their individual maturity rather than harvesting the entire stand at one time. Cut timber should be removed with the least possible damage to the reserved trees.

In some places denuded areas may be reforested by natural or volunteer seeding. In others, planting will be required. For natural seeding, seed trees of desirable species must be nearby, and the ground must be favorable for germination. Shortleaf pine commonly reseeds on turned-out land. Virginia pine is an especially prolific seed producer. Loblolly pine is less prolific.

Tree planting is necessary where volunteer seeding by desirable species does not take place. Advance preparation of the soil is required, and each situation presents a specific problem. This preparation includes such measures as breaking and mulching galled areas, building low check dams of brush in gullies, and plowing contour furrows. Forest tree seedlings of suitable species can be obtained from the Tennessee Valley Authority without cost through the county agricultural agent. Since 1934 a total of about 4,000 acres, including that planted by CCC camps, have been planted to trees. The chief species used

in this planting program are shortleaf pine, loblolly pine, and black locust.[8]

Of first importance is the selection of species that are suited to the soil and to the site. Although farmers many times specify locust because of farm needs for fence posts, pine is usually better suited to the severe growing conditions common to most areas designated for planting to forest. Loblolly is considered one of the most desirable pines because it makes rapid initial growth, provides a heavy leaf litter, and is of relatively high value when harvested. Areas having more favorable moisture relations, favorable slope, such as northern exposure, and good depth to bedrock are preferred for this species. Such areas are most common on the Fullerton, Clarksville, Tellico, Dewey, and Decatur soils, although few areas of Dewey and Decatur soils are designated for reforestation.

For somewhat drier sites, shortleaf pine is well suited. For the driest and most unfavorable sites, such as south-facing steep slopes shallow to bedrock, Virginia pine is probably best suited. A recommended practice on the more favorable sites is to interplant loblolly and shortleaf pines. Loblolly is the more desirable tree, but the ability of shortleaf to sprout following fire prevents complete loss of the forest cover. For the denuded parts of gullied areas and severely eroded tracts, shortleaf is favored over loblolly pine. Yellow-poplar and black walnut must be restricted to choice sites and should be mixed with other species. Black locust is suited to planting in gullies where well-drained wash has accumulated behind check dams.

Forest has important indirect benefits aside from production of wood products, especially on critical areas subject to erosion. A protective layer of forest litter absorbs the impact of the falling drops of water and thereby preserves the tiny pores and channels between the soil particles. Fungi, bacteria, and tiny animals that consume the litter and each other produce a dark-brown colloidal substance called humus. The litter and humus have great capacity to absorb water directly. When humus is carried downward into the mineral soil by percolating water, it improves both structure and fertility. Soil porosity is further increased by the channels left after the decay of dead roots. The surface roots of trees are highly beneficial in binding the soil and have their densest network in the lower parts of well-developed layers of litter.

Results obtained at the erosion station near Statesville, North Carolina, show a loss of only 0.002 ton of soil and 0.06 percent of rainfall from virgin woods (*9*). In contrast, a companion woods plot burned twice yearly shows runoff of 11.5 percent and soil loss of 3.08 tons per acre, as compared to 0.06 percent and 0.001 ton per acre, respectively, on an unburned plot. Similar experiments at Zanesville, Ohio, for a 9-year period on cultivated land, pasture, and woodland show, respectively, the runoff as 20.6, 13.8, and 3.2 percent, and the soil loss per acre as 17.18, 0.10, and 0.01 ton (*10*). Both erosion control and maximum absorption therefore result from complete forest cover, because old-growth forested soil is more porous and absorbs water much more rapidly than the soil in cultivated fields. Where the forest cover is properly maintained, second-growth forested soil does not lose its porosity unless it is overgrazed or the litter is destroyed by fire (*1*).

[8] Information obtained from the Department of Forestry Relations, Tennessee Valley Authority.

Additional Interpretive Soil Groupings

Soils can be grouped to emphasize characteristics that are important in dealing with particular problems. By such groupings soil maps are made more useful. For example the grouping presented in the section, Use and Management of Soils, places together those soils similar in use suitability and management requirements. Management for these groups are shown on the detailed soil map by distinguishing colors. This interpretive grouping is in a separate section because of its importance. Two other interpretive groupings of the soils of McMinn County are discussed in this section: (1) Capability groups (relative suitability of the soils for crops, grazing, forestry, or wildlife) and (2) soil associations (large areas with similar soil patterns). A map of the soil associations is shown in figure 7 on page 81.

Capability Groups of Soils

The capability grouping is an arrangement of soils to show relative suitability for crops, grazing, forestry, or wildlife and the risk of erosion or other damage. Soils that are nearly level, well drained, free from overflow, fairly fertile, and otherwise not limited are placed in class I. They are widely adaptable. The farmer can use his class I soils for crops without special practices, and can choose one of several cropping systems. If he wishes he may use the soils for pasture or for some other purpose.

Soils are placed in class II if they are a little less widely adaptable and thus more limited than those in class I. A gently sloping soil, for example, must be farmed on the contour, kept under vegetation most of the time, or handled in some other manner that will control erosion. Other soils may be included in class II because they are too droughty, too wet, or too shallow to be included in class I.

Class III soils are suitable for regular cropping but have more narrow adaptations for use or more stringent management requirements than class II soils. Soils more limited and narrower in crop adaptations than those of class III, but still usable for tillage part of the time or with special precautions, are placed in class IV.

Soils not suitable for cultivation, or on which cultivation is not advisable, are in classes V, VI, VII, or VIII. Class V, which does not occur in McMinn County, consists of soils not subject to erosion but unsuitable for cultivation because of standing water or frequent overflows. Class VI contains the soils that are steep or droughty or have other serious limitations but will produce fairly good amounts of forage or forest products. As a rule class VI soils should not be cultivated, but some of them can be disturbed enough to prepare them for planting trees or seeding extremely long producing pastures. Soils in class VII are more limited than those in class VI and usually give only fair to poor yields of forage or wood products. Soils in class VIII, a class not used in McMinn County, are so severely limited that they produce little useful vegetation. They may provide attractive scenery or may be parts of useful watersheds. Some have value for wildlife.

Subclasses.—Although the soils within a single capability class present use and management problems of about the same degree, the kinds of management problems differ because the soils are different. Class III in this

county, for example, includes some rolling soils subject to erosion, some shallow and droughty soils, and some poorly drained soils limited by excess water. It is convenient to recognize, within the broad classes, capability subclasses based on the dominant limitation. The subclasses used in McMinn County are established according to the following dominant limitations or risks: Risk of erosion, designated by the symbol (e); excess water (w); and shallowness or droughtiness (s). The subclass is denoted by a small letter following the class number, such as IIe, IIIw, or IIIs.

Capability classes and subclasses

Capability classes and subclasses used in McMinn County are shown in the following list. The brief description of each subclass gives the general nature of the major soils included.

Class I.—Soils that are easy to farm and have no more than slight limitations for use. They can be used under intensive cultivation without special measures to control excess water or erosion and they may be expected to produce high yields with ordinary practices for good soil and crop management.

Class II.—Soils that can be used for tilled crops with only slight risk of erosion or other limitations.
- IIe: Undulating well-drained soils, subject to slight erosion.
- IIs: Cherty alluvial soils.
- IIw: Imperfectly drained alluvial and colluvial soils.

Class III.—Soils that can be used for tilled crops but under moderate risks of erosion, excess water, or other limitations.
- IIIe: Rolling soils subject to erosion.
- IIIs: Soils limited by shallowness or moisture-supplying capacity.
- IIIw: Poorly drained soils.

Class IV.—Soils that have severe limitations when used for cultivation, and when so used require extreme care.
- IVe: Hilly soils, subject to severe erosion.
- IVs: Sandy, shaly, or stony soils.
- IVw: Poorly drained soils on upland flats and depressions.

Class VI.—Soils too steep, too eroded, too sandy, or too shallow for cultivation, except occasionally for seeding long-producing pasture or forage or for planting trees.
- VIe: Hilly and steep soils.
- VIs: Sandy or shallow soils limited by low moisture-supplying capacity and low fertility.

Class VII.—Soils too steep, too stony, too erodible, or too droughty for cultivation.
- VIIe: Steep cherty soils and gullied land.
- VIIs: Steep, droughty, stony soils, and limestone rockland; stony hilly land, stony steep land, and stony very steep land.

The capability class and subclass for each soil is shown in the following list:

	Capability class and subclass
Alcoa clay loam:	
Severely eroded hilly phase (Aa)	IVe.
Severely eroded rolling phase (Ab)	IIIe.
Alcoa loam:	
Eroded hilly phase (Ac)	IVe.
Eroded rolling phase (Ad)	IIIe.
Eroded undulating phase (Ae)	IIe.
Apison loam, eroded rolling phase (Af)	IIIe.
Barbourville loam (Ba)	IIe.
Bolton silt loam:	
Eroded hilly phase (Bb)	IVe.
Eroded rolling phase (Bc)	IIIe.
Eroded steep phase (Bd)	VIe.
Bruno loamy fine sand (Be)	IVs.
Clarksville cherty silt loam:	
Eroded hilly phase (Ca)	IVe.
Eroded rolling phase (Cb)	IIIe.
Eroded steep phase (Cc)	VIIe.
Hilly phase (Cd)	IVe.
Rolling phase (Ce)	IIIe.
Steep phase (Cf)	VIIe.
Cotaco loam (Cg)	IIw.
Cotaco silt loam (Ch)	IIw.
Cumberland silt loam, undulating phase (Ck)	IIe.
Cumberland silty clay loam:	
Eroded rolling phase (Cl)	IIIe.
Eroded undulating phase (Cm)	IIe.
Dandridge shaly silt loam:	
Eroded hilly phase (Da)	IVs.
Eroded rolling phase (Db)	IIIs.
Eroded steep phase (Dc)	VIIs.
Dandridge silt loam:	
Hilly phase (Dd)	IVs.
Rolling phase (De)	IIIs.
Steep phase (Df)	IIIs.
Decatur silty clay:	
Severely eroded hilly phase (Dg)	IVe.
Severely eroded rolling phase (Dh)	IIIe.
Decatur silty clay loam:	
Eroded hilly phase (Dk)	IVe.
Eroded rolling phase (Dl)	IIIe.
Eroded undulating phase (Dm)	IIe.
Dewey clay loam:	
Eroded hilly phase (Dn)	IVe.
Eroded rolling phase (Do)	IIIe.
Eroded undulating phase (Dp)	IIe.
Dewey silty clay:	
Severely eroded hilly phase (Dr)	IVe.
Severely eroded rolling phase (Ds)	IIIe.
Dewey silty clay loam:	
Eroded hilly phase (Dt)	IVe.
Eroded rolling phase (Du)	IIIe.
Eroded undulating phase (Dv)	IIe.
Emory and Abernathy silt loams (Ea)	I.
Emory silt loam (Eb)	IIe.
Etowah silty clay loam, eroded rolling phase (Ec)	IIIe.
Etowah silt loam, undulating phase (Ed)	IIe.
Farragut silty clay loam:	
Eroded rolling phase (Fa)	IIIe.
Eroded undulating phase (Fb)	IIe.
Fullerton cherty silt loam:	
Eroded hilly phase (Fc)	IVe.
Eroded rolling phase (Fd)	IIIe.
Eroded steep phase (Fe)	VIIe.
Hilly phase (Ff)	IVe.
Rolling phase (Fg)	IIIe.
Steep phase (Fh)	VIIe.
Fullerton cherty silty clay loam:	
Severely eroded hilly phase (Fk)	VIe.
Severely eroded rolling phase (Fl)	IVe.
Severely eroded steep phase (Fm)	VIIe.
Fullerton loam:	
Eroded hilly phase (Fn)	IVe.
Eroded rolling phase (Fo)	IIIe.
Eroded undulating phase (Fp)	IIe.
Hilly phase (Fr)	IVe.
Rolling phase (Fs)	IIIe.
Fullerton silt loam:	
Eroded hilly phase (Ft)	IVe.
Eroded rolling phase (Fu)	IIIe.
Eroded undulating phase (Fv)	IIe.
Hilly phase (Fw)	IVe.
Rolling phase (Fx)	IIIe.
Fullerton silty clay loam:	
Severely eroded hilly phase (Fy)	VIe.
Severely eroded rolling phase (Fz)	IIIe.
Greendale cherty silt loam (Ga)	IIs.

	Capability class and subclass
Greendale silt loam (Gb)	IIe.
Gullied land:	
Acid shale material (Gc)	VIIe.
Calcareous shale and sandstone materials (Gd)	VIIe.
Limestone material (Ge)	VIIe.
Guthrie silt loam (Gf)	IVw.
Hamblen and Lindside silt loams (Ha)	IIw.
Hamblen and Lindside silty clay loams (Hb)	IIw.
Hamblen fine sandy loam (Hc)	IIw.
Hayter loam, undulating phase (Hd)	IIe.
Hermitage silt loam:	
Eroded rolling phase (He)	IIIe.
Undulating phase (Hf)	IIe.
Holston loam:	
Eroded rolling phase (Hg)	IIIe.
Eroded undulating phase (Hh)	IIe.
Undulating phase (Hk)	IIe.
Jefferson fine sandy loam, rolling phase (Ja)	IIIe.
Jefferson loam:	
Eroded rolling phase (Jb)	IIIe.
Rolling phase (Jc)	IIIe.
Undulating phase (Jd)	IIe.
Jefferson stony fine sandy loam:	
Hilly phase (Je)	VIs.
Rolling phase (Jf)	IVs.
Leadvale silt loam:	
Eroded rolling phase (La)	IIIe.
Undulating phase (Lb)	IIe.
Lehew-Montevallo loams:	
Hilly phases (Lc)	VIs.
Rolling phases (Ld)	IVs.
Lehew-Montevallo shaly loams:	
Eroded hilly phases (Le)	VIs.
Eroded rolling phases (Lf)	IVs.
Eroded steep phases (Lg)	VIIs.
Steep phases (Lh)	VIIs.
Litz loam:	
Eroded hilly phase (Lk)	VIs.
Eroded rolling phase (Ll)	IIIs.
Eroded steep phase (Lm)	VIIs.
Rolling phase (Ln)	IIIs.
Steep phase (Lo)	VIIs.
Litz shaly silt loam:	
Eroded hilly phase (Lp)	VIs.
Eroded rolling phase (Lr)	IIIs.
Eroded steep phase (Ls)	VIIs.
Eroded undulating phase (Lt)	IIIs.
Litz silt loam:	
Hilly phase (Lu)	VIs.
Rolling phase (Lv)	IIIs.
Steep phase (Lw)	VIIs.
Litz stony loam, very steep phase (Lx)	VIIs.
Monongahela silt loam (Ma)	IIe.
Mines, pits, and dumps	[1].
Needmore silty clay loam:	
Eroded rolling phase (Na)	IIIe.
Eroded undulating phase (Nb)	IIe.
Severely eroded rolling phase (Nc)	IVe.
Neubert loam (Nd)	IIe.
Ooltewah silt loam (Oa)	IIw.
Pace silt loam:	
Eroded rolling phase (Pa)	IIIe.
Rolling phase (Pb)	IIIe.
Undulating phase (Pc)	IIe.
Prader and Melvin silty clay loams (Pd)	IIIw.
Purdy and Tyler silt loams (Pe)	IIIw.
Ramsey stony fine sandy loam:	
Hilly phase (Ra)	VIs.
Steep phase (Rb)	VIIs.
Rockland, limestone material (Rc)	VIIs.
Sequatchie fine sandy loam:	
Eroded rolling phase (Sa)	IIIe.
Undulating phase (Sb)	IIe.
Sequoia silt loam:	
Rolling phase (Sc)	IIIe.
Undulating phase (Sd)	IIe.
Sequoia silty clay loam:	
Eroded rolling phase (Se)	IIIe.
Eroded undulating phase (Sf)	IIe.
Sequoia silty clay, severely eroded rolling phase (Sg)	IVe.
Staser and Huntington silt loams (Sh)	I.
Stony hilly land, Talbott soil material (Sk)	VIIs.
Stony rolling land, Talbott soil material (Sl)	VIs.
Stony steep land, Talbott soil material (Sm)	VIIs.
Stony very steep land, Ramsey soil material (Sn)	VIIs.
Talbott silty clay loam:	
Eroded rolling phase (Ta)	IIIe.
Eroded undulating phase (Tb)	IIe.
Talbott silty clay, severely eroded rolling phase (Tc)	IVe.
Tellico clay loam:	
Severely eroded hilly phase (Td)	IVe.
Severely eroded rolling phase (Te)	IIIe.
Severely eroded steep phase (Tf)	VIIe.
Tellico loam:	
Eroded hilly phase (Tg)	IVe.
Eroded rolling phase (Th)	IIIe.
Hilly phase (Tk)	IVe.
Rolling phase (Tl)	IIIe.
Steep phase (Tm)	VIIe.
Tellico stony loam, very steep phase (Tn)	VIIs.
Waynesboro loam:	
Eroded hilly phase (Wa)	IVe.
Eroded rolling phase (Wb)	IIIe.
Eroded undulating phase (Wc)	IIe.
Whitesburg silt loam (Wd)	IIw.
Wolftever silt loam, undulating phase (We)	IIe.

[1] Not classified for capability.

Soil Associations

Soils occur in rather characteristic geographic association with one another. The Clarksville soils, for example, are characteristically associated with Fullerton, Greendale, and Pace soils. Likewise, the Emory soils are generally associated with the relatively smooth Decatur and Dewey soils.

A soil association may consist of a few soils or of many. These soils may be similar or greatly different. In each soil association, however, there is a certain uniformity of soil pattern. It is important to know the soil association in which a particular soil occurs, because the association may have a great influence on its present and potential use.

A map showing characteristic associations of soils is useful in predicting the suitability of areas for farms of different types and sizes. It is also useful in selecting representative farms for farm-business analysis or for farm demonstrations.

The soils of McMinn County have been grouped into 12 soil associations, which are named for the predominant soil series occurring within them. The distribution and extent of these soil associations are shown in figure 7. A brief description of each follows. More detailed information about individual soils in the associations can be obtained from the detailed soil map and by reading in the section, Descriptions of the Soils.

Clarksville-Fullerton association

The Clarksville-Fullerton association is made up chiefly of hilly and steep Clarksville soils. A small portion consists of Fullerton soils, and Greendale soils occur along the drainageways. The association occurs on the more strongly sloping cherty parts of the cherty ridges to the west of the valley traversed by the Southern Railway. It covers about 8 percent of the county area.

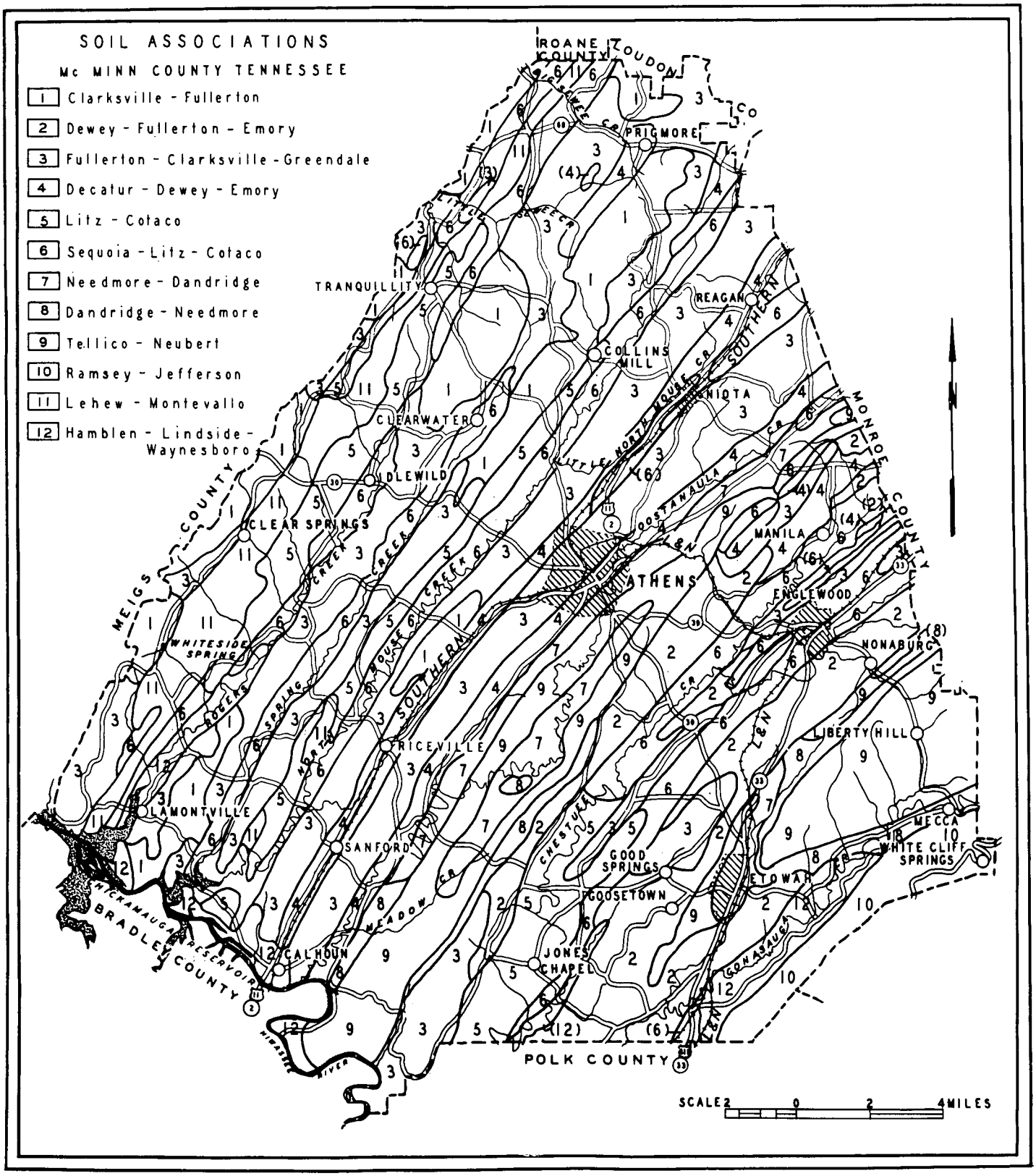


Figure 7.—Soil association map of McMinn County, Tenn.

This is one of the less favorable associations for farming. The low natural fertility, strong slopes, and cherty nature make it unsuited to crops and pasture. The soils respond to fertilization. But their usefulness for farming is limited because a large part of their acreage is not suited to cultivation because high fertility is difficult to maintain.

Much of the acreage in this soil association is under cutover forest. The cleared parts are used chiefly for unimproved pasture, corn, and lespedeza. Crop yields are low and pasture generally is not of high quality.

Dewey-Fullerton-Emory association

The Dewey-Fullerton-Emory association occurs on relatively low ridgelands that overlie cherty limestone. It is in that part of the county between Athens and Etowah. (fig. 8). Fullerton soils predominate, but a considerable

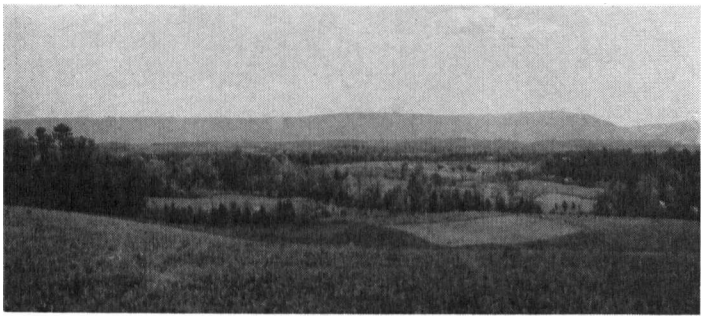


Figure 8.—**View across Chestuee watershed from the higher lying cherty ridgeland (Dewey-Fullerton-Emory association area) on the west toward Starr Mountain. Undulating and rolling Litz soils predominate in the valley or lowland. Much of the land is cleared; parts are idle or revegetated by volunteer stands of pine.**

acreage of Dewey and Decatur soils are intermixed, and Greendale and Emory soils occur along the drainageways. The association ranges from undulating to rolling but includes a very small acreage of hilly land. It occupies about 10 percent of the county.

This is one of the more desirable associations for general farming, and many of the farms are among the more prosperous of the county. A large part of the area is now cleared and used for general farming. The level of fertility is somewhat lower than that of the Decatur-Dewey-Emory association. Nevertheless, an appreciable part is naturally fertile and well suited to crops. The soils respond well to good management, and a great part of the acreage is capable of producing high crop yields, including high yields for the more exacting legumes and grasses.

Fullerton-Clarksville-Greendale association

The Fullerton-Clarksville-Greendale is the most extensive association. It covers about 27 percent of the county. It is widely distributed and occupies much of the cherty ridge area. Most of it is on the ridges that traverse the central part of the county. Fullerton soils greatly predominate throughout this association. In the smoother areas a very small acreage of the Clarksville soils is intermixed. Fullerton and Greendale soils and a few areas of Bolton and Dewey make up a great part of the landscape in the smoother areas. In the more hilly areas Clarksville soils are common and some acreage of Bolton soils occurs, but the Fullerton soils predominate. Greendale soils are throughout the association areas but are more extensive in the smoother parts. In this association slopes range from undulating to hilly. In some places they are undulating to rolling, and in others they are rolling to hilly.

On the whole, the soils of this association are moderate to low in fertility, well drained, and deep to bedrock. A large area of the less hilly soils now is cleared and used for general farm crops, chiefly corn, hay, and small grains. Much of the remaining acreage not under forest is used for pasture.

Between half and three-fourths of the acreage of this association is suited to a wide variety of crops and responds well to good management. Much of the more sloping or hilly acreage not suited to crops is suited to pasture. Soils of this association, however, require heavier fertilization than those of the Decatur-Dewey-Emory association if they are to produce grazing of good quality and high carrying capacity.

Decatur-Dewey-Emory association

The Decatur-Dewey-Emory association, which consists of smooth valley land over limestone, covers about 8 percent of the county (fig. 9). The areas occupied by this

Figure 9.—**Fertile reddish well drained soils on a smooth landscape in the Decatur-Dewey-Emory association in foreground; more hilly Fullerton-Clarksville-Greendale association in background.**

soil association occur near and southeast of Athens. Dewey and Decatur soils predominate; but Emory and Hermitage soils are on the local alluvium along the drainageways. Relief for this association is nearly level to rolling but is hilly in places.

Many of the most productive and intensively operated farms of the county are in this association. Practically all of the acreage has been cleared of forest and is used for general farming. Corn, hay, and small grains are the chief crops. Alfalfa is most common, and dairy farming is carried on more intensively on this association than on any of the others.

The soils of this association are among the most fertile in the county. A great part of the acreage is well suited to

both crops and pasture. The more exacting crops are suited, and stands of the grasses and legumes more desirable for hay and pasture are not difficult to establish and maintain.

Litz-Cotaco association

This association consists of extensive areas of undulating to rolling Litz soils and also narrow strips of Cotaco soils along the drainageways. The areas occur in valleys and consist essentially of shallow shaly silt loam soils over acid shale. The association occupies about 8 percent of the county. The more extensive areas are west of Athens and southwest and west from Etowah.

The soils of this association, as a whole, are low in productivity. Chiefly because of low fertility and shallow depth to shale, they are not well suited to crops or pasture. Much of the acreage has been cleared, but an appreciable part has been eroded and is now idle, abandoned, or used as unimproved pasture. Under a high level of management, however, portions of the Litz soils can be made fairly productive of some crops, especially small grains, hay crops, and pasture. The Cotaco and other soils consisting of alluvium are productive of most general farm crops. At the present time a subsistence type of farming prevails, and the general level of management is low.

Sequoia-Litz-Cotaco association

The Sequoia-Litz-Cotaco is one of the more extensive associations in the county. It covers about 15 percent of the total acreage and is distributed throughout the central and southeastern parts of the county. Like the Litz-Cotaco association, it occurs on undulating to rolling valley positions and overlies shale. In places it occupies the entire valley, whereas in others it occupies a strip in association with a strip of the Litz-Cotaco association. On much of this association, the depth to bedrock is somewhat greater than on the Litz-Cotaco association. In these areas the Sequoia soils prevail. Litz soils are on the stronger slopes, and Cotaco soils occupy strips along the drainageways. There are some areas of Farragut soils intermixed with the Sequoia.

The general level of fertility is higher for this association than for the Litz-Cotaco, especially for the Sequoia and Farragut soils. A very great part has been cleared, and that part occupied by Sequoia, Farragut, Cotaco, and other bottom-land soils is well suited to general farming. Because of erosion, however, the productivity for much of the acreage has been greatly lowered, and the more shallow parts are limited to pasture or forest. This association in general is less productive of crops than the Decatur-Dewey-Emory, but under good management it is well suited to general farming. On much of it the more exacting legumes and grasses can be grown where the fertility is brought to a high level.

Needmore-Dandridge association

This is one of the less extensive associations. It covers about 4 percent of the county. The largest areas are south and east of Athens and consist predominantly of Needmore and Dandridge soils. Included in places are some areas of Whitesburg, Neubert, Hamblen, and Tellico soils. In some areas the Needmore soils prevail. In others the Dandridge soils occupy much of the rolling as well as the hilly parts. This association differs from the Dandridge-Needmore association chiefly in having a smoother surface.

Part of the acreage of this association has been cleared. The shallow depth to shale and the severely eroded condition of much of it are the chief deterrents to high productivity. However, the Hamblen, Whitesburg, Neubert, and other soils on the bottom lands and along the drainageways are suited to intensive use. In addition, a great part of the acreage of the Needmore and Dandridge soils is fairly well suited to long rotations if good management is practiced. A great part of this association is capable of supporting good quality legume-and-grass pasture under proper management.

Dandridge-Needmore association

The Dandridge-Needmore association occurs on hilly landscape and consists of soils shallow to calcareous shale bedrock. It occupies about 2.5 percent of the county, and practically all lies as narrow strips adjacent to areas of the Tellico association in the southeastern part.

Much of the acreage has been cleared, but much has been abandoned. The abandoned areas are now used as unimproved pasture or are reverting to forest. A great part of the acreage is poorly suited to crops because of hilly relief and shallow depth. Under proper management, however, this acreage is capable of supporting fair to good grazing, although the grazing period on the more eroded south-facing slopes is greatly restricted by unfavorable moisture relations.

Tellico-Neubert association

The Tellico-Neubert association consists of hilly to steep soils that are relatively shallow to calcareous sandstone. These soils are recognized by their reddish color and rather sandy permeable nature. The association covers about 9.5 percent of the county and includes some of the more rugged parts. The largest area is adjacent to the Ramsey-Jefferson association that occurs on the very strong slopes of Starr Mountain.

A great part of this association is occupied by cutover mixed deciduous and pine forest. Much of the limited acreage of cleared land is confined to the bottom lands along streams. The very strong slope and shallow depth restrict this association very largely to forest. The very few smooth areas of the upland that have a moderate depth to bedrock are well suited to crops, and so are the soils on the bottom lands.

Ramsey-Jefferson association

The Ramsey-Jefferson association occupies the strong rugged slopes of Starr Mountain and consists of rough mountainous land that has frequent rock outcrops. It covers about 2 percent of the county. The lower part of the slopes is occupied by stony Jefferson soils, and the

main part by Ramsey soils and Stony very steep land, Ramsey soil material. Most areas are shallow to bedrock quartzite, sandstone, or slate or contain a great amount of loose rock. Practically all of this association is in forest, and it is suited only to this use.

Lehew-Montevallo association

This association, which covers about 4 percent of the county, consists predominantly of hilly and steep areas of Lehew and Montevallo soils. In places there are narrow valleys occupied by Cotaco and Hamblen soils. The surface is predominantly steep, and the association areas are normally rugged.

The Lehew and Montevallo soils are shallow to bedrock, low in fertility, and predominantly strongly acid. The limited areas of the Cotaco and Hamblen soils and of the few other soils consisting of local and general alluvium are suitable for crops but are generally low in fertility. A great part of the landscape is in forest, which is, on the whole, the best use for these soils. This association is of little value for the production of crops and pasture, and very little acreage is cropped. A subsistence type of farming prevails in areas where the soils have been cleared for crops.

Hamblen-Lindside-Waynesboro association

The Hamblen-Lindside-Waynesboro is one of the less extensive associations and covers about 3 percent of the county. It occupies nearly level to rolling areas consisting predominantly of soils developed from alluvium. Some of the areas are made up largely of first bottom soils. Others are about equally divided between soils on bottom lands and soils on high stream terraces. The largest area is along Conasauga Creek, southeast of Athens. Other areas are along the Hiwassee River and Rogers Creek.

Nearly all of the acreage is cropped, although some of the more sloping areas are in pasture. A great part of the acreage is at least moderately high in fertility and deep to bedrock. A large part is well suited to crops. The soils on bottom lands are especially suited to intensive use, and under present conditions they are of especial value for corn. An appreciable part is capable of producing high yields under good management. Those parts on bottom lands are subject to overflow.

Morphology and Genesis of Soils

Soil is produced by the action of soil-forming processes on materials deposited or accumulated by geologic agencies. The characteristics of the soil at any given point are determined by (1) the physical and mineralogical composition of the parent materials, (2) the climate under which the soil material has accumulated and existed since accumulation, (3) the plant and animal life on and in the soil, (4) the relief, or lay of the land, and (5) the length of time the forces of soil development have acted on the soil material (*8*).

Climate and vegetation are active factors of soil genesis. They act on the parent material accumulated through the weathering of rocks and slowly change it into a natural body with genetically related horizons. The effects of climate and vegetation are conditioned by relief. The parent material also affects the kind of profile that can be formed and in extreme cases determines it almost entirely. Finally, time is needed for the changing of the parent material into a soil profile. It may be much or little, but some time is always required for horizon differentiation. Usually a long time is required for the development of distinct horizons.

The interrelationships among the factors of soil formation are complex, and therefore the effects of any one factor are hard to isolate with certainty. It is possible to find some areas where four of the factors are constant or nearly so, and in such areas the effects of the fifth factor can be partially evaluated. Even in such places the measurements are approximations of the actual effects. It is convenient, however, to discuss the individual factors and their effects in soil formation, but the reader should remember that it is the interaction of these factors rather than their simple sum that determines the nature of the soil profile.

The purpose of this section is to present the outstanding morphological characteristics of the soils of McMinn County and to relate them to the factors of soil formation. Physical and chemical data are limited for these soils, and the discussion of soil genesis and morphology is correspondingly incomplete. The first part of the section deals with the environment under which the soils exist; the second, with classification of the soils and the part environment has played in determining the morphology of the soils comprising the series.

Factors of Soil Formation in McMinn County

Parent materials

The parent materials of the soils of McMinn County may be considered in two broad classes: (1) Materials residual from the weathering of rocks in place and (2) materials transported by water or gravity and laid down as unconsolidated deposits of clay, silt, sand, and rock fragments. Materials of the first class are related directly to the underlying rocks from which they were derived; materials of the second class, to the soils or rocks from which they were washed.

The parent materials formed in place consist of the residuum of sedimentary rocks. They include limestone (some of which is dolomitic), other stone, and shale. Geologically, the rocks are old. They were formed in the early part of the Paleozoic Era (*4*). Most of the rock formations are folded and faulted and generally have a decided dip.

Certain soils of the county developed from residual materials are generally associated with particular rock formations or parts of rock formations. The Decatur and Talbott soils were derived chiefly from materials weathered from high-grade limestone,[9] some of which is argillaceous. The Dewey, Fullerton, Bolton, and Clarksville soils are associated with the dolomitic limestone of the Knox formation. That part from which the Dewey soils

[9] The limestone is high-grade because the residuum has a low content of siliceous material and gives rise to soils of relatively high fertility.

were formed is of high-grade limestone. The Farragut and Sequoia soils are from interbedded shale and limestone. The Dandridge and Needmore soils were derived from calcareous shale, and the Litz soils from acid shale containing a few lenses or layers of limestone. The Tellico soils were derived from calcareous sandstone, the Lehew and Apison from acid sandy shale, and the Montevallo from acid shale quite free of sand. The Ramsey soil was derived largely from acid sandstone and quartzite.

Parent materials consisting of alluvium fall into two groups: Local alluvium and general alluvium. In most places in McMinn County the separate areas of local alluvium consist of material from one kind of rock, whereas much of the general alluvium consists of a mixture of materials from two or more kinds of rock. Accordingly, the parent rock can be specifically identified for the soils on local alluvium but not for the soils on general alluvium.

The local alluvium is of two kinds: Old local alluvium and young local alluvium. Of the soils consisting of old local alluvium, the Hermitage is comprised chiefly of material derived from high-grade limestone, the Pace chiefly from cherty limestone, the Alcoa from Tellico sandstone, the Leadvale from shale, and the Jefferson from sandstone or quartzite. The Hayter consists predominantly of shale or sandy material strongly influenced by limestone residuum or lime-bearing water.

Of the soils consisting of young local alluvium, the Emory and Abernathy consist predominantly of material originating chiefly from high-grade limestone, the Greendale from cherty limestone, and the Ooltewah from many kinds of limestone. The Barbourville and Cotaco soils consist of materials predominantly from acid shale and sandstone, whereas the Whitesburg consists of materials from calcareous shale, and the Neubert of materials from calcareous sandstone.

The general alluvium is also of two kinds: Old and young. The Cumberland, Etowah, Waynesboro, Holston, Sequatchie, Wolftever, Monongahela, Tyler, and Purdy soils consist of old general alluvium. The Cumberland and Etowah soils are more strongly influenced by material derived from limestone than the others. Those soils on the alluvial benches along the Hiwassee River have a notable component of materials derived from micaceous rocks.

Of the soils consisting of young general alluvium, the Huntington, Lindside, and Melvin soils consist predominantly of material from limestone, whereas the Staser, Hamblen, and Prader soils consist predominantly of material from calcareous shale, sandstone, and interbedded shale and limestone. In mapping these Alluvial soils it was impractical to distinguish soils of the first group from those of the second, and consequently the mapping separations are complexes involving members of both groups.

The Bruno soils consist of very sandy material accumulated through stream sorting of general alluvium that contained an appreciable amount of sandy material. Much of the Bruno soil material is predominantly sand originating from Tellico sandstone. In places, however, parts have originated from sandy dolomitic rocks.

Climate

McMinn County has a humid temperate climate with long warm summers and short mild winters. The high rainfall throughout the county favors rather intense leaching of soluble materials. The soil is frozen for only short periods, especially in the valley area, and to only shallow depths, and the translocation of materials is therefore further intensified.

The general climate of the county is uniform, but small local differences in soil climate exist because of variations in slope and exposure. On the south- and west-facing slopes, the average daily and annual temperatures of the soil are higher than on the north- and east-facing slopes. Soil temperatures are also higher on the steeper slopes. Average moisture content of the soils is less on the south and west slopes than on the north and east slopes. These soil-moisture and temperature conditions affect the length of time that the soil is frozen and the growth of vegetation on the soil. Although the differences are small, they are significant and are possibly the cause of some of the local variations in soils derived from similar parent materials.

Plant and animal life

Trees, shrubs, grasses and other herbaceous plants, micro-organisms, earthworms, and various other forms of plant and animal life live on and in the soil and are active agencies in the soil-forming processes. The nature of the changes that these various biological forces bring about depends, among other things, on the kinds of life and the life processes peculiar to each. The kinds of plants and animals that live on and in the soil are determined by environmental factors, including climate, parent material, relief, age of the soil, and the associated organisms. The influence of climate is most apparent, though not always most important, as a determinant of the kinds of microflora that grow on the well-drained, well-developed soils. In this way climate exerts a powerful indirect influence on the morphology of soils.

A general oak-hickory-chestnut forest was on most of the well-drained, well-developed soils, although locally there may have been large proportions of pine in the forest stands, especially on the more sandy soils. The well-drained, well-developed soils apparently have no marked differences that result directly from differences in vegetative cover.

Most of the trees of the virgin forest were moderately deep or deep feeders. They were chiefly deciduous trees. The leaves range considerably among species in content of various plant nutrients, but in general the quantities of bases and phosphorus returned to the soil in leaves of deciduous trees are high, compared to those returned in coniferous trees. Essential plant nutrients are thus returned to the upper part of the soil from the lower part and retard the depleting action of percolating waters.

Much organic material is added to the soil in the form of dead leaves, roots, and entire plants. Most of it is added to the A horizon, where it is acted upon by micro-organisms, earthworms, and other forms of life and by direct chemical reactions. In McMinn County the rate of decomposition of such organic material is rapid as a result of favorable temperature and moisture conditions, favorable character of the organic material itself, and presumably favorable micropopulation of the soil.

Little is known of the micro-organisms, earthworms, and other population of the soils of the area, but their importance is probably equal to that of the vegetation on the soil.

Relief

Rocks have contributed to differences among soils through their effects on relief. The rocks of most of McMinn County are old formations that are folded and faulted (*4*). The present relief is probably largely a product of differential geologic weathering and erosion because of differences in resistance of the various rocks to these processes. The relief of soils in the county ranges from nearly level to very steep.

The internal drainage of soils of nearly level relief in the limestone areas is exceptionally good as a result of good subterranean drainage through caverns and crevices in the sharply dipping rocks. This excellent subterranean drainage in the areas underlain by limestone counteracts the usual effects of gentle relief on drainage. It allows the nature of the parent rock to dominate over local differences among the well-developed, well-drained soils derived from residual materials—soils that are subject to similar forces of climate and vegetation in this area.

Time

Some materials that have been in place for only a short time have not been influenced sufficiently by climate and vegetation to develop well-defined and genetically related profile horizons. Most soils of the first bottoms are composed of such materials, Soils of steep slope, as previously noted, have their materials constantly renewed and removed by geologic erosion and do not develop genetically related horizons. These two broad groups comprise the younger soils of the county.

Soils that have been in place for a long time and have approached equilibrium with their environment are considered mature or old. Some well-drained soils that are almost level and only slightly eroded exhibit more strongly marked profile characteristics than do well-drained, well-developed soils on the gently rolling uplands. Such soils are very old. The soils of McMinn County range from very young to very old but are largely young to very young.

Classification of Soils

The soils of the county are classified in three soil orders: Zonal, azonal, and intrazonal. In areas where the parent materials have been in place a long time and have not been subject to extreme conditions of relief or of the parent material itself, the soils have the characteristics of zonal soils. Zonal soils are members of one of the classes of the highest category in soil classification and are defined as those great groups of soils having well-developed soil characteristics that reflect the influence of the active factors of soil genesis—climate and living organisms (*8*).

The well-drained, well-developed soils in the county have been formed under relatively similar conditions of climate and vegetation and are zonal soils. It is on these soils that climate and vegetation have had the most influence, and relief and age the least. As a result, the soils that developed from various kinds of parent materials have many properties that are common to all.

In virgin conditions all of the well-drained, well-developed soils have a surface layer of organic debris in various stages of decomposition. All have dark-colored A_1 horizons. The A_2 horizons are lighter in color than either the A_1 or the B. The B horizon is generally uniformly colored yellow, brown, or red and is heavier textured than the A_1 or A_2. The C horizon is variable in color and texture among the different soils. It is usually light red or yellow, mottled with gray or brown, and finer textured than the B horizon.

Analyses of samples of several comparable soils from Jefferson County, Tenn., may be expected to apply to these soils. The silica content decreases and the alumina and iron contents increase with depth. The content of organic matter is moderate in the A_1 horizon, less in the A_2 horizon, and very low in the B and C horizons. The soils are low in bases and phosphorus within the solums. Since the loss on ignition is generally low, a low content of very tightly held water is indicated. These soils are medium, strongly, or very strongly acid throughout the solums. In general the quantities of silt decrease and the quantities of clay increase with depth from the A_1 horizon through the C horizon. The colloid content of the B horizon is much higher than that of the A_2.

In areas of the county where the parent material has been in place only a short time, as in the case of recently transported materials, the soils have poorly defined or no genetic horizons. These soils are young and have few or none of the properties of zonal soils and are therefore called azonal soils. Azonal soils are members of a second class of the highest category of soil classification and are defined as a group of soils that do not have well-developed soil characteristics because their youth, or their condition of parent material, or their relief prevents the development of normal soil profile characteristics (*8*).

These azonal soils are characterized by A_1 horizons that are moderately dark to very dark and apparently moderately to fairly high in organic-matter content; by the absence of a zone of illuviation, or B horizon; and by parent material that is usually lighter than the A_1 horizon in color and similar to, lighter than, or heavier than the A_1 horizon in texture. They may be referred to as A-C soils because of the absence of a B horizon.

On some steep areas where the quantity of water that percolates through the soil is relatively small and where the large amount and rapid rate of runoff contribute to rapid geological erosion, the soils are young. The materials are constantly renewed or mixed, and the changes brought about by vegetation and climate may be so slight that the soils are essentially A-C soils. These soils are also azonal soils.

On some nearly level areas in the county where both internal and external drainage are restricted or where geological erosion is very slow, soils whose materials have been in place a long time have certain well-developed profile characteristics that zonal soils do not have. Such soils are associated geographically with the zonal soils and are called intrazonal soils. They are defined as soils with more or less well-developed soil characteristics that reflect the dominating influence of some local factor of relief or parent material or age over the normal effects of climate and vegetation (*8*). The properties of such soils in this area are generally the result of level relief influenced greatly by the character of the parent material and the kinds of vegetation that grow in such environments.

Soils of each of the three orders—zonal, azonal, and intrazonal—may be derived from similar kinds of parent

materials. Within any one of those orders in this area, major differences among soils appear to be closely related to differences in the kinds of parent materials. The thickness of soil over the rock from which it was derived is partially determined by the resistance of the rock to weathering, the volume of residue after weathering, and the rate of geological erosion. The chemical and physical nature of the parent material modifies the rate and direction of chemical changes that result from climate and vegetation. The kind of parent material also exerts a pronounced influence on the kinds of vegetation that grow on the soil.

The soil series of McMinn County are classified in table 29 according to soil orders and great soil groups, and some of the factors that have contributed to differences in soil morphology are given. Study of this table will aid in understanding the genetic relationships of the soils of the area.

Zonal soils

The zonal soils of McMinn County are subdivided into Red-Yellow Podzolic and Gray-Brown Podzolic great soil groups.

RED-YELLOW PODZOLIC SOILS

Members of the Red-Yellow Podzolic great soil group are well-developed, well-drained acid zonal soils having thin organic (A_0) and organic-mineral (A_1) horizons over a light-colored leached (A_2) horizon, underlain by a red, yellowish-red, or yellow more clayey (B) horizon. They have developed under a deciduous or mixed forest in a warm-temperate moist climate.

The Red-Yellow Podzolic great soil group consists of red members and yellow members. In McMinn County the red members comprise 12 series and the yellow members 9. The red members have thin organic and organic-mineral layers over a yellowish-brown leached layer that rests upon an illuvial red horizon. The yellow members have thin organic and organic-mineral layers over a yellow leached layer that rests on a yellow horizon. The soil-forming processes involved in the development of both members are laterization and podzolization.

The causes of the development of the pronounced color differences between the red members and the yellow members are not entirely known. It appears, however, that the yellow members of the county are generally associated with parent materials either lower in bases or less well-drained internally than the parent material of

TABLE 29.—*Classification of soil series of McMinn County, Tenn., in higher categories, and factors that have contributed to differences in soil morphology* [1]

ZONAL

Great soil group and series	Relief	Parent material	Time [2]
Red-Yellow Podzolic soils:			
Red members:		Residuum from the weathering of—	
Talbott	Undulating to rolling	Argillaceous limestone	Long.
Decatur	Undulating to hilly	High-grade limestone	Long.
Dewey	Undulating to hilly	High-grade limestone and high-grade dolomitic limestone.	Long.
Bolton	Undulating to hilly	Arenaceous limestone or limestone with sandy beds	Long.
Fullerton	Undulating to steep	Moderately cherty dolomitic limestone	Long.
Farragut	Undulating and rolling	High-grade limestone over shale	Long.
Tellico [3]	Rolling to steep	Calcareous sandstone	Long.
		Local alluvium chiefly from—	
Hermitage	Undulating and rolling	High-grade limestone	Long.
Alcoa	Undulating to hilly	Calcareous sandstone	Long.
		General alluvium chiefly from—	
Cumberland	Undulating and rolling	Limestone, some shale, and sandstone	Long.
Etowah	Undulating and rolling	Limestone, some shale, and sandstone	Medium.
Waynesboro	Undulating to hilly	Sandstone, quartzite, shale, and limestone	Long.
Yellow members:		Residuum from the weathering of—	
Clarksville	Rolling to steep	Cherty limestone	Long.
Sequoia	Undulating and rolling	Interbedded shale and limestone	Long.
Needmore	Undulating and rolling	Calcareous shale	Long.
Apison	Undulating and rolling	Acid sandy shale	Long.
		Local alluvium chiefly from—	
Pace	Undulating and rolling	Cherty limestone	Long.
Leadvale	Undulating and rolling	Shale	Long.
Jefferson	Undulating to hilly	Sandstone, sandy shale, and quartzite	Long.
		General alluvium chiefly from—	
Holston	Undulating and rolling	Sandstone, and shale; some limestone in places	Long.
Sequatchie	Undulating and rolling	Sandstone, quartzite, and shale; some limestone in places.	Medium.
Gray-Brown Podzolic soils:			
		Local alluvium chiefly from—	
Hayter	Undulating	Sandstone or quartzite influenced by limestone	Medium.

[1] The factors of climate and vegetation are relatively uniform in their effect on soil formation in this county, so they do not account for the wide differences in the soils.

[2] Length of time during which the soil appears to have been developing, considering the degree of horizon differentiation as evidence.

[3] Much of the steeper parts of Tellico soils approaches the Lithosol group in characteristics.

TABLE 29.—*Classification of soil series of McMinn County, Tenn., in higher categories, and factors that have contributed to differences in soil morphology*—Continued

Great soil group and series	Relief	Parent material	Time
INTRAZONAL			
Planosols:			
		General alluvium chiefly from—	
Wolftever	Undulating	Limestone and shale	Long.
Monongahela	Nearly level and undulating	Shale and limestone	Long.
Tyler	Nearly level	Shale and sandy rock; some limestone in places	Long.
Purdy	Nearly level	Shale and sandy rock; some limestone in places	Very long.
Guthrie	Nearly level	Limestone	Variable.
AZONAL			
Alluvial soils:			
		General alluvium chiefly from—	
Staser	Nearly level	Shale, sandstone, and limestone	Short.
Hamblen	Nearly level	Shale, sandstone, and limestone	Short.
Prader [1]	Nearly level	Shale, sandstone, and limestone	Short.
Huntington	Nearly level	Limestone	Short.
Lindside	Nearly level	Limestone	Short.
Melvin [1]	Nearly level	Limestone	Short.
Bruno	Nearly level	Sandy rocks	Short.
		Local alluvium chiefly from—	
Abernathy	Nearly level	Limestone	Short.
Emory	Undulating and rolling	Limestone	Short.
Ooltewah	Nearly level	Limestone	Short.
Greendale	Undulating and rolling	Cherty limestone	Short.
Barbourville	Nearly level and undulating	Acid sandstone and shale	Short.
Cotaco	Nearly level and undulating	Acid sandstone and shale	Short.
Whitesburg	Nearly level and undulating	Calcareous shale	Short.
Neubert	Nearly level and undulating	Calcareous sandstone; shale intermixed in places	Short.
Lithosols:			
		Residuum from the weathering of—	
Dandridge	Hilly and steep	Calcareous shale	Very short to medium.
Litz	Undulating to very steep	Acid shale with some limestone interbeds	Same.
Lehew	Rolling to steep	Acid dusky red sandy shale	Same.
Ramsey	Hilly and steep	Sandstone and quartzite	Same.
Montevallo	Rolling to steep	Acid fissile shale	Same.

[1] Alluvial soils with gleylike horizons.

the red members. In some areas it appears that the yellow members developed under a vegetative cover that had a greater number of pines and a less luxuriant and somewhat different undergrowth. In relief the red members range from almost level to steep, and the yellow members from undulating to hilly. Differences among the soil profiles, however, are not due primarily to differences in slope gradient. Many can be correlated with the marked differences among the parent materials.

The red members of the Red-Yellow Podzolic great soil group are represented in McMinn County by soils of the Talbott, Decatur, Dewey, Bolton, Fullerton, Farragut, Tellico, Hermitage, Alcoa, Cumberland, Etowah, and Waynesboro series.

Decatur, Dewey, Bolton, and Farragut series.—The soils of the Decatur series have the darkest A horizon and the darkest red B horizon of the soils of McMinn County. They have developed from high-grade limestone that apparently were lower in insoluble impurities, especially silica, than those from which the Dewey, Bolton, Fullerton, and Clarksville soils were formed. The Decatur soils have a predominantly undulating to rolling surface and, compared to the Fullerton, Bolton, and Clarksville soils, occupy a valley or lowland position. They are medium to strongly acid throughout and are the most fertile soils in the county that developed in place. Although this subsoil material is finer textured and firmer than the subsoil materials of the Dewey, Bolton, Fullerton, and Clarksville series, internal drainage is adequate to promote good oxidation. The native vegetation apparently was a luxuriant deciduous forest, chiefly oak, chestnut, and hickory.

A typical profile of Decatur silt loam, undulating phase,[10] is as follows:

A_1 0 to 2 inches, very dark brown mellow silt loam; crumbles readily to soft granular aggregates; contains partly disintegrated organic matter and many small rootlets.

A_2 2 to 10 inches, dark-brown or dark reddish-brown (5YR 3/3; 10YR 4/4, dry) friable heavy silt loam with a well-developed crumb structure.

B_1 10 to 14 inches, dark-red (10YR 3/6; 2.5YR 4/6, dry) friable silty clay loam with moderate medium blocky structure.

B_2 14 to 44 inches, red to dark red (2.5YR 3/6; 4/6, dry) dense but permeable firm silty clay with moderate medium blocky

[10] Acreage too small to map separately. Included in Decatur silty clay loam, eroded undulating phase.

structure; texture is finer with depth; lower layers higher in clay content.[11]

B_3 44 to 60 inches +, red, tight, plastic clay faintly streaked with reddish yellow and yellow; breaks into irregular angular pieces.

The Dewey soils are formed from high-grade limestone and sandy dolomitic limestone that apparently were higher in insoluble impurities, particularly silica, than the rocks parent to the Decatur soils. The surface layer (A horizon) is lighter brown than that of the Decatur soils, and the subsoil (B horizon) is lighter red and a little more friable. There are some small chert fragments in the deep subsoil. The Dewey soils are also a little lower in content of organic matter and fertility than the Decatur soils. The native vegetation was very likely similar to that of the Decatur soils.

The Bolton soils resemble to some degree the Dewey and Decatur soils in color but have more sandy parent rock. The surface layer (A horizon), in most places, is more resilient or spongy and resists scouring on tillage implements. The subsoil is more friable and browner. Vesicular sandstonelike fragments are common throughout the soil mass. The Decatur and Dewey soils occupy level or valley positions in the limestone uplands, but the Bolton soils are associated with the Fullerton soils of the cherty ridges. Much of the Bolton acreage is on strong north- and east-facing slopes.

The soils of the Farragut series resemble those of the Decatur series in color, texture, and consistence of the A and B horizons. However, the B horizon of the Farragut series grades to lighter red with depth. The Farragut soils have a thinner solum than the Decatur soils and are underlain at a depth of about 30 inches by shale, chiefly acid and fissile. The material of the solum appears to be residuum from high-grade limestone. The areas occur on undulating and rolling shale valley lands and are interassociated with Sequoia and Litz soils. Though the subsoils are firm, internal drainage is adequate for good oxidation. The virgin cover was predominantly deciduous forest, chiefly oak, hickory, and chestnut.

Following is a description of a typical profile of Farragut silt loam:

A_1 0 to 2 inches, dark grayish-brown friable silt loam; contains partly disintegrated organic matter and many rootlets.

A_2 2 to 10 inches, dark-brown or dark reddish-brown (2.5 YR 2/4; 7.5YR 5/4, dry) silt loam or silty clay loam.

B_2 10 to 36 inches, dark-red (2.5YR 3/6; 5 YR 5/6, dry) dense, plastic silty clay with moderate medium blocky structure; grades to lighter red or strong brown below 24 inches.

C_2 36 inches +, mottled yellowish-red (5YR 4/6) and brownish-yellow (10YR 6/8) firm silty clay; some shale fragments; bedrock shale at a depth of 40 inches.

Fullerton series.—The soils of the Fullerton series were derived from dolomitic limestone that is moderately high in impurities, particularly silica. The silica occurs in two forms—as chert and as fine sand grains in the dolomite. Where the sand component is more abundant, loam rather than silt loam is the prevailing texture of the surface layer and the subsoil is more nearly sandy clay. The relief of the Fullerton soils is undulating to steep. The Fullerton soils have light yellowish-brown surface soils and yellowish-red firm but friable subsoils. They are not so susceptible to erosion as the Decatur, Dewey, and Talbott soils. The Fullerton soils have redder subsoils than the Clarksville soils and are less cherty and higher in fertility.

Following is a description of a profile of Fullerton cherty silt loam:

A_0 About three-fourths of an inch of partly decayed forest litter.

A_1 0 to 2 inches, dark-brown friable and weakly granular cherty silt loam mixed with organic material from tree leaves, stems, and roots; many live roots and some white moldlike growth; medium acid.

A_2 2 to 10 inches, yellowish-brown (10YR 5/4; 8/4, dry) cherty silt loam.

B_1 10 to 18 inches, yellowish-red (5YR 5/8; 7.5YR 7/6, dry) cherty silty clay loam with moderate medium blocky structure.

B_2 18 to 40 inches, red (2.5YR 5/6; 5YR 6/8, dry) firm cherty silty clay with moderate medium blocky structure; some yellow (10YR 8/6, dry) splotches, especially in lower part.

C 40 inches +, splotched or mottled yellowish-red (5YR 5/8) and yellow (10YR 8/6) firm cherty silty clay—the yellow more prominent with depth; material becomes finer textured and firmer through upper 3 or 4 feet; bedrock limestone at depths of about 20 feet.

Talbott series.—The soils of the Talbott series have heavy fine-textured B and C horizons, a characteristic that is associated with their argillaceous limestone parent rock. The fact that they are moderately shallow to bedrock and occupy smooth valley positions suggests rapid weathering of rock that had a small component of insoluble material. Because the heavy nature of the soils and the shallow depth to bedrock greatly impair internal drainage, the deeper part of the subsoil is mottled. Natural fertility is moderate, and the reaction is medium to strongly acid. Deciduous forest, chiefly oaks, was the prevailing natural vegetation.

The following is a description of a Talbott silt loam profile:

A_1 0 to 1 inch, dark-brown or very dark brown silt loam; much partly disintegrated organic matter.

A_2 1 to 6 inches, dark reddish-brown (5YR 3/3; 7.5YR 5/4, dry) friable silt loam that breaks easily into crumbly mass; this layer grades within a very few inches to layer below.

B_2 6 to 15 inches, yellowish-red (5YR 4/6; 6/6, dry) silty clay with moderate medium blocky structure; plastic when wet, hard when dry.

15 to 32 inches, yellowish-red plastic silty clay, mottled with yellow and some gray; breaks into angular pieces; mottling weak in upper part and strong in lower part; bedrock limestone at a depth of 32 inches.

Tellico series.—The soils of the Tellico series consist of material weathered from calcareous sandstone. Their subsoils have a striking red color and are friable and permeable. The A horizons are noticeably sandy and are much lighter colored than the A horizons of the soils that have similar red subsoils and have developed from limestone. Tellico landscapes are rugged; the slopes are predominantly hilly and steep. Although the modal profile is designated as zonal, much of the acreage on the stronger slopes has either a Lithosolic-Red Podzolic or a Lithosol profile. The nature of the parent rock varies, chiefly to more shaly calcareous sandstone or sandy shale. In some areas the sand component is very small and the subsoil strongly resembles that of the Decatur profile. The Tellico soils are medium in fertility and are moderately low in organic-matter content. They are medium to

[11] Mechanical analysis of a Decatur silt loam profile in Jefferson County, Tenn., shows the following clay content of the principal layers:

0 to 2 inches, 25.9 percent clay
2 to 12 inches, 37.3 percent clay
12 to 36 inches, 50.3 percent clay
36 to 72 inches, 64.4 percent clay
72 to 96 inches, 77.7 percent clay

strongly acid. Internal drainage is moderately rapid, and the solum is well oxidized.

Following is a description of a Tellico profile:

- A_1 0 to 2 inches, very dark grayish-brown (10YR 3/2) loam; partly disintegrated organic matter and many rootlets.
- A_2 2 to 8 inches (approximate), reddish-yellow (moist), light-brown (dry), loam or fine sandy loam.
- B_2 8 to 22 inches, red or dark-red, grading to lighter red with depth, friable but firm sandy clay or sandy clay loam with moderate medium blocky structure.
- C 22 to 40 inches +, red friable sandy clay loam, faintly streaked with reddish yellow or yellowish brown; yellow component becomes more prominent with depth; some weak-structured shaly fragments in the lower part; bedrock at depths of 4 to 7 feet in less sloping areas.

Hermitage series.—The soils of the Hermitage series are zonal soils developed in old local alluvium or colluvium washed chiefly from Decatur, Dewey, Bolton, and some Fullerton areas. They occupy the older, higher lying foot slopes below those soils of the upland. Emory soils occupy the younger, lower lying foot slopes and strips of alluvium along headwater drainageways.

The Hermitage profile resembles the Dewey and Decatur profiles. It differs chiefly in having a somewhat less firm subsoil. In many places, however, the Dewey and Hermitage profiles are difficult to distinguish from each other. The Hermitage soils have a moderately high content of organic matter, are fertile, and have adequate internal drainage for good oxidation. They are medium to strongly acid. For a profile description, see Hermitage silt loam, undulating phase, in the section, Descriptions of the Soils.

Alcoa series.—The soils of the Alcoa series were developed in old local alluvium or colluvium washed chiefly from Tellico soils. They occupy the older, higher lying foot slopes below the Tellico soils, whereas the Neubert soils occupy the younger, lower lying foot slopes and strips of alluvium along headwater drainageways.

The surface layers of the Alcoa soils are more uniformly brownish loam than those of the Tellico soils. In places the soil material rests on shale rather than calcareous sandstone. The thickness of the alluvium ranges from less than 2 feet to about 12, the thinner areas being on the steeper, more eroded parts. Alcoa soils are moderately fertile and are medium to strongly acid. For a profile description, see Alcoa loam, eroded undulating phase, in the section, Descriptions of the Soils.

Cumberland and Waynesboro series.—The soils of these two series developed in old general alluvium. Practically all of the parent material of the soils that developed in old general alluvium is a mixture of materials originating from limestone, sandstone, and shale, but it is thought that the Cumberland soils are more strongly influenced by limestone than the others. The Cumberland soils have a browner surface (A horizon) layer, a redder subsoil, and less sand in the solum than other soils developed from similar materials. In color, the profile of the Cumberland soils covers most of the range of the Decatur and Dewey soils. It differs from these soils chiefly in having a more friable and permeable subsoil. In some areas there is an irregular gravelly bed below the main body of the soil.

The native vegetation for Cumberland and Waynesboro soils was probably deciduous hardwood forest, chiefly oak, hickory, and chestnut.

Following are descriptions of typical profiles:

Cumberland silt loam—

- A_1 0 to 2 inches, very dark brown silt loam.
- A_2 2 to 10 inches, dark reddish-brown (2.5YR 3/4; 5YR 4/4, dry) friable silt loam.
- B_2 10 to 36 inches, dark-red (2.5YR 3/6; 2.5YR 4/6, dry) firm but friable silty clay loam to silty clay with moderate, medium blocky structure.
  36 inches +, lighter red silty clay loam or silty clay with some yellowish splotches or streaks.

Waynesboro loam—

- A_1 0 to 6 inches, dark reddish-brown (5YR 3/4; 10YR 5/4, dry) loam.
- A_2 6 to 10 inches, yellowish-red (5YR 4/8; 5YR 6/6, dry) friable clay loam; breaks into moderate to weak medium blocky fragments.
- B_2 10 to 32 inches, dark-red (2.5YR 3/6; 2.5YR 4/8, dry) firm but friable clay loam with moderate, medium blocky structure; an irregular gravelly bed between the solum and bedrock in places; bedrock limestone or shale at depths of 4 to 20 feet.

Areas of Waynesboro loam on alluvial benches along the Hiwassee River approximate the Hiwassee series (not mapped in McMinn County) because they consist in part of micaceous alluvium from the mountainous areas to the east.

Etowah series.—Soils of this series are on low or moderately low alluvial terraces along some of the larger creeks. A great part of the parent material originated from limestone, although some material from shale and sandstone are very likely intermixed. In most areas the Etowah soils are less well developed than the Cumberland soils. They have lighter brown surface soils and lighter red, more friable subsoils. They are fertile soils and have good internal drainage. They are medium acid and are not so strongly oxidized as the Cumberland soils. For a profile description, see Etowah silt loam, undulating phase, in the section, Descriptions of the Soils.

The yellow members of the Red Yellow Podzolic great soil group in McMinn County are the Clarksville, Sequoia, Needmore, Apison, Pace, Leadvale, Jefferson, Holston, and Sequatchie.

Clarksville series.—The soils of this series are closely associated geographically with the Fullerton soils. They have developed, however, from materials residual from the weathering of dolomitic limestone that is more siliceous than the limestone from which the Fullerton soils were derived. They developed under a forest that was largely deciduous, chiefly oaks.

The parent material weathered from highly siliceous dolomitic limestone may have the same effects on soil development as parent material weathered from sandstone. The highly siliceous dolomitic limestone is weathered to a great depth, and apparently the residuum has lost most of its bases. The fact that the residuum is strongly acid and has a low base-exchange capacity indicates that the siliceous portion dominates the parent material. The thick covering of disintegrated rock protects the unweathered rock and apparently partly accounts for the high positions of Clarksville soils and the resultant steepness of their slopes in many places. These soils have a greater depth to bedrock than the other soils developed in place in McMinn County. They are not so susceptible to erosion as the other soils derived from limestone. This characteristic may partially account for the thickness of weathered material over bedrock. The soils are

strongly acid to very strongly acid and very low in fertility and organic matter. From the surface downward for at least 3 or 4 feet, the texture increases in fineness and the consistence in firmness.

A representative profile is as follows:

- A_1 0 to ½ inch, black (10YR 2/1; 10YR 5/1, dry) mat of partly decomposed organic matter and a small amount of intermixed mineral soil material.
- A_2 ½ to 6 inches, light olive-brown (2.5Y 5/4; 2.5Y 7/2, dry) cherty silt loam; chert in upper 3 or 4 inches of the surface layer.
- A_3 6 to 15 inches, yellowish-brown (10YR 5/4; 2.5Y 8/4, dry) cherty silt loam; grades with depth to cherty silty clay loam with moderate medium structure.
- B_2 15 to 36 inches, predominantly yellow, firm but crumbly cherty silty clay loam grading to cherty silty clay; some yellowish-brown and reddish-yellow splotches.
- C_2 36 inches +, variegated or splotched yellow and reddish-yellow firm to very firm but crumbly cherty silty clay; breaks into irregular angular fragments; dolomitic limestone at depths ranging from 20 to 40 feet.

Sequoia and Needmore series.—The soils of the Sequoia series are developed from interbedded shale and limestone and those of the Needmore series from calcareous shale. The parent rock of some of the Sequoia soils appears to be calcareous shale that has been leached of lime to a depth of several feet. In general the shaly material directly below the solum of the Sequoia soils is acid, whereas that below the Needmore is predominantly calcareous enough to effervesce when treated with an acid. The profiles are alike in that they have a shallow solum consisting of a light-colored silt loam surface soil and a silty clay subsoil (B layer) having in most places a strongly developed blocky structure. Much of the B layer in the Sequoia soils is reddish-yellow, whereas that in the Needmore is yellowish brown. Both are moderate in fertility and medium acid throughout the A and B layers.

Following is a description of a profile of Sequoia silt loam:

- A_1 0 to 1½ inches, medium-gray silt loam; partly disintegrated organic matter and many rootlets.
- A_2 1½ to 7 inches, dark yellowish-brown (10YR 4/4; 2.5Y 7/4, dry) friable silt loam.
- B_2 7 to 16 inches, grades to yellowish-red (5YR 5/8; 5YR 6/6, dry) firm to dense silty clay with strong medium blocky structure.
- B_3 16 to 30 inches, weakly mottled yellowish-red (5YR 5/8; 5YR 6/6, dry) and yellowish-brown (10YR 8/6, dry) very firm silty clay with moderate to weak medium blocky structure.
- C_2 30 inches +, strongly mottled or variegated reddish-yellow, red, and yellow firm dense silty clay or clay; breaks into angular fragments; partly disintegrated brown and olive shale fragments that increase with depth; bedrock shale at a depth of about 36 inches.

Apison series.—The soil of this series has developed in residuum from acid sandy shale or interbedded acid sandy and argillaceous shales. The parent shale varies also in color. Much is reddish or purplish with interbeds of more yellow or brownish colors; some is predominantly grayish or yellowish brown. The color of the surface layer and sublayers of the soil reflect the color of the parent rock. Like the Sequoia and Needmore soils, the Apison soil is shallow over bedrock. The surface layer is leached. The B layer has moderate to strong blocky structure. The soil is low in content of organic matter and plant nutrients and is strongly acid. Internal drainage is good. The areas occupy valley positions adjacent to areas of Lehew-Montevallo complexes, and probably in places some of the soil material is colluvium.

Following is a description of an Apison profile where the parent rock had a large component of weak-red or purplish shale:

- A_1 0 to 1½ inches, dark-gray loam or fine sandy loam; partly decomposed organic matter and many rootlets.
- A_2 1½ to 8 inches, reddish-brown (5YR 4/3; 7.5YR 6/2, dry) friable loam.
- B_2 8 to 28 inches, weak-red (10R 4/3; 10R 6/3, dry) clay loam, weakly mottled with grayer shades; somewhat firm but friable; moderate medium blocky structure.
- C_2 28 inches +, strong-brown (7.5YR 5/8; 7.5YR 6/6, dry) hard silty clay; breaks into angular pieces; variegated yellow and weak-red blocky and fissile shale bedrock at a depth of about 32 inches.

Where the parent shale is more nearly brownish yellow, the surface layer (A horizon) is light yellowish brown, and the subsoil (B layer) is yellowish brown.

Pace, Leadvale, and Jefferson series.—These soils have developed in old colluvium and alluvium washed from adjacent slopes. The Pace soils consist of material originating from cherty dolomitic limestone, the Leadvale soils of material originating largely from shale, and the Jefferson soils of material originating chiefly from acid sandstone.

The Pace soils are closely associated with the Clarksville and Fullerton soils. Their parent materials consist chiefly of colluvium and local alluvium from these soils. They have undulating to rolling relief and were formed under a hardwood forest. Probably because of the slight relief of the Pace soils and their position below slopes where seepage water is more than normal, a pan has developed at a depth of about 24 inches. These soils are strongly acid. The A horizon of Pace silt loam consists of pale-brown or yellowish-brown very friable silt loam containing some small chert fragments and is from 8 to 12 inches thick. The B horizon consists of yellowish-brown friable moderately firm silty clay loam and is from 15 to 18 inches thick. The C horizon is yellow, mottled with gray and brown, compact silty clay loam. Black concretions are common. The Pace soils are underlain by dolomitic limestone in most places. However, some areas in valleys adjacent to the cherty ridge areas are underlain by shale.

The Leadvale soils are closely associated with the Litz and Sequoia soils. Like the other soils developed in old accumulations of colluvial and local alluvial materials, they vary in degree of profile development. However, in most places they have well-defined A, B, and C horizons. These soils are gently sloping to sloping. Because of their position and their silty parent materials, they have restricted internal drainage. They are strongly acid.

The A horizon, 8 to 10 inches thick, consists of light yellowish-brown friable silt loam. The B horizon, 10 to 12 inches thick, is yellowish-brown friable silty clay loam. A few splotches of gray occur in the lower part. The C horizon is firm compact mottled light gray and yellow silty clay loam or silty clay. Black manganese concretions are plentiful in this layer. The depth to shale is very variable and ranges from about 2 feet to 8 or 10 feet.

The Jefferson soils are on the lower slopes at the base of Starr Mountain, which is occupied by Ramsey soils. They occur also at the base of the wooded hills in the western part of the county, which are occupied by the Lehew and Montevallo soils. The coarser textured types (fine sandy loams and stony fine sandy loams) are in the Starr Mountain section. The finer textured type (loam) is associated with the Lehew-Montevallo areas in the

western part of the county. The Jefferson soils are gently sloping to hilly. Unlike the Pace and Leadvale soils, they are free of a pan and have moderate to excessive internal drainage. In most places they have developed under a mixed deciduous-coniferous forest consisting chiefly of oaks and pines. The Jefferson soils are low in bases and organic matter and are medium to strongly acid.

Following is a description of a Jefferson loam profile:

- A_1 0 to 4 inches, brown (10YR 4/3; 10YR 7/2, dry) friable loam; some partly decomposed organic matter in upper part.
- A_2 4 to 15 inches, yellowish-brown (10YR 5/6; 10YR 7/3, dry) friable loam grading to sandy clay loam.
- B_2 15 to 32 inches, reddish-yellow (7.5YR 6/8; 10YR 8/6, dry) friable firm clay loam with moderate medium blocky structure; a few strong-brown (7.5YR 5/8) mottles in lower part.
- C 32 to 50 inches, reddish-yellow (7.5 YR 6/8; 10YR 7/4, dry) firm but brittle and crumbly clay loam; mottled or splotched yellowish brown and yellowish red (5YR 5/8); breaks into angular pieces; some dark soft concretionary aggregates.

Holston and Sequatchie series.—Both of these series consist of Yellow Podzolic soils developed in mixed alluvium on stream terraces. They are light colored, are moderately well drained to well drained, and contain a noticeable amount of sand. Because their horizons are not clearly defined, the Sequatchie soils appear to be younger than the Holston. In general they have a higher content of sand. Practically all of the Sequatchie soils are on low terraces, whereas the Holston are partly on high terraces. The areas along the Hiwassee River mapped as Sequatchie and Holston soils appear to contain much micaceous material washed from areas of micaceous rocks in the mountainous region to the east and resemble the State and Altavista, respectively, to some degree.

Following are typical profiles of these two series:

Holston loam—

- A_2 0 to 8 inches, dark yellowish-brown (10YR 4/4; 10YR 6/4, dry) friable loam; surface inch in virgin areas is dark grayish brown; contains partly decomposed organic matter and many rootlets.
- B_2 8 to 28 inches, yellowish-brown (10YR 5/6; 10YR 7/4, dry) firm but friable clay loam or silty clay loam with moderate medium blocky structure.
- C_2 28 to 40 inches +, mottled yellowish-brown and yellow (small amount of gray) firm brittle clay loam; breaks into angular pieces.

Sequatchie fine sandy loam—

- A_2 0 to 10 inches, dark yellowish-brown (10YR 3/4; 10YR 6/3, dry) loose fine sandy loam.
- B_2 10 to 32 inches, dark-brown (7.5YR 4/4; 10YR 6/6, dry) firm fine sandy loam or sandy clay loam with weak medium blocky structure.
- C_2 32 inches +, brownish-yellow firm but friable sandy clay loam or sandy clay; many weak mottles; in places more sandy than layer above.

GRAY-BROWN PODZOLIC SOILS

Members of the Gray-Brown Podzolic great soil group are a zonal group of soils having a comparatively thin organic covering and organic-mineral layers over a grayish-brown leached A horizon that rests upon an illuvial B horizon. The soils are developed under deciduous forest vegetation in a warm-temperate moist climate. They have a surface covering of leaf litter, a dark thin moderately acid humus, somewhat mixed with mineral soil; a grayish-brown, crumb-structured loamy A horizon; a grayish-brown to brown A_2 horizon; and a moderately heavy nut-structured yellowish-brown to reddish-brown B horizon that becomes redder or lighter colored with depth. The total depth of the solum varies considerably but seldom exceeds 4 feet. Podzolization is the main process in the development of these soils (*8*).

The causes of the development of Gray-Brown Podzolic soils instead of Red-Yellow Podzolic soils appear to be chiefly differences in parent materials and in length of time in developing. In this county, these soils are considered younger than the Red-Yellow Podzolic soils.

The Hayter is the only Gray-Brown Podzolic soil in the county.

Hayter series.—The soil of this series has a very small aggregate area, and almost all of it is on colluvial slopes below Starr Mountain. It appears to consist of local alluvium from sandy rocks that has been influenced by limestone material or lime-bearing water. In most places the alluvium is shallow over sedentary material. The horizons are not strongly distinguished from each other. The profile is brownish. This soil is moderately high in fertility, is medium acid, and has good internal drainage.

Following is a description of a Hayter profile:

- A_2 0 to 12 inches, dark reddish-brown (5YR 3/3; 10YR 5/3, dry) friable loam.
- B_2 12 to 30 inches, reddish-brown (5YR 4/4; 7.5YR 6/4 to 5/4, dry) friable sandy clay loam.
- C_2 30 to 45 inches, yellowish-red (5YR 4/6; 5YR 6/6, dry) sticky moderately plastic clay loam; bedrock (shale in most places) at depths of 2 to 8 feet.

Intrazonal soils

The intrazonal soils in the county are in the Planosol great soil group.

PLANOSOLS

The Planosol great soil group is an intrazonal group of soils with eluviated surface horizons underlain by B horizons more strongly illuviated, cemented, or compacted than those of associated normal soils. These soils were developed upon nearly level upland surface under grass or forest vegetation in a humid or subhumid climate (*8*).

In McMinn County, the Wolftever, Monongahela, Tyler, Purdy, and Guthrie series have been designated as Planosols. They have nearly level or slightly depressional relief and decidedly impaired drainage. The B horizons of some are more dense than those of most zonal soils, but their degree of development varies.

Climatic conditions were similar to those under which the zonal soils developed, but much of the time Planosols are moister and less well aerated than the zonal soils. Vegetation on the intrazonal soils and on the zonal soils probably differed to some extent, although deciduous forests were on all of them. From the standpoint of profile development, the Planosols appear to be older than the Red-Yellow Podzolic soils, but the causes of development of older soils are not entirely known. The relief of the Planosols is such that geologic erosion would be very slow, compared to that for the Red-Yellow Podzolic soils, and this may account partly for the apparently greater manifestation of age in the Planosols. It is possible that relatively dense layers in the parent material and underlying rock strata caused slow internal drainage and a resulting abnormal compaction in most of these soils.

Wolftever series.—The soil of this series is on young, low terraces of mixed alluvium. The alluvium appears to be strongly influenced by materials originating from limestone. Relief is undulating, and internal drainage is decidedly impaired, although the upper 18 inches of the soil is free of mottling. The subsoil, or B horizon, is compact, and the underlying C horizon is dense and slowly permeable. The compactness of the subsoil may be as much a condition inherited from fine sediment as a developed characteristic. The Wolftever soil is moderate in fertility and is medium to strongly acid. It is inclined to be droughty, apparently because of slow root penetration of a lower moisture supply.

Following is a description of a Wolftever profile:

A_2 0 to 5 inches, light-brown heavy silt loam or silty clay loam.
B 5 to 20 inches, light yellowish-brown firm to very firm silty clay loam with moderate medium blocky structure; fragments hard when dry.
C_2 20 to 36 inches +, mottled brownish-yellow, gray, and brown firm silty clay loam or silty clay; breaks into firm fragments; many small dark concretions throughout this layer and some in the layers above.

Monongahela series.—The soil of this series is associated with those of the Holston series on low stream terraces of mixed alluvium. It has slower internal drainage, and is mottled within 14 to 20 inches of the surface. A compact layer or pan has developed at a depth ranging from 18 to 28 inches. The surface is nearly level to undulating. The soil is low in natural fertility and is medium to strongly acid. The native vegetation apparently was deciduous forest, chiefly oaks.

Following is a description of a representative profile:

A_p 0 to 7 inches, pale-brown (10YR 6/3; 10YR 8/2, dry) floury silt loam; in virgin areas, first inch of surface layer dark grayish-brown; many rootlets and much partly decomposed organic matter.
B_2 7 to 18 inches, yellow (2.5Y 7/6 to 10YR 7/6; 2.5Y 8/4, dry) moderately firm but friable silty clay loam; weak to moderate medium blocky structure.
B_{2m} 18 to 24 inches+, mottled light-gray and yellow silty clay; some brown specks; hard or compact, especially when dry.

Tyler, Purdy, and Guthrie series.—The Tyler, Purdy, and Guthrie are gray poorly drained soils consisting of alluvium. They differ mainly in parent material. The Purdy soils are in gentle depressions on stream terraces consisting of mixed alluvium; the Tyler soils are in gentle depressions on stream terraces consisting of local alluvium predominantly material from acid shale; and the Guthrie soils are in depressions in areas of soils developed over limestone. The soils of these series have similar profiles. Their surface soils are generally gray friable silt loam, and their subsoils are gray or mottled compact plastic silty clay. During the wetter parts of the year they are waterlogged and commonly ponded. During the more droughty periods they are dry and hard.

Following is a description of a representative profile of Purdy silt loam:

A_p 0 to 8 inches, dark yellowish-brown (10YR 3/4; 10YR 6/2, dry) floury silt loam; first inch of surface layer dark grayish brown or very dark grayish brown in virgin areas.
B_2 8 to 15 inches, pale-yellow (2.5Y 7/4; 2.5Y 8/2, dry) silt loam.
B_{2m} 15 to 36 inches, light-gray (2.5Y 7/2), mottled with reddish-yellow (5YR 6/8), very firm silty clay loam or silty clay; breaks into angular pieces when dry.

Azonal soils

The Azonal soils in the county are subdivided into two great soil groups—the Alluvial soils and Lithosols.

ALLUVIAL SOILS

These are an azonal group of soils developed from transported and relatively recently deposited material (alluvium) characterized by a weak modification (or none) of the material by soil-forming processes (*8*). In McMinn County 15 series are classified as Alluvial soils. They are on first bottoms along streams, in depressions, and on foot slopes. They have nearly level, gently sloping, and depressional relief and good to very slow internal drainage. Their main properties in common are those related to the lack of a soil profile with genetically related horizons. Soil properties are closely related to the alluvial deposit.

Alluvial soils derived from similar parent material may differ in drainage, and some differences in properties exist because of those drainage differences. They have been differentiated accordingly on the basis of properties associated with good, imperfect, and poor drainage as well as on the basis of differences in parent materials.

Huntington-Lindside-Melvin and Staser-Hamblen-Prader catenas.—The Huntington, Lindside, and Melvin series make up a group, or catena, of Alluvial soils that consist of general alluvium derived chiefly from moderate-grade to high-grade limestone. The Huntington soils have moderate, the Lindside slow, and the Melvin very slow internal drainage.

The Staser, Hamblen, and Prader series make up a catena of Alluvial soils that consist of general alluvium derived chiefly from shale and sandstone but influenced to some extent by limestone. They range from medium acid to neutral. The Staser soils have moderate, the Hamblen moderately slow, and the Prader slow internal drainge. Because of their similarities and because of the difficulty in recognizing the extent of influence of parent rocks on the recent alluvial plains, the two series of similar drainage in each of these catenas were mapped together in most cases as undifferentiated types. These undifferentiated types were Staser and Huntington silt loams, Hamblen and Lindside silt loams, Hamblen and Lindside silty clay loams, and Prader and Melvin silty clay loams. The one soil type mapped singly in these series was Hamblen fine sandy loam. It is assumed that limestone is not the predominant parent rock of this soil in any area, and that all of it originated from the more sandy rocks, which in this area are calcareous sandstone.

The soils of all six of these series are moderate to high in fertility and are not very acid. Much of the acreage has a very recent deposition of alluvium that has been laid down since a large part of the surrounding landscape was brought under cultivation. All of these soils are friable and permeable except parts of the very poorly drained members. These poorly drained parts in many places have a very firm or tight subsoil.

Following are descriptions of soils representing the three degrees of drainage:

Huntington silt loam—
0 to 20 inches, dark reddish-brown (5YR 3/4; 10YR 6/4, dry) friable silt loam.
20 to 48 inches +, somewhat lighter brown silt loam with some mottlings below a depth of 32 inches; in some areas

a darker brown layer (representing an old surface layer) occurs at depths of 8 to 20 inches.

Lindside silt loam—
0 to 16 inches, dark yellowish-brown (10YR 4/4; 10YR 6/4, dry) friable silt loam.
16 to 24 inches, dark yellowish-brown (10YR 4/4; 10YR 6/4, dry) friable silt loam, mottled with gray.
24 to 36 inches +, mottled gray and brown silty clay loam; many dark concretions.

Melvin silty clay loam—
0 to 20 inches, mottled gray, brown, and yellow friable silt loam or silty clay loam; crushed mass is brown (10YR 5/3; 10YR 7/3, dry).
20 to 40 inches, gray, firm, moderately plastic when wet, sticky silty clay loam or silty clay, mottled with brown and yellow; many dark concretions.

Bruno series.—In this series is the very sandy Alluvial soil of the county. It is light colored and free of mottling to a depth of several feet. The rate of percolation is very rapid, and the content of plant nutrients is very low. The soil is subject to overflow, and most of the acreage is on natural levees along the larger streams. The profile lacks structure, but a weak color profile has developed in many places.

Following is a description of a representative profile of Bruno loamy fine sand:

0 to 18 inches, very pale brown loamy fine sand with very weak, coarse blocky structure; some partly decomposed organic matter in first half inch of surface layer.
18 to 36 inches +, pale-yellow loose fine sand, grading towards white with depth.

Emory and Abernathy series.—The soils of the Emory and Abernathy series are well drained and consist of local alluvium derived from moderate-grade to high-grade limestone. A very great part of the material has been washed from adjacent areas of Decatur, Dewey, and Farragut soils, and the redder areas of Fullerton soils. The Emory and Abernathy soils have little profile development, although like the Alluvial soils consisting of general alluvium, some areas have a layer of very young alluvium over a somewhat older surface soil. Emory and Abernathy soils are predominantly brownish or reddish, permeable, and free of mottlings to a depth of 30 or 40 inches. Their profiles resemble that of Huntington silt loam. They differ from each other in position. The Abernathy soil is in closed depressions, such as sinkholes, and is subject to temporary flooding during the winter and during heavy rains. The Emory soils are along the drainageways, chiefly in areas of Decatur, Dewey, Farragut, and Fullerton soils. They have a very gentle slope and enough outlets or drainageways to accommodate runoff except during periods of very heavy precipitation.

Ooltewah series.—The soil of this series is a young Alluvial soil consisting of material derived from limestone, chiefly of moderate to high grade. It has slow internal drainage, and most of the acreage is in sinkholes associated with Dewey, Decatur, Farragut, and Talbott soils. The profile is similar to that of Lindside silt loam in most respects. The first 12 to 20 inches is brown silt loam. Below this is mottled yellow, gray, and brown silt loam or silty clay loam. This soil is less subject to overflow than Lindside silt loam, although it is commonly inundated temporarily during winter and periods of heavy rains. It is moderate to high in fertility, has a moderate content of organic matter, and is medium to slightly acid.

Greendale series.—The soils of this series consist of local alluvium derived from cherty dolomitic limestone. The material has been washed from areas of Clarksville and Fullerton soils. The Greendale are young soils, although in many places profile characteristics have developed to some degree. These soils are light colored and permeable and have a variable but small amount of chert throughout. The more cherty areas consist chiefly of material from the Clarksville soils. Internal drainage ranges from moderately slow to somewhat excessive. The fertility and content of organic matter are moderate to low, and the reaction is medium acid. In a few places a partly cemented cherty matrix occurs at depths ranging from 18 to 28 inches.

Following is a description of a representative profile of Greendale silt loam:

0 to 36 inches, dark-brown (10YR 4/3; 10YR 7/3, dry) friable silt loam.
36 to 48 inches, weakly mottled yellowish-brown (10YR 5/4; 10YR 7/4, dry) and dark yellowish-brown (10YR 3/4; 10YR 6/3, dry) silty clay loam; friable but somewhat sticky when wet.

In places the material below a depth of 14 inches is yellowish-brown firm but friable silty clay loam with weak medium blocky structure.

Neubert, Barbourville, Cotaco, and Whitesburg series.—These series consist of young soils on local alluvium washed from sandstone or shale, or from both. The Neubert soils are formed from material washed from Tellico soils that was derived from Tellico sandstone. The parent material of the Barbourville soil was washed chiefly from Jefferson, Ramsey, Lehew, and Montevallo soils and was derived from coarse-textured rocks, sandstone, and sandy shale. The parent rock of Cotaco loam is the same as for the Barbourville soil; that of Cotaco silt loam is fine textured acid shale. The Whitesburg soil is formed from material washed chiefly from Dandridge soils that was derived from calcareous shale. The Neubert and the Barbourville soils have moderate internal drainage, and the Cotaco and Whitesburg have slow internal drainage. All but the Neubert and some of the Barbourville soils are light colored, medium to strongly acid, and moderate to low in organic matter. The Neubert soil has a reddish color.

All of these soils have little structural development, and parts of some areas have weakly developed profiles. For profile descriptions of members of these series, see the section, Descriptions of the Soils.

LITHOSOLS

These are an azonal group of soils having no clearly expressed soil morphology and consisting of a freshly and imperfectly weathered mass of rock fragments. They are largely confined to areas with rolling to steep relief (*8*). These soils occupy positions where geologic erosion is relatively rapid and consist of materials that are relatively easily eroded. As a result, material is removed from the surface or so mixed that soil-forming processes have not acted on it long enough to produce well-defined genetic soil properties. As mapped, these soils may include small areas of zonal soils.

In McMinn County the Lithosols are of the Dandridge, Litz, Lehew, Ramsey, and Montevallo series. There are

also some areas of man-made Lithosols, such as the miscellaneous land types classified as Gullied land. These are areas in which most of the solum has been lost by accelerated erosion induced by man's activities.

Dandridge, Litz, Montevallo, Lehew, and Ramsey series.—The soils of these series are shallow to bedrock. The Dandridge soils were derived from calcareous shale, the Litz from acid shale with irregular thin lenses of limestone, the Montevallo from acid fissile shale, the Lehew from dusky red or purplish acid sandy shale, and the Ramsey from acid sandstone or quartzite.

In general the slope gradient of the soils of these series exceeds 12 or 15 percent, except for the Litz series and for narrow strips of the others that are on ridge crests flanked by steep slopes. Much of the Litz acreage has a slope ranging from 2 to 12 percent.

All of these soils have only weakly developed color and structure profiles. They are not high in organic matter, and their fertility is moderate to low. Internal drainage is moderate, except for the Ramsey, which has rapid internal drainage. The Dandridge is predominantly calcareous, although in many places the reaction is medium acid. The native forest cover for these soils was mainly deciduous hardwoods, chiefly oak, hickory, and chestnut. Some pines were intermixed, except on the soils of the Dandridge and Litz series. For profile descriptions of these soils, see the section, Descriptions of the Soils.

Soil Survey Methods and Definitions

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

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

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

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

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

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

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

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

Soil type.—Soils similar in kind, thickness, and arrangement of soil layers are classified as one soil type.

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

The soil phase (or the soil type if it has not been subdivided) is the unit shown on the soil map. It is the unit that has the narrowest range of characteristics. Use and management practices, therefore, can be specified more easily than for soil series or yet broader groups that contain more variation.

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

As an example of soil classification, consider the Fullerton series of McMinn County and adjacent counties. This series is made up of five soil types, all of which are subdivided into phases, as follows:

Series	Type	Phase
Fullerton	Cherty silt loam	Eroded hilly phase
		Eroded rolling phase
		Eroded steep phase
		Hilly phase
		Rolling phase
		Steep phase
	Cherty silty clay loam	Severely eroded hilly phase
		Severely eroded rolling phase
		Severely eroded steep phase
	Loam	Eroded hilly phase
		Eroded rolling phase
		Eroded undulating phase
		Hilly phase
		Rolling phase
	Silt loam	Eroded hilly phase
		Eroded rolling phase
		Eroded undulating phase
		Hilly phase
		Rolling phase
	Silty clay loam	Severely eroded hilly phase
		Severely eroded rolling phase

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

acid shale material; Rockland, limestone material; and Stony hilly land, Talbott soil material.

Soil complex.—When two or more soils are so intricately associated in small areas that it is not feasible to show them separately on the soil map, they are mapped together and called a soil complex. This is the case with the Lehew and Montevallo loams in McMinn County.

Literature Cited

(1) AUTEN, J. T.
1933. POROSITY AND WATER CONTROL OF FOREST SOILS. Jour. Agr. Research 46: 997–1014, illus.

(2) DEN UYL, D., AND DAY, R. K.
1934. WOODLAND CARRYING CAPACITIES AND GRAZING INJURY STUDIES. Ind. Agri. Exp. Sta. Bul. 391, 12 pp., illus.

(3) FENNEMAN, N. M.
1938. PHYSIOGRAPHY OF EASTERN UNITED STATES. 714 pp., illus. New York and London.

(4) POND, W. F.
1933. GEOLOGIC MAP OF TENNESSEE. Div. Geol. Tenn. Dept. Ed.

(5) SMITH, GUY D., RIECKEN, F. F., AND SMITH, R. S.
1947. CASS COUNTY SOILS. Ill. Univ. Agr. Expt. Sta. Soil Rpt. 71, 47 pp. illus.

(6) TENNESSEE VALLEY AUTHORITY, DEPARTMENT OF FORESTRY RELATIONS.
1941. FORESTRY DATA FOR THE TENNESSEE VALLEY. Pt. 1, Forestry Bul. No. 3, 155 pp., illus.

(7) ———
1942. FORESTRY DATA FOR THE TENNESSEE VALLEY. Pt. III, Forestry Bul. No. 5, 25 pp.

(8) UNITED STATES DEPARTMENT OF AGRICULTURE.
1938. SOILS AND MEN. U. S. Dept. Agr. Yearbook 1938, 1232 pp., illus.

(9) ———
1944. INVESTIGATIONS IN EROSION CONTROL AND RECLAMATION OF ERODED LAND. U. S. Dept. Agr. Tech. Bul. 873, 66 pp., illus.

(10) ———
1945. INVESTIGATIONS IN EROSION CONTROL AND RECLAMATION OF ERODED LAND. U. S. Dept. Agr. Tech. Bul. 888, 95 pp., illus.

U. S. GOVERNMENT PRINTING OFFICE: 1957

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C.

SOILS OF McMINN COUNTY, TENNESSEE: SUMMARY

Map symbol	Soil	Management group [1]	Slope range	Surface soil color [2]
			Percent	
Ae	Alcoa loam: Eroded undulating phase	6	2–5	Dark reddish-brown
Ad	Eroded rolling phase	8	5–12	Dark reddish-brown
Ab	Alcoa clay loam, severely eroded rolling phase	16	5–12	Dark red
Ac	Alcoa loam, eroded hilly phase	17	12–25	Dark reddish brown
Aa	Alcoa clay loam, severely eroded hilly phase	19	12–25	Dark red
Af	Apison loam, eroded rolling phase	11	5–12	Grayish brown
Ba	Barbourville loam	4	1–3	Yellowish brown
	Bolton silt loam:			
Bb	Eroded hilly phase	17	12–25	Reddish brown
Bc	Eroded rolling phase	8	3–12	Reddish brown
Bd	Eroded steep phase	19	25–40	Reddish brown
Be	Bruno loamy fine sand	2	1–3	Very pale brown
	Clarksville cherty silt loam:			
Ce	Rolling phase	14	3–12	Light gray
Cb	Eroded rolling phase	14	5–12	Grayish yellow
Cd	Hilly phase	18	12–25	Light gray
Ca	Eroded hilly phase	18	12–25	Grayish yellow
Cf	Steep phase	23	25–50	Light gray
Cc	Eroded steep phase	23	25–50	Grayish yellow
Cg	Cotaco loam	4	1–3	Grayish brown
Ch	Cotaco silt loam	4	1–3	Dark yellowish brown
Ck	Cumberland silt loam, undulating phase	6	2–5	Dark brown
	Cumberland silty clay loam:			
Cm	Eroded undulating phase	6	2–5	Reddish brown
Cl	Eroded rolling phase	8	5–12	Reddish brown
Dd	Dandridge silt loam, hilly phase	21	12–25	Dark grayish brown
Da	Dandridge shaly silt loam, eroded hilly phase	21	12–25	Light brownish yellow
Df	Dandridge silt loam, steep phase	21	25–60	Dark grayish brown

See footnotes at end of table.

OF IMPORTANT CHARACTERISTICS

Subsoil		Depth of profile [3]	Parent rock or parent material	General drainage
Color [2]	Consistence			
		Feet		
Dark red	Firm, friable	3–12	Local alluvium colluvium originating from calcareous sandstone; some shale intermixed in places.	Well drained.
Dark red	Firm, friable	2–8	Local alluvium colluvium originating from calcareous sandstone; some shale intermixed in places.	Somewhat excessively drained.
Dark red	Firm, friable	2–5	Local alluvium colluvium originating from calcareous sandstone; some shale intermixed in places.	Somewhat excessively drained.
Dark red	Firm, friable	2–7	Local alluvium originating from calcareous sandstone; some shale intermixed in places.	Somewhat excessively drained.
Dark red	Firm, friable	1½–4	Local alluvium originating from calcareous sandstone; some shale intermixed in places.	Excessively drained.
Yellowish brown	Firm, friable	2–3	Interbedded acid sandstone, sandy shale, and shale.	Well drained.
Brown	Friable	2½–7	Local alluvium originating from acid sandy rocks.	Moderately well drained to well drained.
Red	Firm, friable	15–30	Sandy dolomitic limestone	Well drained.
Red	Firm, friable	15–30	Sandy dolomitic limestone	Well drained.
Red	Firm, friable	10–25	Sandy dolomitic limestone	Well drained.
Pale yellow	Loose	5–16	General alluvium originating from sandy rocks.	Excessively drained.
Yellow	Firm, friable	20–40	Cherty dolomitic limestone	Well drained.
Yellow	Firm, friable	20–40	Cherty dolomitic limestone	Well drained.
Yellow	Firm, friable	15–35	Cherty dolomitic limestone	Somewhat excessively drained.
Yellow	Firm, friable	15–35	Cherty dolomitic limestone	Somewhat excessively drained.
Yellow	Firm, friable	12–30	Cherty dolomitic limestone	Excessively drained.
Yellow	Firm, friable	12–30	Cherty dolomitic limestone	Excessively drained.
Mottled	Friable	2–7	Local alluvium originating predominantly from sandy rocks.	Imperfectly to poorly drained.
Mottled	Friable	3–7	Local alluvium originating predominantly from acid shale.	Imperfectly to poorly drained.
Red	Firm, friable	4–20	Mixed general alluvium, much originating from limestone.	Well drained.
Red	Firm, friable	4–20	Mixed general alluvium, much originating from limestone.	Well drained.
Red	Firm, friable	3–16	Mixed general alluvium, much originating from limestone.	Somewhat excessively drained.
Brownish yellow	Friable	1–4	Calcareous shale	Somewhat excessively drained.
Brownish yellow	Friable	1–3	Calcareous shale	Somewhat excessively drained.
Brownish yellow	Friable	1–2	Calcareous shale	Excessively drained.

SOILS OF McMINN COUNTY, TENNESSEE: SUMMARY

Map symbol	Soil	Management group [1]	Slope range	Surface soil color [2]
			Percent	
Dc	Dandridge shaly silt loam, eroded steep phase	21	25–60	Light brownish yellow
De	Dandridge silt loam, rolling phase	11	5–12	Dark grayish brown
Db	Dandridge shaly silt loam, eroded rolling phase	11	5–12	Yellowish gray
	Decatur silty clay loam:			
Dm	Eroded undulating phase	7	2–5	Dark reddish brown
Dl	Eroded rolling phase	9	5–12	Dark reddish brown
Dh	Decatur silty clay, severely eroded rolling phase	16	5–12	Dark red
Dk	Decatur silty clay loam, eroded hilly phase	17	12–25	Dark reddish brown
Dg	Decatur silty clay, severely eroded hilly phase	19	12–25	Dark red
	Dewey silty clay loam:			
Dv	Eroded undulating phase	7	2–5	Brown
Du	Eroded rolling phase	9	5–12	Reddish brown
Ds	Dewey silty clay, severely eroded rolling phase	16	5–12	Red
Dt	Dewey silty clay loam, eroded hilly phase	17	12–25	Reddish brown
Dr	Dewey silty clay, severely eroded hilly phase	19	12–25	Red
	Dewey clay loam:			
Dp	Eroded undulating phase	7	2–5	Brown
Do	Eroded rolling phase	9	5–12	Reddish brown
Dn	Eroded hilly phase	17	12–25	Reddish brown
Eb	Emory silt loam	3	1–7	Dark brown
Ea	Emory and Abernathy silt loams	3	0–2	Dark brown
Ed	Etowah silt loam, undulating phase	6	2–5	Brown
Ec	Etowah silty clay loam, eroded rolling phase	8	5–12	Yellowish brown
	Farragut silty clay loam:			
Fb	Eroded undulating phase	7	2–5	Dark brown
Fa	Eroded rolling phase	9	5–12	Reddish brown
	Fullerton silt loam:			
Fx	Rolling phase	14	5–12	Very pale brown
Fu	Eroded rolling phase	14	5–12	Brownish yellow
Fz	Fullerton silty clay loam, severely eroded rolling phase	20	5–12	Yellowish red
	Fullerton silt loam:			
Fv	Eroded undulating phase	10	2–5	Very pale brown
Fw	Hilly phase	18	12–25	Very pale brown
Ft	Eroded hilly phase	18	12–25	Brownish yellow
Fy	Fullerton silty clay loam, severely eroded hilly phase	20	12–25	Yellowish red
	Fullerton loam:			
Fs	Rolling phase	14	5–12	Very pale brown
Fo	Eroded rolling phase	14	5–12	Yellowish brown

See footnotes at end of table.

OF IMPORTANT CHARACTERISTICS—Continued

Subsoil		Depth of profile [3]	Parent rock or parent material	General drainage
Color [2]	Consistence			
		Feet		
Brownish yellow	Friable	1–2	Calcareous shale	Excessively drained.
Brownish yellow	Friable	1–4	Calcareous shale	Somewhat excessively drained.
Brownish yellow	Friable	1–3	Calcareous shale	Somewhat excessively drained.
Dark red	Firm	6–18	High-grade limestone	Well drained.
Dark red	Firm	4–14	High-grade limestone	Somewhat excessively drained.
Dark red	Firm	2–12	High-grade limestone	Somewhat excessively drained.
Dark red	Firm	4–12	High-grade limestone	Excessively drained.
Dark red	Firm	3–12	High-grade limestone	Excessively drained.
Red	Firm, friable	8–20	High-grade limestone	Well drained.
Red	Firm, friable	7–18	High-grade limestone	Somewhat excessively drained.
Red	Firm, friable	5–16	High-grade limestone	Somewhat excessively drained.
Red	Firm, friable	5–16	High-grade limestone	Somewhat excessively drained.
Red	Firm, friable	4–15	High-grade limestone	Excessively drained.
Red	Firm, friable	8–20	High-grade sandy limestone	Well drained.
Red	Firm, friable	7–18	High-grade sandy limestone	Somewhat excessively drained.
Red	Firm, friable	5–16	High-grade sandy limestone	Somewhat excessively drained.
Dark reddish brown	Friable	5–12	Local alluvium originating from high-grade limestone.	Well drained.
Reddish brown	Friable	5–15	Local alluvium originating from high-grade limestone.	Moderately well drained.
Reddish yellow	Friable	4–15	Mixed general alluvium, much originating from limestone.	Well drained.
Reddish yellow	Friable	3–10	Mixed general alluvium, much originating from limestone.	Somewhat excessively drained.
Red	Firm	1½–4	Limestone and shale	Well drained.
Red	Firm	1½–3	Limestone and shale	Somewhat excessively drained.
Yellowish red	Firm, friable	16–40	Moderately cherty dolomitic limestone	Somewhat excessively drained.
Yellowish red	Firm, friable	16–40	Moderately cherty dolomitic limestone	Somewhat excessively drained.
Yellowish red	Firm, friable	15–35	Moderately cherty dolomitic limestone	Somewhat excessively drained.
Yellowish red	Firm, friable	16–40	Moderately cherty dolomitic limestone	Well drained.
Yellowish red	Firm, friable	10–25	Moderately cherty dolomitic limestone	Somewhat excessively drained.
Yellowish red	Firm, friable	10–25	Moderately cherty dolomitic limestone	Somewhat excessively drained.
Yellowish red	Firm, friable	10–25	Moderately cherty dolomitic limestone	Excessively drained.
Yellowish red	Firm, friable	16–40	Moderately cherty dolomitic limestone	Well drained.
Yellowish red	Firm, friable	16–40	Moderately cherty dolomitic limestone	Well drained.

SOILS OF McMINN COUNTY, TENNESSEE: SUMMARY

Map symbol	Soil	Management group [1]	Slope range	Surface soil color [2]
	Fullerton loam:—Continued		*Percent*	
Fp	Eroded undulating phase	10	2–5	Yellowish brown
Fr	Hilly phase	18	12–25	Very pale brown
Fn	Eroded hilly phase	18	10–25	Yellowish brown
	Fullerton cherty silt loam:			
Fg	Rolling phase	14	2–12	Very pale brown
Fd	Eroded rolling phase	14	5–12	Yellowish brown
Fl	Fullerton cherty silty clay loam, severely eroded rolling phase	20	5–12	Yellowish red
	Fullerton cherty silt loam:			
Ff	Hilly phase	18	12–25	Very pale brown
Fc	Eroded hilly phase	18	12–25	Yellowish brown
Fk	Fullerton cherty silty clay loam, severely eroded hilly phase	23	12–25	Yellowish red
	Fullerton cherty silt loam:			
Fh	Steep phase	23	25–60	Very pale brown
Fe	Eroded steep phase	23	25–60	Yellowish brown
Fm	Fullerton cherty silty clay loam, severely eroded steep phase	23	25–60	Yellowish red
Ga	Greendale cherty silt loam	4	1–7	Very pale brown
Gb	Greendale silt loam	4	1–7	Very pale brown
	Gullied land:			
Gc	Acid shale material	23	5–40	Variegated yellow, yellowish red and strong brown.
Gd	Calcareous shale and sandstone materials	23	5–75	Some reddish, some brownish yellow.
Ge	Limestone material	23	5–40	Reddish yellow to dark red
Gf	Guthrie silt loam	22	0–2	Light gray
Hc	Hamblen fine sandy loam	1	0–2	Reddish brown or brownish gray
Ha	Hamblen and Lindside silt loams	1	0–2	Brown
Hb	Hamblen and Lindside silty clay loams	1	0–2	Brown
Hd	Hayter loam, undulating phase	6	2–12	Dark brown
	Hermitage silt loam:			
Hf	Undulating phase	6	2–5	Brown
He	Eroded rolling phase	8	5–15	Dark red
	Holston loam:			
Hk	Undulating phase	10	2–5	Light yellowish brown

See footnotes at end of table.

OF IMPORTANT CHARACTERISTICS—Continued

Subsoil		Depth of profile [3]	Parent rock or parent material	General drainage
Color [2]	Consistence			
		Feet		
Yellowish red	Firm, friable	16–40	Moderately cherty dolomitic limestone	Well drained.
Yellowish red	Firm, friable	10–25	Moderately cherty dolomitic limestone	Somewhat excessively drained.
Yellowish red	Firm, friable	10–25	Moderately cherty dolomitic limestone	Somewhat excessively drained.
Yellowish red	Firm, friable	16–40	Moderately cherty dolomitic limestone	Well drained.
Yellowish red	Firm, friable	16–40	Moderately cherty dolomitic limestone	Somewhat excessively drained.
Yellowish red	Firm, friable	15–35	Moderately cherty dolomitic limestone	Somewhat excessively drained.
Yellowish red	Firm, friable	10–25	Moderately cherty dolomitic limestone	Somewhat excessively drained.
Yellowish red	Firm, friable	10–25	Moderately cherty dolomitic limestone	Somewhat excessively drained.
Yellowish red	Firm, friable	10–25	Moderately cherty dolomitic limestone	Excessively drained.
Yellowish red	Firm, friable	5–25	Moderately cherty dolomitic limestone	Excessively drained.
Yellowish red	Firm, friable	5–25	Moderately cherty dolomitic limestone	Excessively drained.
Yellowish red	Firm, friable	5–25	Moderately cherty dolomitic limestone	Excessively drained.
Dark yellowish brown	Friable	5–12	Local alluvium originating from cherty limestone.	Well drained.
Dark yellowish brown	Friable	5–12	Local alluvium originating from cherty limestone.	Well drained.
	Friable, shaly	0–2	Acid shale	Somewhat excessively drained.
	Firm, friable	0–4	Calcareous shale and calcareous sandstone	Somewhat excessively drained.
	Firm, friable	0–15	Limestone	Somewhat excessively drained.
Mottled light gray, yellow, and brown.	Very firm	5–20	Local alluvium originating from limestone	Poorly drained.
Mottled gray, brown, and in places reddish brown.	Friable	4–15	Mixed general alluvium originating chiefly from sandy rocks.	Imperfectly drained.
Mottled brown, yellow, and gray.	Friable	4–15	Mixed general alluvium originating chiefly from limestone and shale.	Imperfectly drained.
Mottled brown, yellow, and gray.	Firm, friable	4–15	Mixed general alluvium originating chiefly from limestone and shale.	Imperfectly drained.
Reddish brown	Friable	2–8	Local alluvium originating chiefly from sandy stone and quartzite.	Well drained.
Dark red	Firm, friable	5–12	Local alluvium originating chiefly from high-grade limestone.	Well drained.
Dark red	Firm, friable	4–10	Local alluvium originating chiefly from high-grade limestone.	Well drained.
Yellowish brown	Firm, friable	5–15	Mixed general alluvium originating from sandstone and shale; some limestone in places.	Moderately well drained.

SOILS OF McMINN COUNTY, TENNESSEE: SUMMARY

Map symbol	Soil	Management group [1]	Slope range	Surface soil color [2]
	Holston loam—Continued		*Percent*	
Hh	Eroded undulating phase	10	2–5	Light yellowish brown
Hg	Eroded rolling phase	15	5–12	Light yellowish brown
Ja	Jefferson fine sandy loam, rolling phase	15	3–12	Yellowish gray
	Jefferson stony fine sandy loam:			
Jf	Rolling phase	15	3–12	Yellowish gray
Je	Hilly phase	18	12–25	Yellowish gray
	Jefferson loam:			
Jd	Undulating phase	10	2–5	Yellowish gray
Jc	Rolling phase	15	5–12	Yellowish gray
Jb	Eroded rolling phase	15	5–12	Grayish yellow
	Leadvale silt loam:			
Lb	Undulating phase	5	2–5	Light yellowish brown
La	Eroded rolling phase	15	5–12	Grayish yellow
Lc	Lehew-Montevallo loams, hilly phases	23	12–25	Light reddish brown and grayish yellow.
	Lehew-Montevallo shaly loams:			
Le	Eroded hilly phases	23	12–25	Light reddish brown and brownish yellow.
Lh	Steep phases	23	25–60	Light reddish brown and grayish yellow.
Lg	Eroded steep phases	23	25–60	Light reddish brown and brownish yellow.
Ld	Lehew-Montevallo loams, rolling phases	11	5–12	Light reddish brown and grayish yellow.
Lf	Lehew-Montevallo shaly loams, eroded rolling phases	11	5–12	Light reddish brown and brownish yellow.
Lv	Litz silt loam, rolling phase	11	5–12	Light yellowish brown
	Litz shaly silt loam:			
Lr	Eroded rolling phase	21	5–12	Brownish yellow
Lt	Eroded undulating phase	11	2–5	Brownish yellow
Lu	Litz silt loam, hilly phase	21	12–25	Light yellowish brown
Lp	Litz shaly silt loam, eroded hilly phase	21	12–25	Brownish yellow
Lw	Litz silt loam, steep phase	23	25–60	Light yellowish brown
Ls	Litz shaly silt loam, eroded steep phase	23	25–60	Brownish yellow

See footnotes at end of table.

OF IMPORTANT CHARACTERISTICS—Continued

Subsoil		Depth of profile [3]	Parent rock or parent material	General drainage
Color [2]	Consistence			
		Feet		
Yellowish brown	Firm, friable	5–15	Mixed general alluvium originating from sandstone and shale; some limestone in places.	Moderately well drained.
Yellowish brown	Firm, friable	2–12	Mixed general alluvium originating from sandstone and shale; some limestone in places.	Somewhat excessively drained.
Yellow	Friable	2–12	Local alluvium originating from quartzite and sandstone; some slaty material.	Well drained.
Yellow	Friable	2–12	Local alluvium originating from quartzite and sandstone; some slaty material.	Well drained.
Yellow	Friable	2–10	Local alluvium originating from quartzite and sandstone; some slaty material.	Well drained.
Yellow grading to mottled	Firm, friable	2–10	Local alluvium originating from quartzite and sandstone; some slaty material.	Well drained.
Yellow grading to mottled	Firm, friable	2–8	Local alluvium originating from quartzite and sandstone; some slaty material.	Well drained.
Yellow grading to mottled	Firm, friable	2–8	Local alluvium originating from quartzite and sandstone; some slaty material.	Well drained.
Yellowish brown, weakly mottled.	Firm, friable	3–10	Local alluvium originating chiefly from shale	Moderately well drained.
Yellowish brown, weakly mottled.	Firm, friable	2–8	Local alluvium originating chiefly from shale	Somewhat excessively drained.
Reddish brown and brownish yellow.	Friable	1–2	Acid sandy and fine-grained shale	Somewhat excessively drained.
Reddish brown and brownish yellow.	Friable	1–2	Acid sandy and fine-grained shale	Somewhat excessively drained.
Reddish brown and brownish yellow.	Friable	½–1½	Acid sandy and fine-grained shale	Excessively drained.
Reddish brown and brownish yellow.	Friable	½–1½	Acid sandy and fine-grained shale	Excessively drained.
Reddish brown and brownish yellow.	Friable	1–2	Acid sandy and fine-grained shale	Somewhat excessively drained.
Reddish brown and brownish yellow.	Friable	1–2	Acid sandy and fine-grained shale	Somewhat excessively drained.
Brownish yellow	Friable	1–2	Acid fissile shale with limestone lenses	Somewhat excessively drained.
Brownish yellow	Friable	½–1½	Acid fissile shale with limestone lenses	Somewhat excessively drained.
Brownish yellow	Friable	1–2	Acid fissile shale with limestone lenses	Well drained.
Brownish yellow	Friable	½–1½	Acid fissile shale with limestone lenses	Somewhat excessively drained.
Brownish yellow	Friable	½–1	Acid fissile shale with limestone lenses	Excessively drained.
Brownish yellow	Friable	½–1	Acid fissile shale with limestone lenses	Excessively drained.
Brownish yellow	Friable	½–1	Acid fissile shale with limestone lenses	Excessively drained.

SOILS OF McMINN COUNTY, TENNESSEE: SUMMARY

Map symbol	Soil	Management group [1]	Slope range	Surface soil color [2]
	Litz loam:		*Percent*	
Lk	Eroded hilly phase	21	12–25	Grayish brown
Lo	Steep phase	23	25–60	Grayish brown
Lm	Eroded steep phase	23	25–60	Brownish yellow
Ln	Rolling phase	11	5–12	Grayish brown
Ll	Eroded rolling phase	11	5–12	Grayish brown
Lx	Litz stony loam, very steep phase	23	60+	Grayish brown
	Mines, pits, and dumps	23	1–60+	
Ma	Monongahela silt loam	5	1–4	Very pale brown
	Needmore silty clay loam:			
Nb	Eroded undulating phase	12	2–5	Pale yellow
Na	Eroded rolling phase	13	5–12	Grayish yellow
Nc	Severely eroded rolling phase	21	5–12	Yellowish brown
Nd	Neubert loam	3	1–5	Reddish brown
Oa	Ooltewah silt loam	3	0–2	Brown
	Pace silt loam:			
Pc	Undulating phase	5	1–5	Brown
Pb	Rolling phase	15	5–12	Brown
Pa	Eroded rolling phase	15	5–12	Grayish yellow
Pd	Prader and Melvin silty clay loams	22	0–2	Mottled brown and gray
Pe	Purdy and Tyler silt loams	22	0–2	Pale yellow
	Ramsey stony fine sandy loam:			
Rb	Steep phase	23	25–60	Pale brown
Ra	Hilly phase	23	12–25	Pale brown
Rc	Rockland, limestone material	23	3–50	
	Sequatchie fine sandy loam:			
Sb	Undulating phase	6	1–5	Yellowish brown
Sa	Eroded rolling phase	8	5–20	Yellowish brown
Sd	Sequoia silt loam, undulating phase	12	2–5	Light brown
Sf	Sequoia silty clay loam, eroded undulating phase	12	2–5	Brownish yellow
Sc	Sequoia silt loam, rolling phase	13	5–12	Light brown
Se	Sequoia silty clay loam, eroded rolling phase	13	5–12	Brownish yellow

See footnotes at end of table.

OF IMPORTANT CHARACTERISTICS—Continued

Subsoil		Depth of profile [3]	Parent rock or parent material	General drainage
Color [2]	Consistence			
		Feet		
Strong brown	Firm, friable	1½–4	Calcareous sandy shale or sandstone	Somewhat excessively drained.
Strong brown	Firm, friable	1–2	Calcareous sandy shale or sandstone	Excessively drained.
Strong brown	Firm, friable	½–2	Calcareous sandy shale or sandstone	Excessively drained.
Strong brown	Firm, friable	1½–4	Calcareous sandy shale or sandstone	Somewhat excessively drained.
Strong brown	Firm, friable	1–4	Calcareous sandy shale or sandstone	Somewhat excessively drained.
Strong brown	Firm, friable	0–1	Calcareous sandy shale or sandstone	Excessively drained.
Yellow	Firm, friable	5–15	Mixed general alluvium originating from shale, limestone, and sandstone.	Imperfectly drained.
Yellowish brown	Firm, friable	1½–4	Calcareous shale	Moderately well drained.
Yellowish brown	Firm, friable	1–3	Calcareous shale	Somewhat excessively drained.
Yellowish brown	Firm, friable	½–2	Calcareous shale	Somewhat excessively drained.
Reddish brown	Friable	3–12	Local alluvium originating from calcareous sandstone or shaly sandstone.	Moderately well to well drained.
Mottled brown, gray, and yellow.	Friable	5–12	Local alluvium originating chiefly from limestone.	Somewhat poorly drained.
Yellowish brown	Firm, friable	5–12	Local alluvium originating from cherty limestone.	Moderately well drained.
Yellowish brown	Firm, friable	4–10	Local alluvium originating from cherty limestone.	Somewhat excessively drained.
Yellowish brown	Firm, friable	4–10	Local alluvium originating from cherty limestone.	Somewhat excessively drained.
Gray, mottled with yellow	Firm	4–15	Mixed general alluvium originating chiefly from shale and limestone.	Poorly drained.
Mottled gray and yellow	Very firm	4–12	Mixed general alluvium originating chiefly from shale, sandy rock, and limestone.	Poorly drained.
Strong brown	Friable	½–2½	Sandstone and quartzite	Excessively drained.
Strong brown	Friable	1–3	Sandstone and quartzite	Somewhat excessively drained.
			Limestone	Excessively drained.
Yellowish brown	Friable	5–5	Mixed general alluvium originating chiefly from sandstone, quartzite, and shale.	Well drained.
Yellowish brown	Friable	3–12	Mixed general alluvium originating chiefly from sandstone, quartzite, and shale; some limestone in places.	Somewhat excessively drained.
Reddish yellow	Firm, friable	2½–4	Interbedded shale and limestone	Moderately well drained.
Reddish yellow	Firm, friable	2–3	Interbedded shale and limestone	Moderately well drained.
Reddish yellow	Firm, friable	2–2½	Interbedded shale and limestone	Somewhat excessively drained.
Reddish yellow	Firm, friable	1½–2	Interbedded shale and limestone	Somewhat excessively drained.

SOILS OF McMINN COUNTY, TENNESSEE: SUMMARY

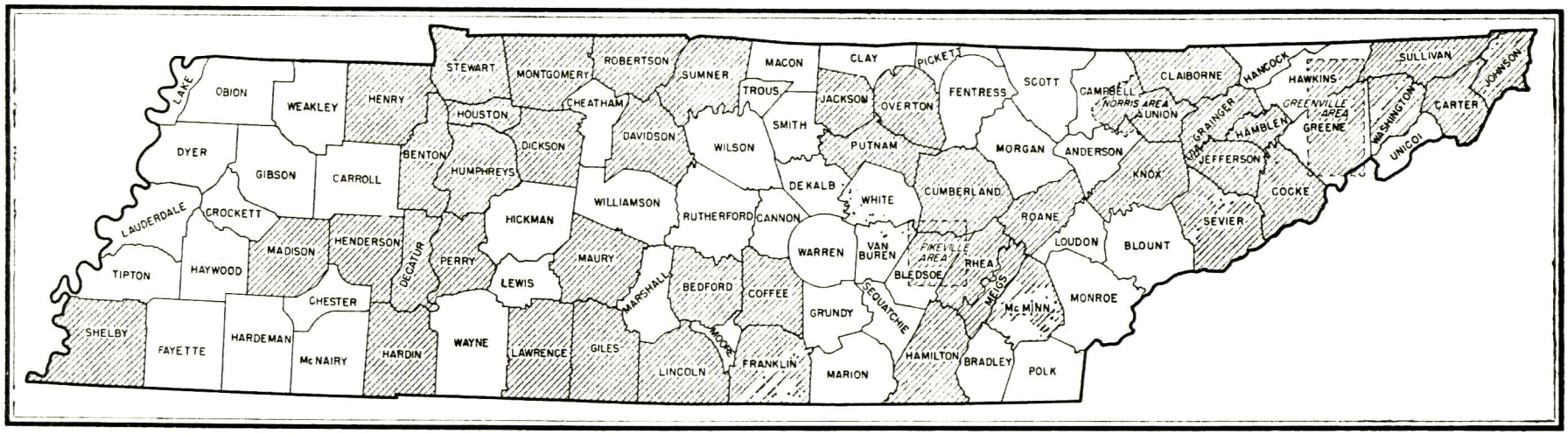
Map symbol	Soil	Management group [1]	Slope range	Surface soil color [2]
			Percent	
Sg	Sequoia silty clay, severely eroded rolling phase	21	5–12	Reddish yellow
Sh	Staser and Huntington silt loams	1	0–2	Dark brown
Sn	Stony very steep land, Ramsey soil material	23	60+	Brownish yellow
Sl	Stony rolling land, Talbott soil material	19	2–12	Reddish brown
Sk	Stony hilly land, Talbott soil material	19	12–25	Reddish brown
Sm	Stony steep land, Talbott soil material	23	25+	Reddish brown
	Talbott silty clay loam:			
Tb	Eroded undulating phase	12	2–5	Dark reddish brown
Ta	Eroded rolling phase	13	5–12	Dark reddish brown
Tc	Talbott silty clay, severely eroded rolling phase	19	5–12	Yellowish red
	Tellico loam:			
Tl	Rolling phase	8	5–12	Reddish yellow
Th	Eroded rolling phase	8	5–12	Reddish yellow
Te	Tellico clay loam, severely eroded rolling phase	16	5–12	Red
	Tellico loam:			
Tk	Hilly phase	18	12–25	Reddish yellow
Tg	Eroded hilly phase	18	12–25	Yellowish red
Td	Tellico clay loam, severely eroded hilly phase	19	12–25	Red
Tm	Tellico loam, steep phase	23	25–60	Reddish yellow
Tf	Tellico clay loam, severely eroded steep phase	23	25–60	Red
Tn	Tellico stony loam, very steep phase	23	60+	Reddish brown
	Waynesboro loam:			
Wc	Eroded undulating phase	6	2–5	Reddish yellow
Wb	Eroded rolling phase	8	5–12	Reddish yellow
Wa	Eroded hilly phase	17	12–25	Reddish yellow
Wd	Whitesburg silt loam	4	1–4	Brown
We	Wolftever silt loam, undulating phase	7	1–5	Light brown

[1] For descriptions and discussion of these groups, see section Use and Management of Soils. These groups are represented on the detailed soil map by distinguishing colors.

OF IMPORTANT CHARACTERISTICS—Continued

Subsoil		Depth of profile [3]	Parent rock or parent material	General drainage
Color [2]	Consistence			
		Feet		
Variegated reddish yellow, yellow, and gray.	Firm, friable	½–1½	Interbedded shale and limestone	Somewhat excessively drained.
Brown	Friable	4–15	General alluvium originating chiefly from limestone and shale.	Well drained.
Brownish yellow	Friable	0–1	Sandstone and quartzite	Excessively drained.
Reddish yellow	Very firm	0–3	Limestone	Somewhat excessively drained.
Reddish yellow	Very firm	0–2½	Limestone	Excessively drained.
Reddish yellow	Very firm	0–2	Limestone	Excessively drained.
Yellowish red	Very firm	2½–8	Argillaceous limestone	Moderately well drained to well drained.
Yellowish red	Very firm	2–6	Argillaceous limestone	Moderately well drained to well drained.
Yellowish red	Very firm	1½–5	Argillaceous limestone	Moderately well drained to well drained.
Red or reddish brown	Friable	3–7	Calcareous sandstone; shale intermixed in places.	Well drained.
Red or reddish brown	Friable	3–7	Calcareous sandstone; shale intermixed in places.	Somewhat excessively drained.
Red or reddish brown	Friable	1½–5	Calcareous sandstone; shale intermixed in places.	Somewhat excessively drained.
Red or reddish brown	Friable	2–6	Calcareous sandstone; shale intermixed in places.	Somewhat excessively drained.
Red or reddish brown	Friable	2–6	Calcareous sandstone; shale intermixed in places.	Somewhat excessively drained.
Red or reddish brown	Friable	1–4	Calcareous sandstone; shale intermixed in places.	Somewhat excessively drained.
Red or reddish brown	Friable	1–3	Calcareous sandstone; shale intermixed in places.	Excessively drained.
Red or reddish brown	Friable	1–3	Calcareous sandstone; shale intermixed in places.	Excessively drained.
Red or reddish brown	Friable	0–2	Calcareous sandstone; shale intermixed in places.	Excessively drained.
Red	Firm, friable	4–20	Mixed old general alluvium originating from shale, limestone, and sandstone.	Well drained.
Red	Firm, friable	3–16	Mixed old general alluvium originating from shale, limestone, and sandstone.	Somewhat excessively drained.
Red	Firm, friable	2–8	Mixed old general alluvium originating from shale, limestone, and sandstone.	Somewhat excessively drained.
Pale yellow, mottled with gray and brown.	Friable	3–8	Young local alluvium originating from calcareous shale.	Somewhat poorly drained.
Light yellowish brown grading to mottled.	Firm	4–12	Mixed general alluvium originating from limestone, shale, and sandstone.	Moderately well drained.

[2] Moderately moist.
[3] This is the depth of the soil to bedrock or to distinctly different material as a bed of gravel.



Areas surveyed in Tennessee shown by shading.

Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at (800) 457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

Nondiscrimination Statement

Nondiscrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the basis of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, whether all or part of an individual's income is derived from any public assistance program, or protected genetic information. The Department prohibits discrimination in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases apply to all programs and/or employment activities.)

To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (http://directives.sc.egov.usda.gov/33081.wba) within 45 days of the date of the alleged discriminatory act, event, or personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for

program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

Supplemental Nutrition Assistance Program

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (http://directives.sc.egov.usda.gov/33085.wba).

All Other Inquiries

For information not pertaining to civil rights, please refer to the listing of the USDA Agencies and Offices (http://directives.sc.egov.usda.gov/33086.wba).