

# SOIL SURVEY

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## **Fauquier County Virginia**

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**UNITED STATES DEPARTMENT OF AGRICULTURE**  
Soil Conservation Service  
In cooperation with the  
**VIRGINIA AGRICULTURAL EXPERIMENT STATION**

# How To Use THE SOIL SURVEY REPORT

**F**ARMERS who have worked with their soils for a long time know about the soil differences on their farms, perhaps also the differences on 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. One way for farmers to avoid some of the risk and uncertainty involved in trying new production methods and new varieties of plants is to learn what kinds of soils they have so that they can compare them with the soils on which new developments have proved successful.

## SOILS OF A PARTICULAR FARM

The soil map accompanies the soil survey report. To find what soils are on any farm or other land, it is necessary first to locate this land on the map. This is easily done by using roads, streams, villages, dwellings, and other landmarks to locate the boundaries of the land.

Each kind of soil mapped within the farm or tract is marked on the map with a symbol. For example, all the areas marked Fe are Fauquier silt loam, undulating phase. The color in which the soil area is shown on the map will be the same as the color indicated on the map legend for the particular type of soil. If you want information on the Fauquier soil turn to the section, Soil Types, Phases, and Land Types, and find Fauquier silt loam, undulating phase. In this section you will find statements concerning the characteristics of this soil, its principal uses, and some of the uses to which it is suited.

Suppose, for instance, you wish to know how productive Fauquier silt loam, undulating phase, is. You will find the soil listed in the left-hand column of table 6. Opposite the name you can read the yields for the different crops grown on it.

If, in addition, you wish to know what uses and management practices are recommended for Fauquier silt loam, undulating phase, read what is said about this soil in the section, Soil Types, Phases, and Land Types. Refer also to the section, Use and Management of Important Groups of Soils, where the soils suited to the same uses and management practices are grouped together. Find management group 2, page 137, which contains Fauquier silt loam, undulating phase. Read what is said about crops, crop rotations, liming, fertilizing, erosion control methods, and other management practices for this group of soils. What you read will apply to Fauquier silt loam, undulating phase.

## SOILS OF THE COUNTY AS A WHOLE

A general idea of the soils of the county is given in the first part of the section, The Soils of Fauquier County, which tells about the principal kinds of soils, where they are found, and how they are related to one another. After reading this section, study the soil map and notice how the different kinds of soils tend to be arranged in different parts of the county. These patterns are likely to be associated with well-recognized differences in type of farming, land use, and land use problems.

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; churches, hospitals, and schools; availability of roads, railroads, electric services, and water supplies; the industries of the county; and cities, villages, and population characteristics. Information about all these will be found in the section, General Nature of the Area, and in the section, General Information About the Agriculture of Fauquier County.

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, Morphology and Genesis of Soils.

This publication on the soil survey of Fauquier County, Va., is a cooperative contribution from the—

SOIL CONSERVATION SERVICE

and the

VIRGINIA AGRICULTURAL EXPERIMENT STATION

# SOIL SURVEY OF FAUQUIER COUNTY, VIRGINIA<sup>1</sup>

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<sup>1</sup> This report was prepared by James H. Petro, Virginia Agricultural Experiment Station, Blacksburg, Virginia.

<sup>2</sup> Field work 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 on November 15, 1952.

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**T**HE northwestern part of Fauquier County is in the Blue Ridge Mountains and outlying foothills but the greater part is in the Piedmont Plateau province. Agriculture is the most important enterprise and is somewhat diversified. Hay, corn, and wheat are the principal crops. The dairy industry has become very important because of the proximity of the county to the milk market of Washington, D. C. Beef cattle are also raised and are sold mainly in Lancaster, Jersey City, and Baltimore. Many large estates are located in Fauquier County, and some saddle horses and racehorses are bred. Hay is the most extensively grown crop. About one-third of the county is in forests, and lumbering is second to agriculture in importance. To provide a basis for the best uses of the land, this soil survey was made by the United States Department of Agriculture and the Virginia Agricultural Experiment Station. Field work was completed in 1944, and, unless otherwise specifically indicated, all statements in this report refer to conditions in the county at that time.

## GENERAL NATURE OF THE AREA

### LOCATION AND EXTENT

Fauquier County is in the northeastern part of Virginia (fig. 1). Warrenton, the county seat, is approximately in the geographical center of the county. It is about 45 miles southwest of Washington, D. C., and 85 miles northwest of Richmond, Va.

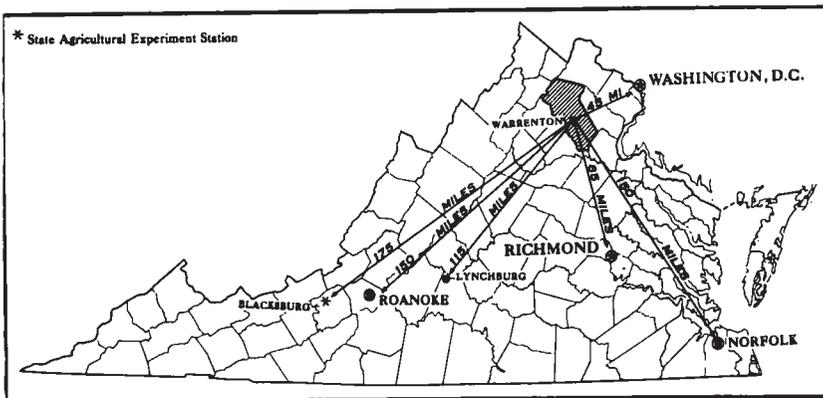


FIGURE 1.—Location of Fauquier County in Virginia.

The county is roughly rectangular in shape. It is about 45 miles in length and extends in a northwest-southeast direction. The width ranges from about 6 miles at the southernmost tip to about 22 in the northern part. The Rappahannock River forms the southwestern and parts of the western and southern boundaries and separates the county from Rappahannock and Culpeper Counties. The main crest of the Blue Ridge Mountains separates the county from Clarke and Warren Counties on the west and northwest boundaries. The county is bounded by Loudon County on the north and Prince William County on the east. The main crest of the Bull Run Mountains forms a part of this eastern boundary. Deep Run is a part of the southeastern boundary between Fauquier and Stafford Counties. The total land area is 667 square miles, or 426,880 acres.

#### PHYSIOGRAPHY, RELIEF, AND DRAINAGE

Fauquier County lies in both the Blue Ridge and Piedmont Plateau physiographic provinces (1).<sup>3</sup> The Piedmont Plateau, which is subdivided into the rolling to steep Piedmont Plateau, undulating to rolling Triassic Plain of the Piedmont Plateau, and undulating to rolling Piedmont Plateau, comprises about 80 percent of the county (fig. 2).

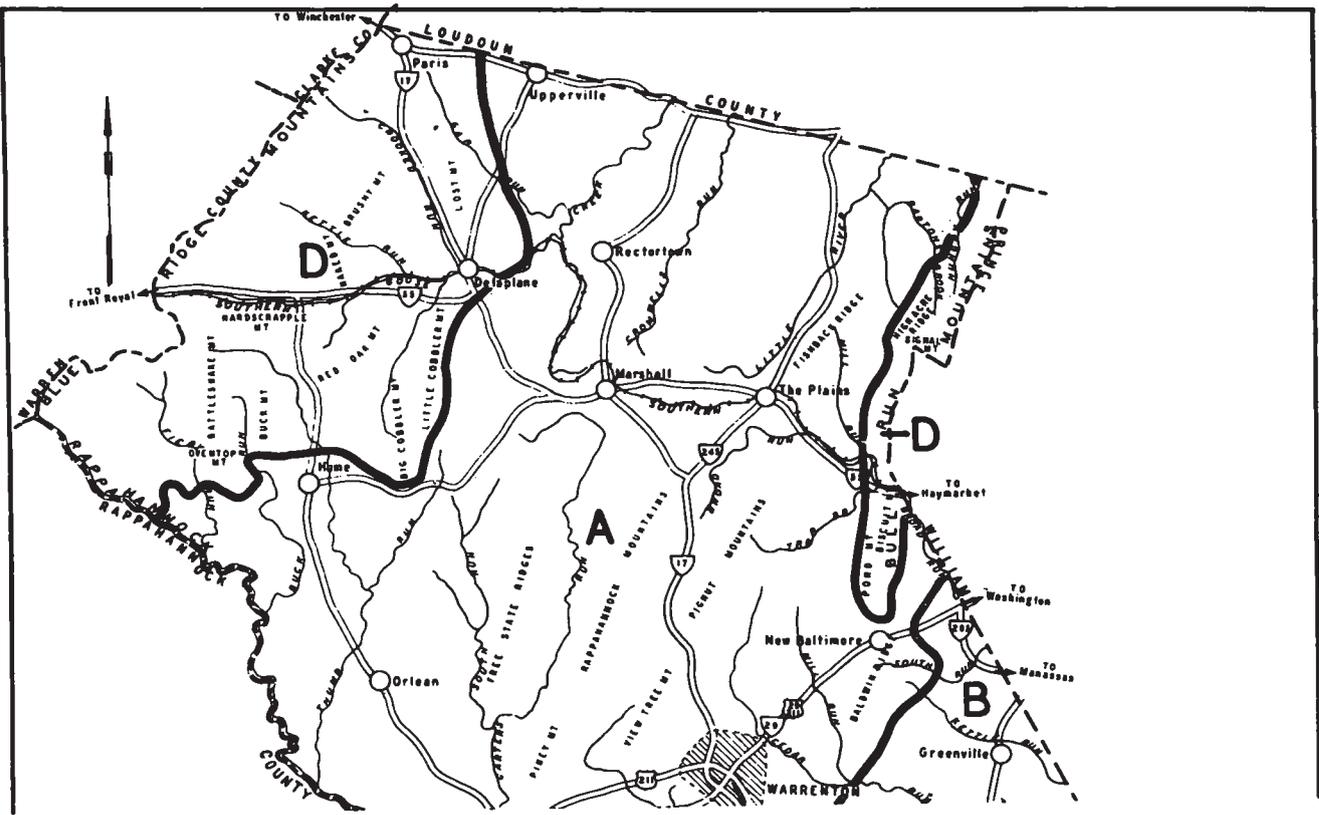
The Blue Ridge province in the northwestern part of the county includes the Blue Ridge Mountains and outlying mountains or foothills. The foothills include Lost, Brushy, Naked, Red Oak, Little Cobbler, Big Cobbler, Rattlesnake, Buck, Oventop, and Hardscrapple Mountains. The Bull Run Mountains, which are in the northeastern part of the county, are included in the Blue Ridge province by Jonas (2). The Blue Ridge is underlain either by greenstone or granitic rocks, and the foothills largely by granite locally containing dikes of greenstone or diabase. North of Thorofare Gap the Bull Run Mountains are underlain by fine-grained white quartzite. To the south, however, they are underlain by quartzite on their eastern and greenstone on their western slope, the two rocks joining roughly at the mountain crest. The terrain of the area is chiefly steep and rugged: large rocks are strewn over and protrude from most of the mountain slopes. Comparatively narrow, rolling to hilly uplands underlain chiefly by granitic rocks occur between the foothills. Elevation of the mountains range from the 900 feet above sea level on Lost Mountain<sup>4</sup> to the 2,375 feet on High Knob<sup>5</sup> of the main Blue Ridge. The valleys are of considerably lower elevation. The Rappahannock River, Goose Creek, and many of their tributaries originate in the Blue Ridge and its foothills.

The rolling to steep and the undulating to rolling divisions of the Piedmont Plateau are old plains that are highly dissected by numerous small streams flowing in narrow winding valleys. This dissection has given the uplands a predominantly rolling relief. The rolling to steep division extends from the Blue Ridge foothills southeastward to the Catoclin Mountain border fault that separates it from the Triassic

<sup>3</sup> Italic numbers in parentheses refer to Literature cited, p. 231.

<sup>4</sup> Data from U. S. Army, Corps of Engineers, topographic map of Upperville Quadrangle, Virginia.

<sup>5</sup> Data from U. S. Geological Survey topographic map of Front Royal Quadrangle, Virginia.





Plain. In general the rolling to steep Piedmont Plateau is rougher and more completely dissected and has stronger relief, steeper valley slopes, and narrower divides than the undulating to rolling division.

There are four sets of recognizable land surfaces in the rolling to steep division: (1) Old undulating to rolling divides of the upland level, (2) hilly to steeply sloping sides of monadnock hills or mountains rising above the general upland level, (3) recent hilly to steep valley slopes produced by deep stream dissection of the upland level, and (4) flood plains along the larger streams. The occasional hills, locally called mountains, rise above the upland level and considerably increase the local relief. Their character and distribution indicate that they exist largely because they are at the headwaters of streams and not because they are composed of rock more resistant to weathering and erosion. For the most part, they represent partially dismembered mountainous ridges rather than more completely dismembered isolated peaks. The Rappahannock and Pignut Mountains composed of greenstone and the monadnock hills and ridges composed of arkosic quartzite in the "Free State" region are outstanding examples. These range in elevation from 900 to 1,250 feet above sea level. Most of the rolling to steep Piedmont Plateau is underlain by greenstone, but there are sizable areas of granite and arkosic quartzite and minor areas of mica schist and gneiss.

The undulating to rolling division of the Piedmont Plateau is in the extreme southern part of the county immediately south of the Triassic Plain. It is rather highly dissected by numerous streams and is characterized by broad undulating to rolling divides that are remnants of an old upland level. The underlying rocks consist of sericite schist and gneiss and high-quartz granite or quartz monzonite. The general elevation of the plateau ranges from 300 to 400 feet above sea level, and the general relief is not so rough as in the rolling to steep division. There are no mountains or hills, but numerous small streams flowing into the Rappahannock River have cut back into this upland. Steep V-shaped valley slopes along the lower stream courses have resulted.

The undulating to rolling Triassic Plain of the Piedmont Plateau is a relatively level lowland belt extending across the southern part of the county from northeast to southwest. It is approximately 18 miles wide in its northernmost end and 9 miles wide in its southernmost. Its area is 156.9 square miles (4). It lies between the rolling to steep and the undulating to rolling divisions of the Piedmont Plateau. Rocks of Triassic age underlie the area. These consist of red shale and sandstone that locally have been intruded by dikes and sills of diabase. The Triassic Plain has a lower average elevation than the adjoining Piedmont and slopes gently to the southwest from an altitude of 400 feet near Greenville to about 300 feet near Remington. The relief is predominantly level to undulating, but it is rolling to hilly along the streams and drains. Low but prominent ridges from 10 to 50 feet above the plain occur where the diabase dikes and sills crop out. In general the courses of streams, which have a dendritic drainage pattern, have been but slightly affected by the diabase ridges.

The northern and eastern parts of the county are drained by streams that are a part of the Potomac River drainage system. Goose Creek, the master stream in the northern part, rises in the

Blue Ridge near Manassas Gap. Its tributaries include Crooked Gap, Kettle, Cromwells, Burned Mill, and Hungry Runs and Little River. The eastern part is drained by Broad and Cedar Runs. Broad Run heads in the Rappahannock Mountains and cuts through the Bull Run Mountains at Thorofare Gap. Little Bull, Catharpin, Mill, and South Runs and Trap Branch are its principal tributaries. Cedar Run, which includes Cat Tail, Turkey, Owl, Elk, Dorrels, Town, and Licking Runs among its tributaries, heads in the Pignut Mountains and leaves the county southeast of Catlett.

The Rappahannock River rises in the Blue Ridge and drains the west-central and southwestern parts of the county. Fiery, Buck, Thumb, Kirby, Carters, Barrows, Great, Tinpot, Marsh, Summerduck, and Deep Runs are its principal tributaries.

Drainage is well developed in the Blue Ridge province and in both upland divisions of the Piedmont Plateau province. Except for the larger streams, the drains generally flow parallel to the ridges and form a more or less trellislike drainage pattern. However, in the Triassic Plain, the streams have treelike drainage patterns on the rather uniformly resistant Triassic rocks. Here the streams flow through comparatively smooth and undissected terrain; the streams in the other regions flow through the fairly wide and deep valleys they have dissected. Natural surface drainage is good throughout most of the county. The only section that does not have adequate surface drainage at all times is the Triassic Plain.

#### WATER SUPPLIES

Springs, wells, and streams provide an adequate supply of water for people and livestock except during periods of prolonged drought. The small streams, shallow wells, and branch-head springs are the first sources of supply to go dry during periods of limited rainfall, but the branch-bottom springs and deeper wells usually maintain their flow during such periods.

According to Furcron (1), ground water conditions are favorable in quartzite, granite, mica schist, slate, sericite schist, and gneiss rocks. These are good water-bearing rocks because they are porous and contain many bedding planes and joints in which water may collect. Springs are abundant. As a good supply of water can be obtained at relatively shallow depths, the wells are more commonly dug than drilled. The water is soft and excellent for most purposes.

Very few continuously producing springs and generally the most deeply drilled wells are in the greenstone area. The greenstone rocks have low porosity, and the cracks and joints are scarce and widely spaced. Wells usually have to be drilled, and failures are common.

Springs are rather uncommon in the Triassic Plain area underlain by shale, sandstone, or diabase. The comparatively flat and undissected relief offers little means for the ground water to flow to the surface. As ground water is close to the surface, the wells are usually dug rather than drilled. In contrast to shale or sandstone, Triassic diabase contains many more open joints and is a better water-producing rock. Its water is soft in comparison to the usual hard water of wells in shale or sandstone.

### VEGETATION

Practically all of the county was originally covered with oak-hickory forest and a scattering of redcedar and scrub, shortleaf, and white pines. The best quality long-bodied timber grew on the most productive soils, which were cleared first for agriculture. Except for the small amount used to build the necessary farm buildings, the timber from these early clearings was rolled into piles and burned.

At present, about one-third of the county area is in forest. Little virgin timber remains, and the forest stands consist of two general types: (1) Cut-over hardwood or hardwood-pine forests, and (2) nearly pure stands of scrub or shortleaf pine on once cleared land. The present hardwood forest is largely in the Stony land (basic rock)-Catoclin; Stony land (acidic rock)-Brandywine; Louisburg-Stony land-Culpeper; and Iredell-Mecklenburg soil associations. These areas contain soils and land types that are largely unsuited to crops or pasture because of stoniness, shallowness, low fertility, steepness of slope, unfavorable drainage, or various combinations of these and other undesirable features. The second-growth stands of nearly pure pine are on a wide variety of soils that were once cleared but so impoverished by misuse and erosion that they were subsequently abandoned. The pine forests are largely in the Nason-Tatum soil association.

### CLIMATE

The climate of Fauquier County, Va., is of the humid continental type with rather hot humid summers, rigorous but not too severe winters, and an average annual rainfall of about 41 inches.

Rather uniform climatic conditions prevail over the entire county. The climate is not greatly modified by oceanic influences, although the Blue Ridge Mountains and other mountains within the county appear to cause some local differences. The climatic data compiled at the United States Weather Bureau station at Culpeper, Va., which is about 24 miles southwest of Warrenton, are believed to be fairly representative of climatic conditions in this county. Unless otherwise indicated, all figures subsequently quoted in this section are taken from data compiled at the Culpeper station. The normal monthly, seasonal, and annual temperature and precipitation at this station are given in table 1.

The difference between the average summer and winter temperatures is only 38° F. Temperatures of 90° to 95° in summer and 15° to 20° in winter are frequent extremes. The winters, although generally somewhat mild and open, are characterized by frequent cold spells of short duration. However, they allow for outdoor work the greater part of the time. Winter temperatures above 70° or below 10° are uncommon. Although winter crops frequently receive little protection from a snow blanket, wheat, barley, rye, hardy winter oats, alfalfa, and some winter vegetables such as parsnips, turnips, and kale are grown on the well-drained soils with but little danger of winterkilling. However, freezes are frequently severe enough to injure leguminous cover crops and winter grains on poorly drained soils and in some cases on soils with fine-textured surface layers. The summers are generally rather hot and sometimes humid. Summer temperatures above 100° or below 60° are uncommon. Spring and especially autumn are generally pleasant.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Culpeper, Culpeper County, Va.*

[Elevation, 475 feet]

Month	Temperature <sup>1</sup>			Precipitation <sup>2</sup>			
	Average	Absolute maximum	Absolute minimum	Average	Total for the driest year	Total for the wettest year	Average snowfall
	° F.	° F.	° F.	Inches	Inches	Inches	Inches
December	36.2	75	-7	3.12	2.75	6.43	4.3
January	34.7	74	-20	2.99	2.70	3.97	7.6
February	36.3	84	-8	2.40	1.65	1.20	4.2
Winter	35.7	84	-20	8.51	7.10	11.60	16.1
March	45.3	89	6	2.90	2.45	3.54	3.6
April	54.4	96	14	3.36	2.40	4.95	3.9
May	64.1	96	31	4.02	2.72	8.14	0
Spring	54.6	96	6	10.28	7.57	16.63	7.5
June	72.0	100	39	4.97	2.40	4.85	0
July	75.7	104	48	3.82	.92	5.43	0
August	73.9	101	48	4.80	.41	7.74	0
Summer	73.9	104	39	13.59	3.73	18.02	0
September	68.1	97	35	3.24	1.04	3.71	0
October	56.3	92	23	3.16	.19	4.27	.2
November	45.2	80	9	2.49	1.34	5.46	.3
Fall	56.5	97	9	8.89	2.57	13.44	.5
Year	55.2	104	-20	41.27	<sup>3</sup> 20.97	<sup>4</sup> 59.69	24.1

<sup>1</sup> Average temperature based on 44-year record, 1909 to 1952; highest and lowest temperature from 22-year record, 1909 to 1930.

<sup>2</sup> Average precipitation based on 46-year record, 1907 to 1952; wettest and driest on 46-year record, 1907 to 1952; snowfall on 24-year record, 1907 to 1930.

<sup>3</sup> 1930.

<sup>4</sup> 1948.

The average frost-free period is 189 days—extending from April 17 the average date of the latest killing frost, to October 23, the average date of the earliest. The United States Weather Bureau substation at Leeds Manor, Fauquier County, reports a slightly longer average frost-free period. This station is situated in the Blue Ridge physiographic province a short distance from the main Blue Ridge. In either case, the long frost-free period allows ample time for the growing and maturing of all the common field crops. Killing frosts have occurred as late as April 30 and as early as September 26. Generally, the grazing period extends from about April 15 to as late as the last of November. During the winter months, most farmers allow their beef cattle to run in pastures or feed lots except during the severest

weather. They keep their milk cows in barns most of the time during winter.

The more mountainous sections of the Blue Ridge and rolling to steep Piedmont upland physiographic divisions of the county appear to have more variable climatic conditions than the rest of the county. These sections probably have a slightly lower average temperature, more frequent showers, and a greater total amount of rain and snow than elsewhere in the county. These conditions are explained by the greater general elevation; proximity and relationship to the main Blue Ridge; lay of the land, including direction of slope; and the effect of relief on air drainage.

Frosts frequently occur in valleys and depressions when vegetation on the ridges and higher slopes shows no effect of frost; the early fall and late spring frosts invariably do greater injury in the lower lying positions. Damage to fruit trees from early spring frost is less frequent on ridgetops and north-facing slopes, where spring growth of orchard trees is more retarded, than on the lower lying areas or south-facing slopes. Although injury to fruit trees from late spring frosts may occur in other parts of the county, this is uncommon. Practically all of the commercial orchards in the county are therefore located either on the mountain foothills in the Blue Ridge province or on the higher mountains or hills of the rolling to steep Piedmont province.

The average annual rainfall in the county is fairly well distributed throughout the year, although the greatest amount occurs in spring and summer when rains are most needed by growing crops and pastures. Normally there are no prolonged dry and wet periods, but occasionally dry periods prevail long enough in summer and early fall to affect the yields of crops and pastures, especially on the shallow Louisburg, Hazel, Catocin, Brandywine, and Penn soils. Pastures on all the well-drained upland soils of the county generally show a marked decrease in growth during the latter part of July, in August, and in the early part of September. It is also true that crops such as corn, which is highly sensitive to soil moisture conditions, are greatly dependent upon sufficient rainfall during the month of July and the first part of August for satisfactory growth. The success or failure of the corn crop, especially on the more shallow droughty soils, is in a large measure determined by the amount and distribution of rainfall during this period.

Although rainfall may be relatively abundant and well distributed during the summer months, the soil-moisture supply of the well-drained upland soils may be seriously low because of the high prevailing temperatures. Such temperatures promote heavy loss of soil moisture through evaporation from the ground surface and transpiration by plants. This is especially true on the shallow upland soils. Because of the character of the summer rains, runoff is usually greater during the summer months. Thus, most of the well-drained upland soils may actually absorb less moisture during this period. Because all of the well-drained upland soils differ in their capacity to absorb and retain moisture, their soil-moisture conditions vary even under identical rainfall.

On the other hand, wet periods sometimes prevail long enough during the growing season to injure crops, particularly on soils such

as the Croton, Kelly, Calverton, and Belvoir that are not well drained. Spring rainy periods often delay the preparation of the seedbed and the planting of crops, especially on the low-lying soils of the Triassic Plain and the heavy-textured soils such as the Davidson, Iredell, and Hiwassee, which have exacting moisture conditions for tillage. In addition, short wet spells during the summer may handicap other farming operations, such as harvesting small grains and cultivating corn.

Most of the creek and river bottoms are flooded one or more times during spring and summer, when the heaviest precipitation usually occurs. Occasionally the Rappahannock River overflows its banks with serious local results. Much of the winter precipitation comes in the form of snow or slow drizzling rains. Spring and fall rains are usually slow and steady, but heavy downpours, showers, and thunderstorms are frequent in summer, late in spring, and early in autumn.

According to the Weather Bureau records at Lynchburg, which presumably would apply to this county, since both regions are similarly situated with respect to the Blue Ridge Mountains, the prevailing winds are northwesterly. Winds of high velocities are infrequent. The average hourly wind velocity is greatest in the spring, but averages about 6 miles an hour over the year. Hailstorms and tornadoes, infrequent and not severe, generally affect only small areas. The slow, steady, and prolonged rains usually come from the east or northeast, and the heavy showers, downpours, and thunderstorms from the southwest. Winds from the northwest usually bring clear but cool weather.

#### ORGANIZATION AND POPULATION <sup>6</sup>

Fauquier County, the 51st county of Virginia to be established, was formed from part of Prince William County in 1759 by act of the Virginia Assembly. It was named in honor of Francis Fauquier, an early colonial governor of Virginia. At one time the county was part of a vast proprietary estate that was granted in 1649 by King Charles II of England and comprised all the territory known as the Northern Neck of Virginia.

The first white man to follow the Rappahannock River into what is now Fauquier County was John Lederer, a German physician, who visited the area in 1670. The first attempt at colonization was made by George Brent, Nicholas Hayward, and others in 1696, when a blockhouse was built as a defense against wandering bands of Seneca Indians between Town and Cedar Runs on what was known as the Brent Town tract. Later, in 1714, another settlement was established on the bottom lands of the Rappahannock River. This locality constituted at that time a part of the American "far west" and had a population of about 80 people. In 1721, immigrants from Switzerland and the Rhine valley settled on Licking Run near the present site of Midland. From the date of this community, called Germantown, the settlement of the county progressed rapidly. Most of the later settlers were of English origin. They came from the Tidewater section of the Virginia colony in great numbers during the period from 1725 to the outbreak of the Revolutionary War. About the year 1736, a land office was opened by Lord Fairfax at Belvoir for "granting out

<sup>6</sup> Historical data for this section was furnished largely by Walter B. Nourse.

the land." Most of the present white natives are descendants of the early Anglo-Saxon and German settlers.

In the "Free State" region, a number of the inhabitants are descendants of Hessian soldiers who left the British army during the Revolution and settled in this region. The county is the birthplace of John Marshall, first Chief Justice of the United States Supreme Court; Simon Kenton, scout, pioneer, and Indian fighter; and Gen. Turner Ashby, Confederate Army leader. Although none of the larger battles of the Civil War were fought in the county, its territory was frequently the scene of important maneuvers and skirmishes, and its railroads were constantly employed in the movement of troops and supplies. Brief cavalry engagements took place at Catlett, Remington (then Rappahannock Station), Upperville, and Atoka.

Immediately following the Civil War, the entire agricultural program was disrupted, and land values were very low. Negroes left the county in large numbers, and there was little help to farm the land. From about 1870 to 1895, a large number of people of German ancestry from Pennsylvania and the Shenandoah Valley came to the county. These immigrants were formerly hard-working tenant farmers and had come to take advantage of the cheap land. Starting in 1921, an influx of northern people of wealth began, but this movement has gradually slackened since 1930. These people bought large acreages of land; built beautiful estates; and established themselves as racehorse and riding-horse breeders or livestock producers. The area near Warrenton and Middleburg is generally considered the heart of the foxhunt country of Virginia.

The 1950 census gives the population of the county as 21,248, all of which is classified as rural. In the same year, the rural farm population was 47.6 percent, and the rural nonfarm population, 52.4 percent.

There are no large cities. Warrenton, the county seat, is the largest, and its population in 1950 was 1,797. In the same year, Remington had a population of 309, and The Plains, 405. Other towns, villages, and trading centers are Marshall, Upperville, Rector-town, Markham, Delaplane, Paris, Atoka, Halfway, Broad Run Post Office, and Georgetown in the northern part of the county; New Baltimore, Bethel, Hume, Orlean, Conde, Ada, Turnbull, and White Sulphur Springs in the central part; and Catlett, Calverton, Midland, Bealeton, Cassanova, Auburn, Bristersburg, Goldvein, Summerduck, Morrisville, Sowego, and David in the southern part. These villages have very small populations and are supported mainly by agriculture.

The average density of population is 32.2 persons to the square mile. The density is least in the Nason-Tatum and Goldvein soil associations in the extreme southern part of the county; in the Iredell-Mecklenburg association, locally known as blackjack and redjack lands; in the Louisburg-Stony land-Culpeper association in the "Free State" region; and in the stony land types of the mountains. Population is also somewhat less than average in some of the more productive sections where the land is held in large tracts. Elsewhere in the county outside of the urban areas, the density is average or above average.

#### INDUSTRIES

Fauquier County always has been primarily an agricultural area and has no industries employing large numbers of workers. Outside

of farming, lumbering is the only important agricultural enterprise. Most of the forested land is not in farms. During World War II, lumbering was carried on much more extensively than in normal times and was largely centered in Nason-Tatum and Goldvein soil associations and in the mountainous regions. Numerous portable and semipermanent sawmills operate sporadically throughout the forested areas. Scrub and shortleaf pine are cut for pulpwood when prices are high.

Other agriculturally related industries include a grain elevator, creamery, cannery, and livestock auction yard at Marshall; and several flour mills, two of which are water operated.

One or two quarries are operated in the Bull Run Mountains, where a schistose type of quartzite is obtained for flagstones. Other quarries in greenstone, granite, and fine-grained diabase are operated for railroad ballast, road metal, and crushed stone for concrete. During the early part of the 19th century, several gold mines were in operation near Goldvein. When richer gold deposits were discovered elsewhere, the mines were no longer a paying venture and were abandoned.

#### TRANSPORTATION AND MARKETS

Fauquier County has railroad, truck, bus, and passenger-automobile transportation facilities. Two railroads cross the county. The main line of the Southern Railway from Washington, D. C., to Atlanta, Ga., passes through the towns of Catlett, Calverton, Midland, Bealeton, and Remington in the Triassic Plain part of the county. Freight and passenger stations are maintained at some of these towns. This railroad, which is also used by the Chesapeake & Ohio Railway, was the famous Orange & Alexandria Railroad of Civil War days. A spur line connects Warrenton with the main line at Calverton. The Harrisonburg to Manassas branch of the Southern Railway passes through Markham, Delaplane, Rectortown, Marshall, The Plains, and Broad Run Post Office in the northern part of the county. Passenger service has recently been discontinued on this branch line. In addition to the railroads, buses operate on regular schedules on the main highways between principal towns.

Federal highways 50, 211, and 15 and State primary highways 17, 29, 28, and 233, all of which are paved, are in the county. State secondary highways reach all important communities. Most of these are improved dirt and gravel roads but some are paved. This close network of roads is of great benefit in the distribution and marketing of farm products. Milk is collected daily and trucked to city markets, principally Washington, D. C. Cattle, sheep, and other livestock are shipped by rail or truck, mainly to Washington and Baltimore. Trucks are becoming increasingly important in the transportation of all farm products, including lumber. Products such as chickens, eggs, and cream are sold and necessary supplies purchased largely within the county at the various trading centers.

#### CULTURAL DEVELOPMENT AND IMPROVEMENT

Churches and schools are well distributed. High schools and some grade schools have been consolidated and are maintained in principal communities. School buses provide transportation for

rural students. There are no colleges in the county. All communities have rural mail delivery.

Telephone service is available to all towns, most communities, and many farms. The 1950 census reports 756 farms with telephones. Electric lights and power are becoming available to most areas that are able to maintain a permanent rural population. Of the 1,260 farms reporting electricity in 1950, 1,255 farms received it from a power line.

The prevailing condition of farm buildings, general farm improvements, and modern conveniences for the rural home are in general an expression of the character of the soil and land conditions. In the granite and greenstone areas, where most of the soils are productive and favorable for cultivation, buildings are generally good and improvements have been made on most of the farms. This is also true of dairy farms in the Triassic Plain part of the county. Silos are a conspicuous feature. Fences are constructed of stone, wood, or wire and are well maintained. Elsewhere in the county, particularly in the undulating to rolling Piedmont upland where the soils are less productive and less favorable for cultivation, the buildings on each farm are fewer and not so well improved. Exceptions are the estates operated by people who derive their income largely from sources other than agriculture. Most of these estates are of the racehorse-beef cattle type and are not self-sustaining.

Farm equipment varies according to the productivity and workability of the land. Tractors, trucks, hay balers, and other heavy farm implements are fairly common in the granite belt where the Chester soils predominate, in the greenstone belt where the Fauquier soils predominate, and in the dairying sections of the Triassic Plain. Such equipment is scarcer in the rougher and poorer parts of the county. The 1950 census reports 1,006 farms with 1,591 automobiles, 517 farms with 701 trucks, and 651 farms with 1,056 tractors. Work animals are generally of good stock, although their quality reflects the general land conditions.

## THE SOILS OF FAUQUIER COUNTY

The soils of Fauquier County differ greatly in such characteristics as color, texture, consistence and structure, stoniness, thickness and arrangement of layers and depth to underlying material, drainage, degree of erosion, permeability, relief, reaction and fertility. These differences are recognized in the large number of soil series, types, phases, and other land units mapped in the county. These differences also affect the productivity, workability, conservability, and, accordingly, the agricultural uses to which the soil units are suited.

The soils range considerably in color. Colors intermediate between brown and gray predominate in the uneroded surface soils. However, erosion and mixing of subsoil and surface soil by tillage have produced a greater variety of surface-soil colors. The subsoils range from mottled light gray and yellow in the poorly drained soils to uniformly brown or red in the well-drained soils.

The soils differ in their virgin surface texture. Generally those soils underlain by fine-textured parent rocks, such as greenstone, diabase, mica schist, or slate, have silt loam surface soils. On the

other hand, those soils that have their origin in coarser textured rocks, such as quartzite, granite, or gneiss, have a loam, fine sandy loam, or sandy loam surface soil. The surface-soil texture of the alluvial and colluvial soils is largely dependent on the texture of the transported materials from which they have formed. The subsoils are mainly clay loam, silty clay loam, clay, or silty clay.

Soil consistence and structure vary considerably. The surface soils are generally friable. The well-drained deep or moderately deep upland, terrace, and old colluvial soils have commonly moderately firm or friable subsoils with blocky structure, but some poorly drained soils have plastic more or less structureless subsoils. The excessively drained upland soils and the alluvial and recent colluvial soils are typically friable and relatively structureless throughout their profiles.

The soils vary greatly in their stone content. At the present time, about 16 percent of the county consists of soils having enough stone to practically prevent cultivation. With a few exceptions, these stony areas are restricted to the mountain or hill sections. A great part of these areas is under native forest. In general the more stony soils are in the granite, greenstone, and quartzite belts. As evidenced by the large number of stone fences in these regions, most of the soils here were originally quite stony. The more arable parts were cleared of forest and most of the stone was removed. The somewhat less arable areas were largely cleared of their loose surface stone. Most of these areas are used for pasture. The stone fences interfere greatly with the rearrangement of fields to accommodate stripcropping and tillage on the contour.

The soils vary considerably in thickness of the different soil layers and depth to underlying material. Approximately 37 percent of the soils have relatively thick heavy subsoils; 9 percent have thin, moderately heavy subsoils; and 54 percent have no true subsoils but have light-textured friable subsurface layers.

Soil drainage ranges from very poor to excessive. In about 80 percent of the county, the soils are well or excessively drained; in about 10 percent, they are intermediately drained; and in about 10 percent, they are poorly to very poorly drained. It is estimated that about 15 percent of the land requires artificial drainage to make it suitable for cultivated crops.

The degree of erosion ranges from apparently none to severe. Some erosion is evident on practically all of the soils that have been cleared and used for crops. As mapped, about 31 percent of the soils of the county are slightly sheet eroded, or have lost less than 25 percent of the original surface soil; 41 percent are moderately sheet eroded, or have lost from 25 to 75 percent of the original surface soil; and 5 percent are severely sheet eroded, or have lost 75 percent or more of the original surface soil and up to 25 percent of the subsoil. About 5 percent are moderately sheet eroded and have shallow gullies; less than 1 percent are moderately sheet eroded and have deep gullies not crossable with heavy farm machinery; less than 1 percent are severely sheet eroded and have shallow gullies; and less than 1 percent are severely sheet eroded and have deep gullies. Only the first bottom soils, recent colluvial soils, and uncleared parts of the uplands and old colluvial lands show no evidences of erosion.

Generally erosion is the result of poor land use and management, but it is also influenced by the slope. Moreover, soils, even on comparable relief, vary in their natural susceptibility to erosion. In this county, under similar conditions of use, management, slope, and rainfall, soils with silt loam surface layers are generally less porous and more erodible than those with loam or sandy loam surface layers.

The natural tilth of the surface soils is usually favorable. Exceptions are stony soils and soils with clay loam or silty clay loam surface soils. In reality these clay loam or silty clay loam surface soils are largely exposed subsoil, the original surface soil having been lost by erosion. Such eroded soils are subject to puddling, surface baking and cracking, and cloddy conditions if tilled when excessively moist. Their moisture conditions for tillage are exacting.

The soils range from level to steep. Level or nearly level areas (slopes less than 2 percent) occupy about 13 percent of the county; undulating areas (slopes 2 to 7 percent) about 28 percent; rolling areas (slopes 7 to 14 percent) about 32 percent; hilly areas (slopes 14 to 25 percent) about 19 percent; and steep areas (slopes exceeding 25 percent) about 8 percent. About 28 percent of the county is considered unsuited to cultivation because of steepness of slope.

The soils range from relatively high to low in natural fertility and productivity. About 32 percent of the soils suited to cultivation are relatively high in fertility and productivity, about 20 percent medium, and about 48 percent low. Generally the soils in the northern part of the county are more fertile and productive than those in the southern.

The soils of the uplands, terraces, and old colluvial slopes have developed under a warm humid climate and a predominantly hardwood forest. Under this environment they have been rather highly leached of bases and plant nutrients, and only a relatively small amount of organic matter has accumulated. As compared with the Prairie soils of the central United States, they are more highly acid and considerably poorer in plant nutrients and organic matter. On the other hand, they are more fertile and less acid than comparable soils farther south where the average temperature and rainfall are higher and leaching is more severe and continuous. They differ from one another in fertility and content of organic matter, even in the virgin state; and such differences have been further widened or altered by cropping, erosion, and other artificially stimulated processes of impoverishment. In contrast to these soils, most of the soils of the bottoms and recent colluvial slopes are high in natural fertility, moderately well supplied with bases (especially calcium), and fairly well supplied with organic matter.

Certain soil characteristics are commonly associated. For example, shallow profile, absence of a heavy subsoil, very high runoff, rapid internal drainage, comparatively light color of the surface soil, low content of organic matter, and relatively high rock content are natural features of hilly and steeply sloping soils. In contrast, a slightly darker surface soil, greater depth to bedrock, a moderately thick or thick heavy subsoil, increased content of organic matter, medium runoff, moderate internal drainage, and decreased rock content usually characterize the soils on undulating to rolling relief. Because of lack of adequate runoff and internal drainage, the soils of the depressions

and level areas may have heavy thick mottled subsoils. Other soils of the depressions or those at the foot of eroded slopes consist of recently deposited material washed from the adjoining uplands and are well drained throughout.

Chiefly because of the differences in characteristics, the soils differ from one another in their use suitability and management requirements. Some are highly productive, easy to work, and easy to conserve and, therefore, physically well suited to agricultural uses. Others are low in productivity, difficult to work, and difficult to conserve and are unsuited or very poorly suited to agricultural uses. Most of the soils, however, are between these two extremes. About 57 percent of the county is thought to be suitable for cultivated crops, 32 percent for permanent pasture, and 11 percent only for forest.

#### SOIL SERIES AND THEIR RELATIONS

In order to make full use of the soil survey, it is necessary to know the soils and to understand their relationships to each other. These relationships are more easily understood if the soils are grouped according to their position in the landscape. The soils of Fauquier County are placed in five groups: (1) Soils of the uplands, (2) soils of the terrace lands, (3) soils of the old colluvial slopes, (4) soils of the recent colluvial slopes, and (5) soils of the bottom lands.

Table 2 will aid in the identification of the soils and show the relation of one soil to another. This table gives the topographic position, parent rock or parent materials, and drainage for the soil series of the county.

#### SOILS OF THE UPLANDS

The soils of the uplands are on the higher lands above the stream valleys. They have developed in place from residuum weathered from the underlying parent rocks, and their properties are generally closely associated with the character of these underlying rocks. On the basis of differences in the kind of underlying material, the upland soils are placed in the following subgroups: (1) Soils developed over granitic rocks;<sup>7</sup> (2) soils developed over massive greenstone or diabase dikes in granite; (3) soils developed over schistose greenstone dikes in granite; (4) soils developed over greenstone;<sup>8</sup> (5) soils developed over arkosic quartzite and conglomerate; (6) soils developed over mica schist, mica gneiss, graphitic schist, and slate; (7) soils developed over Triassic shale and/or sandstone; (8) soils developed over sericite and biotite schist; and gneiss; (9) soils developed over coarse-grained Triassic diabase; (10) soils developed over fine-grained Triassic diabase; (11) soils developed over high-quartz granite or quartz-monzonite.

The upland soils constitute about 72 percent of the area of the county.

*Soils developed over granitic rocks, granite, granodiorite, granite gneiss, or schistose granite.*—The Brandywine (loam and gritty loam), Belvoir loam, Chester loam, and Eubanks loam soils occur in the northern and western parts of the county. These soils are differ-

<sup>7</sup> Includes granite, granodiorite, granite gneiss, schistose granite.

<sup>8</sup> Includes massive greenstone (epidotic); schistose greenstone (chloritic); agglomerate greenstone (largely chloritic, partly epidotic); greenstone (undifferentiated) interbedded with mica schist, mica gneiss, and quartzite.

TABLE 2.—The soil series of Fauquier County, Va., grouped to show their topographic position, parent rock or parent material, and drainage

## SOILS OF THE UPLANDS

Parent rock or parent material	Somewhat excessively to excessively drained <sup>1</sup>	Well drained <sup>1</sup>	Moderately well drained <sup>2</sup>	Imperfectly drained <sup>3</sup>	Poorly drained <sup>4</sup>
<b>Igneous and metamorphosed igneous rocks:</b>					
Granitic rocks <sup>5</sup> .....	Brandywine (loam and gritty loam).....	Chester loam (yellowish-red subsoil); Eubanks loam (red subsoil). Eubanks (silt loam and stony silt loam).		Belvoir.....	
Massive greenstone or diabase dikes in granite.					
Schistose greenstone dikes in granite.....	Brandywine (silt loam).....	Chester silt loam.....			
<b>Greenstone:</b>					
Massive greenstone (epidotic).....	Catoctin.....	Fauquier (Piedmont Plateau); Clifton (Blue Ridge Mountains).			
Schistose greenstone (chloritic).....	do.....	Fauquier.....			
Agglomerate greenstone (largely chloritic, partly epidotic).	do.....	Myersville.....		Orange.....	
Greenstone (undifferentiated) interbedded with mica schist, mica gneiss, and quartzite.		Lloyd.....			
Coarse-grained Triassic diabase.....		Davidson.....	Mecklenburg.....	Zion (friable); Iredell (plastic). do.....	Elbert.
Fine-grained Triassic diabase.....		Montalto.....			Elbert (concretionary phase).
High-quartz granite or quartz-monzonite.			Goldvein.....		
<b>Sedimentary and metamorphosed sedimentary rocks:</b>					
Arkosic quartzite and conglomerate.....	Louisburg.....	Culpeper (red subsoil); Albemarle (yellowish-brown subsoil).			
<b>Mica schist, mica gneiss, graphitic schist, and slate:</b>					
Mica schist and mica gneiss.....	Hazel.....	Elloak.....			
Mica schist and mica gneiss (extremely micaceous variety).	Manor.....				
Varved slate.....	Hazel.....				
Black graphitic schist and slate.....	Watt.....				
<b>Triassic shale and/or sandstone:</b>					
Interbedded Triassic shale and coarse-grained diabase.					Kelly.
Triassic red shale and sandstone.....	Penn <sup>7</sup> .....	Bucks (dark reddish-brown subsoil); Wadesboro (red to dark-red subsoil). Catlett.....		Calverton.....	Croton.
Baked Triassic shale (bluish-gray).		Tatum (red subsoil); Nason (yellowish-red subsoil).		Lignum.....	
Sericite and biotite schist; and gneiss.....	Manteo.....				

SOILS OF THE TERRACE LANDS

General alluvium on stream terraces: Old fine-textured alluvium, largely from basic rocks (greenstone, diabase, etc.). Old coarse-textured alluvium, largely from acidic rocks (granite, gneiss, schist, quartzite, slate, etc.). Moderately young fine-textured alluvium from a wide variety of rocks; both basic and acidic.		Hiwassee.....			
		Hiwassee (light-colored variant).....	Masada.....		
		State.....			

SOILS OF OLD COLLUVIAL SLOPES

Old colluvial rock and soil materials originally from— Arkosic quartzite..... Greenstone..... Granite, granite gneiss, schist.....		Braddock (red subsoil); Thurmont (yellowish-brown subsoil). Dyke..... Tusquitee.....			

SOILS OF RECENT COLLUVIAL SLOPES <sup>1</sup>

Local recent wash and slough from— Greenstone and other basic rocks..... Granite, quartzite, schist, gneiss, slate (acidic rocks).		Meadowville.....			Rohrersville. Worsham.
		Starr.....	Seneca.....		

SOILS OF THE BOTTOM LANDS <sup>1</sup>

Recent alluvium on stream bottoms from— Triassic shale, sandstone, and diabase.... General alluvium from various kinds of rocks. <sup>1</sup>		Bermudian..... Congaree.....		Rowland..... Chewacla.....	Bowmansville. Wehadkee.

<sup>1</sup> Indistinct profile due to rapid geological erosion; color usually yellowish brown but varies with parent material.

<sup>2</sup> Reddish-brown, red, yellowish-red, or brown soils; free of mottling.

<sup>3</sup> Yellowish-red or yellowish-brown soils; usually free of mottling.

<sup>4</sup> Yellowish-brown or yellow, mottled with gray below 12 to 15 inches; alluvial and recent colluvial soils, brown or yellowish-brown mottled with light brownish-gray below 12 inches.

<sup>5</sup> Brownish-gray or grayish-brown mottled with gray at or near the surface.

<sup>6</sup> Includes granite, granodiorite, granite gneiss, and schistose granite.

<sup>7</sup> The Penn soils have undulating to hilly relief; their shallow profile is due chiefly to geologic youthfulness and resistance to weathering rather than to rapid geologic erosion; surface runoff is low to medium.

<sup>8</sup> These soils do not have distinct textural profiles, chiefly because of the short time their parent materials have been in place.

<sup>9</sup> From all rocks found in the county.

entiated chiefly in depth to bedrock, distinctness of horizons, and color of surface soil and subsoil layers.

The Brandywine soils are yellowish-brown, excessively drained, shallow, and chiefly on hilly to steep slopes. Two types of Brandywine soils are present. Brandywine gritty loam overlies a coarse-textured granite, whereas Brandywine loam has developed over a finer grained granite. The Brandywine soils are usually the most stony of this group.

The Belvoir soils occur in depressions or flats and are imperfectly drained. They have light yellowish-brown loam surface soils and mottled yellowish-brown and light-gray heavy-textured subsoils.

The Chester and Eubanks loam soils are well drained; occupy undulating to gently rolling interstream areas; and are differentiated largely on the basis of color of their surface soils and subsoils. The Chester soils have a light yellowish-brown loam surface soil and a brown to yellowish-red clay loam subsoil. The surface soil of the Eubanks series is a light-brown loam, and the subsoil is a red clay loam.

*Soils developed over massive greenstone or diabase dikes in granite.*—The Eubanks silt loams are in close association with the Chester and Brandywine loam soils and overlie dikes of massive greenstone or diabase that have profusely intruded granite rocks.

The Eubanks soils are readily distinguished from the associated soils by their brown to reddish-brown silt loam surface soils and red clay loam subsoils. They occur chiefly on rolling relief and are well drained. A complex of the Chester and Eubanks soils occurs where the two soils are too intricately associated to be separated on the map.

*Soils developed over schistose greenstone dikes in granite.*—The Brandywine and Chester silt loam soils, occurring in the southern part of the granite belt, have developed over dikes of schistose greenstone that intrude granite. They differ chiefly in depth and degree of profile development.

The Brandywine silt loam soils occur mainly on hilly slopes and have shallow profiles. They are weakly developed and have a brown to dark-brown surface soil and a strong brown to dark reddish-brown substratum (little or no subsoil).

The Chester silt loam occurs chiefly on ridgetops and less steeply sloping areas and has a moderately shallow to deep profile with more distinct surface soil and subsoil layers than the Brandywine soils. It is moderately well developed; the surface soil is brown to dark brown and the subsoil is strong brown to yellowish red.

*Soils developed over greenstone.*—The Catocin, Fauquier, Clifton, Myersville, Orange, and Lloyd soils have formed from the residuum weathered from greenstone, or greenstone interbedded with mica schist, mica gneiss, and quartzite. Greenstone, a basic rock, occurs in the central part of the county, as well as in the Blue Ridge Mountains. Three distinct varieties are recognized: (1) Massive greenstone (epidotic); (2) schistose greenstone (chloritic); (3) agglomerate greenstone (largely chloritic, partly epidotic). The Catocin soils are derived from all three varieties, the Fauquier soils from the first two, the Clifton soils from the first, and the Myersville and Orange soils from the third. The Lloyd soils are derived from greenstone

(undifferentiated) interbedded with mica schist, mica gneiss, and quartzite.

The Catoctin soils are shallow, excessively drained, and chiefly on hilly slopes. They have yellowish-brown to brown silt loam surface soils and brown to strong brown stony silt loam subsurface layers. A few loose stones and rock outcrops are characteristic of the surface.

The Fauquier soils, locally known as red clay land, are moderately deep, well drained, typically on rolling relief, and the most extensive of this group. The virgin surface soil is a dark reddish-brown silt loam, and the subsoil is a dark-red clay. Most of these soils have been in cultivation a long time and are severely eroded. In eroded areas, freshly plowed fields have a red silty clay loam surface soil.

The Clifton soil is quite stony and occupies rolling ridgetops of the Blue Ridge Mountains. This well-drained shallow soil has a brown to reddish-brown stony silt loam surface soil and a yellowish-red to reddish-brown stony silty clay loam subsoil.

The Myersville soils are inextensive. They are well drained, occur on undulating to rolling relief, and are shallow to moderately deep. The surface soil is a light yellowish-brown to brown silt loam, and the subsoil is a yellowish-red to strong brown silty clay.

The Orange soils occur in slight depressions or at the heads of drains in close association with the Myersville soils. The surface 1-inch layer is a dark-gray silt loam. Below this is a pale-yellow to light-gray silt loam. The subsoil is a mottled yellow, gray and brown silty clay loam or silty clay. Broken light-colored basic rock may occur at 24 to 30 inches. These two soils are mapped as the Myersville-Orange complex.

The Lloyd soils have formed over greenstone (undifferentiated), interbedded with mica schist, mica gneiss, and quartzite. They are very deep and well-drained, have a light-brown, brown, or yellowish-red silt loam surface soil and a red to dark-red clay subsoil. They resemble the Fauquier soils, but differ chiefly in having a light-colored surface soil and in being deeper to bedrock.

*Soils developed over arkosic quartzite and conglomerate.*—The Louisburg, Culpeper, and Albemarle soils were derived from the weathered products of arkosic quartzite and conglomerate.

The Louisburg soils are shallow to bedrock, excessively drained, locally stony, and chiefly on hilly slopes. They have light yellowish-brown sandy loam surface soils and yellowish-brown stony sandy loam subsurface layers.

The well-drained Culpeper and Albemarle soils have milder slopes than the Louisburg, are deeper, and have heavier textured subsoils. They both have light yellowish-brown surface soils and are differentiated largely on the basis of color of their subsoils.

The Culpeper soil has a yellowish-red to red thick clay loam subsoil, whereas the Albemarle has a thinner strong brown to yellowish-brown sandy clay loam subsoil. These two series are not of great agricultural value, as compared with the Chester or Fauquier soils. Like the Louisburg soils, they are very strongly to extremely acid in reaction, low in organic-matter and plant-nutrient content, and subject to severe leaching. All three soils of this group occur most extensively in the "Free State" region.

*Soils developed over mica schist, mica gneiss, graphitic schist, and slate.*—Associated with the granite, greenstone, and quartzite in the northeastern and central parts of the county are bodies of mica schist, mica gneiss, graphitic schist, and slate. These rocks weather to the material from which Hazel, Elioak, Manor, and Watt silt loam soils have formed. The Hazel soils are derived from mica schist, mica gneiss, and varved slate, the Elioak from mica schist and mica gneiss, the Manor from extremely micaceous varieties of mica schist and mica gneiss, and the Watt from graphitic schist and slate.

The Hazel soils are the most extensive, but are not well suited to cultivated crops because of steep slopes and shallowness to bedrock. These excessively drained soils have yellowish-brown silt loam surface soils and yellowish-brown or brown slaty silt loam subsurface layers.

The Elioak soils have well-defined profiles, are deep and well drained, and have relatively heavy textured, thick subsoils. They typically have undulating to rolling relief, yellowish-brown or brown silt loam surface soil, and red micaceous clay loam subsoil. Although not considered agriculturally important soils of the county, they are by far the most responsive and the most productive soils of this group.

The Manor soils do not have a well-defined profile, either in color or texture. They are further characterized by the extreme friability and high mica content of the entire profile. The surface soil is a yellowish-red to strong-brown micaceous silt loam, and the subsoil is a yellowish-red to strong-brown very micaceous heavy silt loam. The Manor soils are well drained, have rolling to hilly relief, and are very erodible.

The Watt soil is dark grayish-brown, shallow, and excessively drained. It has developed over black graphitic schist and slate that locally outcrops in narrow bands within larger areas of mica schist and mica gneiss. The soil has hilly slopes and is inextensive, erodible, and unsuited to cultivation.

All the soils in this group are quite low in inherent fertility and are rather highly acid in reaction.

*Soils developed over Triassic shale and/or sandstone.*—The Wadesboro, Penn, Bucks, Calverton, Croton, Catlett, and Kelly series were developed from Triassic shale and/or sandstone. These are purplish-red or "Indian red" rocks except for local thin lenses of light-gray sandstone. The soils from this sandstone are too limited in extent to separate. Another exception is the shale, adjacent to intrusions of coarse-grained diabase, which by contact metamorphism has been altered to a baked bluish gray or dark gray.

The Wadesboro soils are deep, have heavy-textured thick subsoils, are well drained, and generally occupy the highest topographic position in this group. They have undulating to rolling relief and are rather highly leached, strongly acid in reaction, and low in inherent fertility. The surface soil is light yellowish-brown, and the subsoil is a red or dark-red clay loam. The silt loam type has developed over Triassic red shale. Wadesboro fine sandy loam is underlain by Triassic red sandstone and differs from the silt loam chiefly in surface texture.

The Penn soils are the most extensive of this group. They are shallow somewhat excessively drained droughty soils that occur chiefly on gently undulating to rolling relief. The surface soil is reddish-

brown with a purplish cast. The subsurface layer is reddish-brown to dark reddish-brown with a purplish cast. The Penn soils were derived from Triassic red shale and sandstone, the silt loam from the shale and the loam from the sandstone.

The Bucks soil may be considered a deeper development of the Penn soils. It has developed over Triassic red shale and sandstone and, as in the case of the Penn soils, the color is inherited from the parent rock. It is well drained, occupies undulating relief, and has a moderately deep profile and a heavy-textured relatively thick subsoil. The surface soil is a brown silt loam; the subsoil is a reddish-brown silty clay loam or silty clay with a purplish cast. The Bucks soil is considerably more productive and less erodible than the Penn soils.

The imperfectly drained light-colored Calverton soil typically occupies flats or slight depressions on level to gently undulating relief. It has a light yellowish-brown surface soil and a yellowish-brown, slightly mottled with light brownish-gray, silty clay subsoil. The Calverton soil usually adjoins the Croton soil, which is on level broad flats or low seepy areas along small drains.

The Croton soil is poorly to very poorly drained. It is further characterized by a mottled light yellowish-brown and gray surface soil and a highly mottled light-gray and yellowish-brown plastic clay subsoil. It is adapted to cultivated crops only if drained.

The Catlett soil is shallow and well drained. It has formed over Triassic shale that is adjacent to intrusions of coarse-grained Triassic diabase and has been altered by contact metamorphism to a baked bluish-gray or dark-gray shale. This soil is brownish-gray or grayish-brown, but resembles the Penn silt loam in depth of profile and other characteristics. It is inextensive and has undulating relief and relatively low productivity.

The poorly drained Kelly soil has level to undulating relief and is underlain by interbedded Triassic shale and coarse-grained diabase. Although closely resembling the Croton soil, it differs in having a more plastic, sticky, and impervious subsoil. The surface soil is a light brownish gray, slightly mottled with light yellowish brown, and the subsoil is a highly mottled yellowish-brown and gray, very plastic and sticky clay. Like the Croton, it is not suitable for cultivation unless drained.

All the soils in this group are rather highly acid in reaction and low in organic-matter and plant-nutrient content.

*Soils developed over coarse-grained Triassic diabase.*—The Iredell, Davidson, Mecklenburg, Elbert, and Zion soils have formed from the weathered products of coarse-textured Triassic diabase.

The imperfectly drained Iredell soils, locally known as blackjack soils, occupy level to undulating relief and are the most extensive in this group. They are readily recognized by their brownish-gray silt loam surface soils and their olive-brown, extremely plastic and sticky, dense clay subsoils. These soils have poor workability when eroded and are rather low in productivity.

The well drained Davidson and moderately well drained Mecklenburg soils are closely associated and typically occur on undulating to rolling relief at higher elevations than other soils of this group. The Davidson soil is characterized by its dark reddish-brown clay

or clay loam surface soil and its thick dark-red dense clay subsoil. Although highly productive, it is very susceptible to erosion if not properly used and managed. The Mecklenburg soils are intermediate between the Davidson and Iredell soils in color and consistence of the subsoil. They have yellowish-red to dark reddish-brown loam surface soils and reddish-brown, slightly plastic clay subsoils.

The Elbert soil resembles the Iredell soils in most features but differs in being more poorly drained. It occurs in wet flat depressions usually surrounded by Iredell soils. The surface soil is a mottled gray and light brownish-gray, floury silt loam, and the subsoil is a highly mottled light olive-brown and gray, very plastic and sticky clay.

The Zion soils typically occur along the border zones of coarse-grained Triassic diabase and Triassic shale. They have developed principally over diabase but in places over mixed baked shale and diabase. Although Zion soils have surface characteristics similar to those of the Iredell soils, they have less plastic, sticky, and thick subsoils, have stronger relief, and are better drained.

*Soils developed over fine-grained Triassic diabase.*—Fine-grained Triassic diabase underlies the Iredell, Zion, Elbert, and Montalto soils. These Iredell soils are similar to those underlain by the coarse-textured diabase, but the Zion and Elbert soils in this group represent a variation from the corresponding soils developed over coarse-textured diabase. These differences are brought out in the following pages where the soils are discussed in much more detail.

The well-drained Montalto have dark reddish-brown to yellowish-red silt loam surface soils and dark-red silty clay subsoils. They typically have undulating to rolling relief; and although moderately shallow to bedrock, they are fertile and productive if adequately supplied with moisture and properly managed. These soils are locally stony.

*Soils developed over sericite and biotite schist; and gneiss.*—The extreme southern part of the county is underlain by sericite and biotite schist, and gneiss, which weather to form the parent material of the Tatum, Nason, Lignum, and Manteo soils. As a group, these soils are the poorest in the county agriculturally. They all are extremely acid and low in plant nutrients, organic matter, and productivity.

The undulating to rolling Tatum soils are probably the best agricultural soils of this group. These are well-drained, moderately deep soils with reddish-yellow silt loam surface soils and red micaceous clay loam subsoils. In many places these soils are severely eroded.

The extensive well-drained Nason soils are moderately deep and have undulating to rolling relief. The surface soil is a light yellowish-brown to pale-brown silt loam, and the subsoil is a strong-brown to yellowish-red clay loam.

The light-colored Lignum soil is imperfectly drained and has level to gently undulating relief. It has a pale-brown or light yellowish-brown silt loam surface soil and a mottled light olive-brown and yellowish-brown, slightly mottled with gray, clay loam subsoil.

The steep excessively drained Manteo soil is shallow and contains numerous fragments of schist throughout its profile. This soil is inextensive, largely in forest, and of little agricultural significance.

*Soils developed over high-quartz granite or quartz-monzonite.*—The soils of the Goldvein series overlie coarse-textured high-quartz granite or quartz-monzonite that occurs as intrusive bodies in schists and gneisses in the extreme southern part of the county. They are moderately well drained deep soils on undulating to rolling slopes. The surface soils are light yellowish-brown gritty silt loams, and the subsoils are yellowish-brown, compact, very gritty clay loams. A semicemented layer composed largely of small angular quartz particles occurs in the subsoil. The Goldvein soils are strongly acid in reaction and very low in organic-matter and plant-nutrient content.

#### SOILS OF THE TERRACE LANDS

In the geologic past, rivers and streams flowed at considerably higher levels, and at these levels, they deposited varying quantities of gravel, sand, silt, and clay on their flood plains. During the progress of stream cutting, the channels were gradually deepened. New flood plains were formed at lower levels, but remnants of the older, higher lying flood plains were left. These areas are now above the overflow stage of the present streams and constitute the terrace lands. Some of these lands are high and quite far removed from the present stream channel, whereas others are lower and closer to the channel. The lower and apparently younger terraces are frequently referred to as second bottoms or benches. The terrace materials, with the exception of those underlying the State soil, have been in place long enough to permit development of deep soils that have distinct profile differentiation in color and texture.

The soils of the terraces have developed from old alluvial materials washed from uplands underlain by a wide variety of rocks. Most of the alluvium originated in the local uplands, but some of that along the Rappahannock River partly originated in the Blue Ridge Mountains in the counties to the west.

The terrace soils have undulating to gently rolling relief and are well drained. In the virgin condition, they are strongly to very strongly acid but they differ widely in organic-matter and plant-nutrient content. Agriculturally they are important, as most of them are well suited to the production of crops.

The soils of the terraces differ principally in color, texture, consistence, character of parent material, geographic position, stone content, and thickness and arrangement of soil layers. Mainly on the basis of such differences, they are classified in three soil series—Hiwassee, Masada, and State. These soils are largely on the terraces along the lower courses of the Rappahannock River. The terrace soils have an aggregate area of less than 1 percent of the county.

The Hiwassee soils, which are among the most productive of the county, are of small extent. In profile characteristics, they closely resemble the Davidson soil of the uplands. They were derived from fine-textured alluvium composed mainly of silts, clays, and fine sands. The surface soil is reddish-brown loam, and the thick subsoil is a dark-red heavy clay that is sticky when wet. Hiwassee soils appear to be very erodible. For the most part, they occur on low terraces. Stones are not common.

The light-colored variants of Hiwassee soils are largely on old high terraces. They are derived from coarse-textured alluvium composed

predominantly of sand and gravel. In morphology they closely resemble the Culpeper soils of the uplands. The surface soil is a light yellowish-brown loam, and the subsoil is a yellowish-red to reddish-brown clay loam or sandy clay loam. These soils are associated with the Masada soil and usually occur as isolated areas far removed from the present streams. Varying amounts of rounded cobbles and pebbles occur throughout the profile. These Hiwassee soils are highly leached and low in organic matter and plant nutrients.

The Masada soil is associated with the light-colored variants of the Hiwassee soils on remnants of the older and higher terraces of the Rappahannock River. It is characterized by its light yellowish-brown loam surface soil, its reddish-yellow or brown fine gravelly clay loam subsoil, and the presence of rounded pebbles and cobbles on the surface and in the soil. The parent alluvium, like that of the light-colored variants of the Hiwassee soils, is composed largely of sands and gravel. The soil is low in organic-matter and plant-nutrient content.

The State soil occurs on low and very young terraces that are subject to occasional stream overflow. The terraces indicate the first stages of terrace development; they are first bottoms that are beginning to be isolated from the farthest reach of floodwaters as the streams gradually cut deeper channels. The State soil exhibits a low degree of profile differentiation in color and texture. It has a light yellowish-brown silt loam surface soil and a yellowish-brown or brown silty clay loam subsoil.

#### SOILS OF THE OLD COLLUVIAL SLOPES

Rather extensive areas of old colluvial rock and soil materials washed or rolled from mountain slopes occur in the county. They are on the lower slopes and at the foot of mountains and in old colluvial fans in mountain hollows and gaps. The depositions occurred years before the soil was cleared, and the material has lain in place long enough for deep soils with distinct profiles in color and texture to develop. The soils of the old colluvial slopes are members of the Dyke, Tusquitee, Braddock, and Thurmont series. They comprise about 1 percent of the area of the county.

In the Blue Ridge and on certain slopes of the Bull Run Mountains, the old colluvium is composed almost entirely of materials washed and rolled from uplands underlain by greenstone. These materials have given rise to the Dyke soil. It has a dark reddish-brown silt loam surface soil and a dark-red silty clay subsoil. This well-drained deep soil has undulating to rolling relief. Although inextensive, it is quite fertile and productive of crops.

The Tusquitee soil has developed over old colluvial materials of granitic origin. It occurs locally in the hollows of the Blue Ridge and outlying foothills. The surface soil is a brown to dark-brown loam, and the subsoil is a brown to strong-brown clay loam. The old land surface occurs at depths ranging from 2 to 20 feet from the present surface. In many places subangular granitic rocks are on the surface and in the soil layers. This well-drained fertile soil is on undulating to rolling relief.

The Braddock and Thurmont soils have developed over very old colluvial material washed and rolled from mountain slopes underlain

by quartzite in the Bull Run Mountain-Baldwin Ridge region. The colluvium occurs largely as more or less continuous bands of thick-bedded material on the lower more gentle mountain slopes. It represents a mass movement of material from these old worn-down mountains rather than local accumulation of material in hollows and gaps. South of New Baltimore, the areas of colluvium are smaller and more discontinuous. They occur usually as small isolated areas some distance from the western, southern, and eastern sides of Baldwin Ridge. The widespread occurrence of this old colluvium suggests that the Bull Run Mountain chain was originally entirely capped with quartzite and extended many hundreds of feet higher than now.

The Braddock and Thurmont soils are mapped separately, largely because of the differentiating color of their subsoils. The Braddock soils have a yellowish-brown stony loam surface soil and a red clay loam subsoil containing a few stones. The Thurmont soil has a light yellowish-brown stony loam surface soil and a strong brown or brown sandy clay loam subsoil. Both soils have rounded and subangular quartzite rocks over the surface and in the soil that interfere with cultivation. Where these stones are numerous enough to prevent practical cultivation of the Braddock soil, a very stony loam type is mapped. Both soils are well drained, have undulating to rolling relief, are low in plant nutrients and organic matter, and are strongly to extremely acid.

#### SOILS OF THE RECENT COLLUVIAL SLOPES

The recent colluvial slopes consist of local deposits of soil material that has washed and sloughed from adjoining upland slopes. The accumulations are at the base of slopes, along small drains, and in upland depressions particularly where erosion has been active on the upland soils of the adjoining slopes. They have been deposited largely since the soil was cleared and cultivated and have not been in place long enough for the development of distinct soil horizons. The members of five soil series—Meadowville, Rohrsersville, Starr, Seneca, and Worsham—include such accumulations. These soils differ widely in color, texture, character and source of parent material, and drainage. They also differ somewhat in relief. Although most of them are important agriculturally, they are relatively inextensive in comparison to the upland soils. They comprise about 7 percent of the area of the county.

The well-drained Meadowville soil consists of soil materials washed principally from the Fauquier soils but also from other upland soils underlain by greenstone. The upper 24 inches is a reddish-brown to yellowish-red silt loam; below this depth is a yellowish-red to dark reddish-brown silty clay loam. Relief is almost level to gently rolling; fertility, lime, and organic matter are rather high. This is a very productive and valuable soil.

The Rohrsersville soil consists of material identical in origin to that of the Meadowville soil but differs in being poorly drained. The surface soil is a strong-brown to reddish-brown, slightly mottled with light brownish-gray, silt loam. It grades into a highly mottled yellowish-brown and gray silty clay loam. The Rohrsersville soil has almost level relief and is unsuited to crops because of its poor drainage.

In general the Starr soil consists of materials washed from brown to reddish-brown upland soils underlain by all the various rock types of the county except greenstone or Triassic rocks. About 75 percent of it, however, is formed of materials washed from Brandywine, Chester, and other soils underlain by granitic rocks. The soil has almost level to gently undulating relief and is well drained, high in fertility and organic-matter content, and very productive of most crops. It is typically brown or reddish brown throughout its profile; the color and texture depend largely on the color and texture of the upland soils from which its material is washed.

The Seneca soil is a light yellowish-brown or yellowish-brown loam. It may be slightly heavier in texture and mottled with light brownish gray at the lower depths. It has undulating slopes, is moderately well drained, and consists of materials washed principally from light-colored upland soils underlain by granite and quartzite.

The poorly to very poorly drained Worsham soil has almost level relief and is derived from materials washed from acidic rocks such as granite, quartzite, schist, gneiss, and slate. It has a slightly mottled grayish-brown, gray, and yellow silt loam surface soil and a highly mottled gray and yellowish-brown plastic clay subsurface horizon. This soil has limited usefulness for crops because of poor drainage; it is best suited to pasture.

#### SOILS OF THE BOTTOM LANDS

The term "bottom lands" means the flood plains, or those nearly level areas along the streams that are flooded periodically. The material giving rise to the soils in the bottom lands has been carried there by the streams, and its character depends largely on the source of the material, the rate at which the water was moving when the material was deposited, and the present drainage. The soils in the bottoms are young. The material from which they are developing has not lain in place long enough for development of well-defined surface soils and subsoil horizons such as those found in most of the soils of the uplands, terraces, and old colluvial lands. The soils of the bottom lands are essentially parent materials that have undergone but little change since deposition.

All the soils of the bottom lands are subject to periodic flooding. Some of them, however, because of their position in relation to the stream, are more subject to overflow than others. They are friable and range from medium to very strongly acid. Most are free of stone, but a few contain some gravel in the lower part of the profile. All of them have nearly level relief and very low surface runoff, but they range from rapid to slow in internal drainage.

In Fauquier County two catenas, or groups, of bottom land soils are classified. These catenas are differentiated because of the character and origin of their alluvial materials. Within each group, differences in internal drainage exist. On the basis of these differences in internal drainage, the soils of each catena or group are classified in 3 soil series: (1) Bermudian, Rowland, Bowmansville; (2) Congaree, Chewacla, Wehadkee. In addition, one miscellaneous land type—Mixed alluvial land—is mapped.

The soils of the Bermudian, Rowland, and Bowmansville series constitute the catena of bottom land soils composed of alluvium

washed from uplands underlain by Triassic shale and sandstone and partly by diabase. Consequently, they occur largely within the Triassic Plain part of the county. The differences in these soils are due chiefly to differences in drainage. The Bermudian soil is well drained, the Rowland soil is imperfectly drained, and the Bowmansville soil is poorly drained. The Bermudian soil is brown to dark brown throughout its profile; the Rowland is brown to dark brown to a depth of 12 to 20 inches, below which it is mottled yellowish brown and light brownish gray; and the Bowmansville is a mottled light yellowish brown, gray, and light brownish gray from the surface downward.

Except for the flood hazard, the Bermudian soil is well suited to the production of corn and hay. The Rowland is less suitable and the Bowmansville wholly unsuitable for these crops; both are best adapted to permanent pasture. All these soils retain in varying degrees the purplish cast of the Penn and Bucks upland soils from which their soil material has been chiefly washed.

The Congaree, Chewacla, and Wehadkee soils form the other catena of bottom land soils. They consist of varying mixtures of materials washed from uplands underlain by a wide variety of rocks common to the county. The Congaree soils are well drained, predominantly brown throughout the profile, and usually somewhat micaceous. The silt loam and fine sandy loam types are mapped; both are very productive of corn and hay. Small grain is not well suited to these soils, largely because of the flooding hazard and the tendency of small grain to lodge. Congaree soils are high in content of organic matter and plant nutrients.

The Chewacla is an imperfectly drained brown soil faintly mottled with light brownish gray at about 12 inches. The mottles increase with depth, and the soil is highly mottled below 25 inches. It is used largely for pasture, which is considered its best use under existing conditions.

The Wehadkee soil is poorly drained and is mottled grayish brown, gray, and dark yellowish brown throughout its profile. It is wholly unsuited to the production of crops and is best adapted to permanent pasture.

Mixed alluvial land consists of first bottom soils that are extremely variable in texture and drainage. The largest part of this separation consists of coarse-textured riverwash. It is inextensive and not important agriculturally.

#### MISCELLANEOUS LAND TYPES

In mapping, it is often necessary to recognize certain land conditions as land types rather than as definite soil series, types, or phases. Usually a land type contains a number of soil types and phases that are combined in a single unit because of one or more common outstanding characteristics that limit agricultural usefulness.

Ten miscellaneous land types are recognized in Fauquier County, and together they account for about 14 percent of the area of the county. One of these, Mixed alluvial land, has already been discussed under Soils of the Bottom Lands. Seven of them include land characterized by many outcrops of bedrock, by numerous loose

rocks on the surface and throughout the soil profile, or by combinations of these two kinds of stoniness. Such rocks are sufficiently numerous to prevent tillage or make it impractical, even if other features of the land are favorable.

Stony rolling and hilly land, acidic rock; Stony steep land, acidic rock; and Stony (very stony) steep land, acidic rock, carry outcrops and loose rock of acidic nature, such as granite, quartzite, schist, gneiss, quartz, or slate. Stony rolling and hilly land, basic rock; Stony steep land, basic rock; and Stony (very stony) steep land, basic rock, are land types of corresponding stoniness that carry outcrops and loose rock of basic nature, such as greenstone or diabase.

In addition to this main separation into two groups based on the nature of the rocks, each main group is subdivided on the basis of differences in both relief and the degree of stoniness, as indicated by the names of each separation. The outcrops and stones occupy about 20 to 40 percent of the surface of the stony land types, and more than 40 percent of the surface of the very stony land types. The various combinations of rock, soil, relief, and degree of stoniness largely determine the suitabilities of these land types for either pasture or forest.

Stony colluvium, consisting of local alluvium and colluvium, contains loose rock that rolled from mountain slopes. These rocks prevent cultivation. Its other characteristics, especially drainage, are extremely variable.

The two remaining land types include land that has been greatly disturbed or altered. Rough gullied land is characterized by a close network of deep destructive gullies. It contains a large number of upland soils. Made land consists of areas altered by excavations or fill for the construction of buildings, athletic fields, and the like. It has little or no agricultural significance.

#### SOIL TYPES, PHASES, AND LAND TYPES

In the following pages, the soil types, phases, and land types of Fauquier County are described in detail, and their relation to agriculture is discussed so far as present knowledge permits. The acreage and proportionate extent of these soil mapping units is listed in table 3, and their location and distribution are represented graphically on the accompanying map.

**Albemarle loam, undulating phase** (2 to 7 percent slopes) (Ab).—This is a light-colored upland soil locally known as light sandy land. It is well drained and moderately deep and was derived from residuum weathered from arkosic quartzite and conglomerate. It occupies undulating flats and ridgetops in close association with Albemarle loam, rolling phase, and with the Culpeper and Louisburg soils. The areas are small to moderately large. Runoff and internal drainage are medium. Sheet erosion ranges from slight to moderate, but more than half of the aggregate area is uneroded or only slightly

TABLE 3.—*Approximate acreage and proportionate extent of the soils mapped in Fauquier County, Va.*

Soil	Acres	Percent
Albemarle loam:		
Rolling phase.....	912	0.2
Undulating phase.....	1,164	.3
Belvoir loam:		
Level phase.....	1,868	.4
Undulating phase.....	2,616	.6
Bermudian silt loam.....	446	.1
Bowmansville silt loam.....	1,513	.4
Braddock stony loam, rolling phase.....	1,410	.3
Braddock very stony loam, rolling phase.....	858	.2
Brandywine gritty loam:		
Hilly phase.....	3,550	.8
Rolling phase.....	3,116	.7
Brandywine loam-Eubanks silt loam, hilly phases.....	200	.05
Brandywine loam:		
Hilly phase.....	20,473	4.8
Rolling phase.....	8,988	2.1
Steep phase.....	2,488	.6
Brandywine silt loam:		
Hilly phase.....	1,552	.4
Rolling phase.....	754	.2
Bucks silt loam, undulating phase.....	6,812	1.6
Calverton silt loam, undulating phase.....	7,516	1.8
Catlett silt loam, eroded undulating phase.....	1,978	.5
Catoctin silt loam:		
Eroded steep phase.....	1,016	.2
Hilly phase.....	15,270	3.6
Rolling phase.....	4,420	1.0
Chester-Brandywine loams:		
Hilly phases.....	268	.05
Rolling phases.....	13,937	3.3
Undulating phases.....	1,211	.3
Chester-Brandywine silt loams, rolling phases.....	932	.2
Chester loam-Eubanks silt loam, rolling phases.....	936	.2
Chester loam:		
Rolling phase.....	1,120	.3
Undulating phase.....	4,817	1.1
Chester silt loam, undulating phase.....	268	.05
Chewacla silt loam.....	10,323	2.4
Clifton stony silt loam, rolling phase.....	1,289	.3
Congaree fine sandy loam.....	419	.1
Congaree silt loam.....	1,623	.4
Croton silt loam.....	10,944	2.6
Culpeper clay loam, eroded rolling phase.....	581	.1
Culpeper fine sandy loam:		
Rolling phase.....	2,628	.6
Undulating phase.....	554	.1
Davidson clay, eroded rolling phase.....	173	.05
Dyke silt loam, eroded rolling phase.....	500	.1
Elbert silt loam.....	988	.2
Elbert silt loam, concretionary phase.....	235	.05
Elioak silt loam:		
Eroded hilly phase.....	414	.1
Eroded rolling phase.....	628	.2
Rolling phase.....	4,212	1.0
Undulating phase.....	1,984	.5

TABLE 3.—*Approximate acreage and proportionate extent of the soils mapped in Fauquier County, Va.—Continued*

Soil	Acres	Percent
Eubanks loam:		
Eroded rolling phase.....	501	0.1
Rolling phase.....	2,261	.5
Eubanks silt loam:		
Eroded hilly phase.....	136	.03
Rolling phase.....	1,667	.4
Eubanks stony silt loam, rolling phase.....	544	.1
Fauquier-Eliaok silt loams:		
Rolling phases.....	3,977	.9
Undulating phases.....	790	.2
Fauquier silt loam:		
Hilly phase.....	555	.1
Rolling phase.....	9,391	2.2
Undulating phase.....	3,671	.9
Fauquier silty clay loam:		
Eroded hilly phase.....	2,159	.5
Eroded rolling phase.....	11,465	2.7
Eroded undulating phase.....	473	.1
Goldvein gritty silt loam:		
Rolling phase.....	2,605	.6
Undulating phase.....	3,329	.8
Hazel silt loam:		
Hilly and steep phases.....	6,393	1.5
Rolling phase.....	1,653	.4
Hiwassee loam:		
Eroded rolling light-colored variant.....	431	.1
Undulating light-colored variant.....	617	.1
Undulating phase.....	324	.05
Hiwassee silty clay loam, eroded rolling phase.....	351	.05
Iredell silt loam:		
Eroded undulating phase.....	3,767	.9
Level phase.....	2,862	.7
Undulating phase.....	5,446	1.3
Iredell stony silt loam, undulating phase.....	1,939	.5
Kelly silt loam, level and undulating phases.....	9,088	2.1
Lignum silt loam, undulating phase.....	858	.2
Lloyd clay loam, eroded rolling phase.....	571	.1
Lloyd silt loam, rolling phase.....	399	.1
Louisburg sandy loam:		
Hilly and steep phases.....	7,708	1.8
Rolling phase.....	4,669	1.1
Made land.....	200	.05
Manor silt loam:		
Eroded hilly phase.....	557	.1
Rolling phase.....	1,345	.3
Manteo shaly silt loam, hilly and steep phases.....	3,753	.9
Masada loam, undulating phase.....	211	.05
Meadowville silt loam.....	3,751	.9
Mecklenburg loam:		
Rolling phase.....	1,331	.3
Undulating phase.....	1,043	.2
Mixed alluvial land.....	1,143	.3
Montalto silt loam:		
Rolling moderately shallow phase.....	1,661	.4
Undulating moderately shallow phase.....	4,908	1.2
Montalto silty clay loam, eroded rolling moderately shallow phase.....	560	.1
Montalto stony silt loam, rolling moderately shallow phase.....	2,318	.5

TABLE 3.—*Approximate acreage and proportionate extent of the soils mapped in Fauquier County, Va.—Continued*

Soil	Acres	Percent
Myersville-Orange silt loams:		
Rolling phases.....	2, 141	0. 5
Undulating phases.....	1, 543	. 4
Nason silt loam:		
Rolling phase.....	9, 040	2. 1
Undulating phase.....	7, 422	1. 7
Penn loam:		
Eroded rolling phase.....	1, 098	. 3
Undulating phase.....	1, 544	. 4
Penn shaly silt loam, eroded hilly phase.....	1, 170	. 3
Penn silt loam:		
Eroded rolling phase.....	1, 725	. 4
Rolling phase.....	7, 976	1. 9
Undulating phase.....	20, 180	4. 7
Rohrersville silt loam.....	1, 188	. 3
Rough gullied land.....	301	. 05
Rowland silt loam.....	2, 963	. 7
Seneca loam.....	3, 513	. 8
Starr silt loam.....	8, 796	2. 1
State loam.....	157	. 04
Stony colluvium.....	2, 062	. 5
Stony rolling and hilly land:		
Acidic rock.....	16, 105	3. 8
Basic rock.....	11, 125	2. 6
Stony steep land:		
Acidic rock.....	10, 649	2. 5
Basic rock.....	2, 554	. 6
Stony (very stony) steep land:		
Acidic rock.....	9, 064	2. 1
Basic rock.....	7, 126	1. 7
Tatum silt loam:		
Rolling phase.....	3, 965	. 9
Undulating phase.....	1, 818	. 4
Tatum silty clay loam, eroded rolling phase.....	2, 439	. 6
Thurmont stony loam, undulating phase.....	450	. 1
Tusquitee loam, rolling phase.....	920	. 2
Wadesboro fine sandy loam, rolling phase.....	891	. 2
Wadesboro silt loam:		
Rolling phase.....	3, 306	. 8
Undulating phase.....	3, 378	. 8
Watt silt loam, hilly phase.....	126	. 03
Wehadkee silt loam.....	5, 687	1. 3
Worsham silt loam.....	9, 530	2. 2
Zion silt loam, undulating phase.....	1, 643	. 4
Total.....	426, 880	100. 0

eroded. The native vegetation consists of hardwood forest, mainly white, chestnut, and scarlet oaks with a few hickories and dogwoods.

#### Profile description:

- 0 to 9 inches, light yellowish-brown to yellowish-brown very friable loam containing a few small angular quartz particles; almost white when dry.
- 9 to 12 inches, yellowish-brown or light yellowish-brown very friable sandy loam containing abundant small quartz fragments.
- 12 to 32 inches, strong-brown to yellowish-brown very friable sandy clay loam that breaks into weakly cemented blocky pieces.
- 32 inches +, mingled strong-brown and yellowish-brown friable to more or less loose sandy loam containing many fragments of weathered quartzite; grades into more solid bedrock.

In places the subsoil is yellowish red or reddish yellow and is thicker and denser than normal. The surface texture is predominantly a loam, but it is locally a fine sandy loam or sandy loam. The texture of the surface soil seems to be influenced by the amount and texture of the quartz grains contained in the underlying quartzite rock.

The soil is very strongly to extremely acid in reaction and very low in plant-nutrient and organic-matter content. It has received a poor supply of lime and plant nutrients from the parent rock and has lost these materials to a considerable extent through long and severe leaching. Because it is loose and porous, this soil is highly adsorptive and permeable to water, but has only fair capacity to hold moisture. Plant roots and air penetrate and circulate freely.

Although the soil is very responsive to lime, fertilizer, and other good management practices, most amendments are rather rapidly lost through leaching. The soil has excellent tilth and occupies relief favorable for the use of farm machinery. Locally, small stones are on the surface and in the soil, but not of sufficient size and quantity to interfere with cultivation. Because of favorable relief and permeability, the soil is not very susceptible to accelerated erosion.

*Use suitability.*—About 40 to 55 percent of the soil is in cutover forest. About 10 percent is idle, and the rest is about equally divided between cropland and pasture.

The soil is fairly well suited to the production of the common crops. Although it holds moisture and retains improvements rather poorly, it possesses many favorable physical characteristics and responds very well to good management. Good management practices should include heavy liming, fertilization, additions of organic matter, and crop rotations of moderate length that include legumes.

Special crops such as tobacco may be well adapted to the soil. Although this crop is not grown in the county, it is grown extensively in southern Virginia on soils that are very similar to the Albemarle soils. For a more detailed discussion of use and management, see management group 4.

**Albemarle loam, rolling phase** (7 to 14 percent slopes) (Aa).—This phase differs from Albemarle loam, undulating phase, chiefly in having steeper slopes. On the average, the surface soil and subsoil are slightly thinner and the subsoil is less dense and compact than that of the undulating phase. Sheet erosion varies from slight to moderate. The most concentrated areas of soil are near Conde and west of The Plains. The surface soil is normally a light yellowish-brown to yellowish brown very friable loam, and the subsoil is a strong-brown to yellowish-brown friable sandy clay loam.

*Use suitability.*—About 50 to 60 percent of this soil has been cleared. Most of the cleared land is now in cultivation, but a considerable part is in pasture or idle.

The soil is fairly well suited to the common crops of the county. In general its use suitability and management requirements are similar to those of the undulating phase. Nevertheless, the stronger slopes result in more rapid runoff, decreased water-holding capacity, and an increased problem of conservation. For a discussion of use and management, see management group 5.

**Belvoir loam, undulating phase** (2 to 7 percent slopes) (Bb).—This light-colored imperfectly drained soil occupies wide undulating areas and narrower depressions in the uplands underlain by granitic rocks. The soil occurs in the northern part of the county in association with the Chester, Worsham, and Brandywine soils. For the most part, areas of this soil are small and scattered, but one large concentration occurs in a plain near Marshall and a second south of Atoka. Internal drainage and runoff are slow. The native vegetation consisted of red maple, beech, elm, and other water-tolerant trees.

**Profile description:**

- 0 to 6 inches, light yellowish-brown very friable weak granular loam.
- 6 to 14 inches, yellowish-brown friable heavy loam that seems hard or slightly cemented; small angular quartz particles make up 15 percent of the soil mass in some places.
- 14 to 25 inches, mottled light-gray and yellowish-brown gritty clay loam that is compact and apparently cemented; firm when moist and plastic when wet.
- 25 inches +, mottled light yellowish-brown, gray, and yellowish-brown friable gritty loam that becomes more friable and gritty with increasing depth and grades into granite bedrock at a depth of 5 feet or more.

Belvoir loam, undulating phase, is moderately to strongly acid and low in organic matter. It is wet during the rainy season but becomes dry, compact, and hard late in summer when the water table is lowest. Whether the soil is wet or dry, the compact lower layers restrict movement of air and water and the penetration of plant roots. The soil has a fair water-supplying capacity, but crops may be injured by either extended periods of drought or waterlogging. Apparently plant nutrients are fairly abundant; but unless the soil is artificially drained, their availability to plants is restricted because of poor aeration caused by the impeded drainage and compactness of the subsoil. The surface soil is permeable and friable and can be maintained in good tilth with reasonable care. Runoff is not excessive, and the soil is rather easily conserved.

There are some minor differences in areas mapped as Belvoir loam, undulating phase. In forested areas a thin surface layer of forest litter and leaf mold overlies a 1- to 2-inch dark grayish-brown friable loam. The total thickness of the soil over bedrock and the depth to mottling are variable from place to place. A few areas are poorly drained and resemble the Worsham soils.

*Use suitability.*—This phase is not considered very desirable. Probably 70 percent has been cleared, and about half of the cleared land is now used for crops. Approximately 35 percent of the cleared land is in permanent pasture, and only a small part is idle. Corn, small grains, and hay are grown, but alfalfa is not well adapted. Practically all large areas in cultivation are drained artificially by means of bedding and ditching. This allows the surface water to drain away and tends to keep the water table somewhat deeper during wet seasons. Reducing fluctuations of the water table in this way lessens the damage to crops by drought and waterlogging and promotes better aeration. Lime and fertilizer requirements are rather high, and crop response to them may be low because of the unfavorable moisture conditions and the limited thickness of the plant-rooting zone. For a discussion of use and management, see management group 7.

**Belvoir loam, level phase** (0 to 3 percent slopes) (Ba).—This phase differs from the undulating phase in having more level slopes and in containing a shallow surface layer of colluvium washed from the adjoining uplands. Drainage, on the average, is slightly more imperfect, and the surface soil is slightly deeper and coarser textured than that of the undulating phase. The soil occupies small elongated areas in association with the undulating phase and the Chester and Brandywine soils in the northern part of the county. It is characterized by a light yellowish-brown very friable loam surface soil and a mottled yellowish-brown and gray firm and compact gritty clay loam subsoil.

*Use suitability.*—About 75 percent of this phase has been cleared; probably 60 percent of this is now used for cultivated crops, and the rest for pasture. The cultivated areas were cleared largely because they are small and narrow and surrounded by larger areas of more productive soils, not because they are desirable for crops.

The soil is only fair to poor for crops. Although its use suitability is similar to that of the undulating phase, its problems of management are slightly greater and its yields are lower. Artificial drainage is more difficult on this soil, but it is necessary for successful crop growth. For a discussion of use and management, see management group 7.

**Bermudian silt loam** (0 to 2 percent slopes) (Bc).—This well-drained brown soil occurs on first bottoms that are subject to periodic overflow and deposition of soil material. It consists of alluvium washed from uplands underlain largely by Triassic shale and sandstone but partly by Triassic diabase. It is in narrow elongated areas along Cedar, and Licking Runs and other streams in the Triassic Plain part of the county. It is associated chiefly with the soils of the Rowland and Bowmansville series. Runoff is slow to very slow, and internal drainage is medium.

**Profile description:**

0 to 16 inches, brown to dark-brown very friable silt loam.

16 to 48 inches, brown to dark-brown, friable, heavy silt loam or light silty clay loam that breaks into somewhat platy lumps.

48 inches +, dark-brown, slightly mingled with yellowish-brown, friable heavy silt loam.

The soil is medium to strongly acid in reaction and apparently rich in organic matter and plant nutrients. It has excellent tilth under a wide range of moisture conditions and no stones. The open porous character of the soil allows easy penetration of plant roots and free movement of air. Rainfall is readily absorbed, and the water-supplying capacity is high.

*Use suitability.*—Practically all of this soil has been cleared. At least three-fourths is now in permanent pasture and the rest is in cultivation.

Although this is a productive and valuable soil, it is subject to periodic flooding and typically occurs in long narrow areas that are too small to receive individual attention. It usually receives the same use and management as the closely associated Rowland silt loam.

The soil is well suited to corn and hay and especially well suited to truck crops. Small grains are not well suited because of the flooding hazard and the tendency of small grains to lodge on such a fertile soil.

Although flooding limits the use suitability of the soil, it serves to replenish the supply of plant nutrients and organic matter. Little lime, fertilizer, or other amendments are used. For a more detailed discussion on use and management, see management group 1.

**Bowmansville silt loam** (0 to 2 percent slopes) (Bd).—This poorly drained soil of the first bottoms is associated with the Bermudian and Rowland soils (pl. 14, *B*). It consists of materials washed from uplands underlain by Triassic shale and sandstone. It typically occurs in rather narrow elongated level areas along the larger streams in the Triassic area. Usually it is some distance from the stream channel. Stream overflow on this soil is less than on the Bermudian and Rowland soils. Internal drainage is slow, principally because of the high water table; and runoff is very slow.

Profile description:

- 0 to 8 inches, brown or dark-brown, slightly mottled with light brownish-gray, friable heavy silt loam.
- 8 to 17 inches, mottled light yellowish-brown and light brownish-gray friable silty clay loam containing numerous small dark mineral concretions.
- 17 inches +, highly mottled yellowish-brown, gray, and light brownish-gray slightly plastic and sticky silty clay loam containing numerous small dark mineral concretions.

Locally there are a few swales and depressions. Some of the soil, especially that in the depressions, is semiswampy a large part of the year. These areas support a swampgrass vegetation and contain numerous crayfish holes. Although the flood plains in the Triassic shale and sandstone area appear to be quite wide, true first bottom soils occupy a relatively small part of them.

The soil is strongly acid in reaction, apparently fairly high in organic matter, and moderately well supplied with plant nutrients. Because of the poor aeration of the soil, however, the availability of the plant nutrients to most crops is restricted. The soil is readily permeable to water and has a high water-supplying capacity, but the high water table restricts plant-root development and circulation of air.

*Use suitability.*—Probably 15 to 25 percent of the soil is in forest, and practically all of the cleared land is in permanent pasture.

In its present condition, this soil is not suitable for the common crops of the county. It is moderately well suited to pasture. It supports a poorer quality of pasture than Rowland silt loam because it has poorer drainage, which causes poorer aeration and lower capacity to supply plant nutrients. Sedges and reeds persist unless the soil is artificially drained. Open ditches are most commonly used for artificial drainage. If drained, reclaimed, and adequately limed and fertilized, the pastures could be greatly improved in quantity and quality of forage. For a more detailed discussion on use and management, see management group 10.

**Braddock stony loam, rolling phase** (7 to 14 percent slopes) (Be).—This soil is characterized by a light-colored, stony surface soil and a red subsoil. It is a well-drained deep soil developed from very old colluvial rock and soil materials that rolled and washed from mountain slopes underlain by arkosic quartzite. In most places the colluvium has spread a considerable distance over the lower parts of the mountain slopes and has covered the original land surface. The soil occurs in

moderately large areas in the Bull Run Mountain-Baldwin Ridge area in close association with the Thurmont, Dyke, and other Brad-dock soils. The largest concentration is on the eastern slope of the Bull Run Mountains between New Baltimore and Thorofare Gap. A few slopes are between 2 and 7 percent. Internal drainage is medium, and runoff is medium to rapid. Although the soil is slightly to severely sheet eroded, more than 50 percent is only moderately sheet eroded. A few shallow gullies occur locally.

Profile description:

- 0 to 5 inches, brown or yellowish-brown very friable granular stony loam; abundant rounded or subangular quartzite pebbles and cobbles on the surface and in the soil.
- 5 to 11 inches, reddish-brown friable granular stony heavy loam.
- 11 to 20 inches, red friable to firm clay loam containing a few rocks; breaks into small blocky pieces.
- 20 to 50 inches, dark-red, friable when moist but slightly sticky when wet, sandy clay loam containing numerous rocks; breaks into small, blocky pieces that are easily crushed.
- 50 inches +, predominantly red, streaked with brownish yellow, friable sandy clay loam containing an abundance of rocks, which may make up 50 to 70 percent of the material.

Slight changes in surface texture, in the color of the subsoil, and in thickness of the soil layers locally occur. Small knobs of soils underlain by mica schist protrude here and there. The number of rocks on the surface and in the soil is variable, and small eroded areas with reddish-brown clay loam surface soils are numerous. Except for its stone content, the soil resembles the Culpeper and Wadesboro soils. Where it adjoins the Wadesboro soil, boundaries are rather arbitrarily placed. The soil is readily distinguished from the associated Elioak soils because of the scarcity of mica flakes in its profile. It is distinguished from the closely associated Thurmont soils by its red subsoil.

The soil is strongly to extremely acid in reaction and has low supplies of organic matter and plant nutrients. The surface soil loses organic matter rapidly under cultivation and, as a result, is almost white when dry. The soil absorbs water readily, retains moisture well, and allows free circulation of water and free penetration of plant roots. The scarcity of plant nutrients is traceable to the original scarcity of these materials in the parent rock and to the long and severe leaching of the soil. Because of the stones, tilth is only fair to poor.

*Use suitability.*—Probably 75 to 80 percent of this soil has been cleared at one time or another. About 30 percent of the cleared land has since been abandoned and is now lying idle in various stages of pine reforestation. The part that is now in agricultural use is about equally divided between crops and pasture.

The soil is fairly well suited to crops and pasture, but low fertility and stoniness limit its usefulness. Large amounts of lime and fertilizer and adequate additions of organic matter are needed for satisfactory yields of the common farm crops. Alfalfa and red clover would require heavier applications of lime and fertilizer. The soil is used and managed much the same as Culpeper fine sandy loam, rolling phase, and crop yields are about the same for the two soils. This soil is not so readily restored to productivity as the Fauquier or Eubanks soils but appears to be responsive to good management

practices and to retain the improvements gained from them. For a more detailed discussion on use and management, see management group 5.

**Braddock very stony loam, rolling phase** (7 to 14 percent slopes) (Bf).—This soil differs from Braddock stony loam, rolling phase, primarily in having considerably more quartzite cobbles, boulders, and pebbles on the surface and in the soil profile. The stones practically prevent cultivation (pl. 1, A). The most extensive areas of soil are in close association with Braddock stony loam, rolling phase, and the Thurmont soils on the slopes of the Bull Run Mountains. A few slopes are less than 7 percent. There is considerable variation in degree of accelerated sheet erosion, but most of the soil is moderately sheet eroded. Gullies are not common.

*Use suitability.*—Practically all of this soil was at one time cleared for agricultural use. At least 50 percent of the land once cleared is now lying idle in various stages of pine reforestation. The remaining land is in permanent pasture.

Because of its high stone content, this soil is unsuited to crops but well suited to permanent pasture (pl. 1, B). Good pastures can be established and maintained through the proper use of lime and fertilizer. Weed control by clipping is difficult. For a discussion of use and management, see management group 12.

**Brandywine loam, hilly phase** (14 to 25 percent slopes) (B1).—This shallow excessively drained brown soil occurs on hilly to steep uplands in the northern part of the county. It occurs on slopes of deeply cut stream valleys and on slopes of mountainsides or hillsides. This phase is widely distributed and is the most extensive soil in the county. Areas are rather large and elongated and occur in close association with other members of the Brandywine series, with the Chester and Belvoir soils, and with the three mapping units of stony land derived from acidic rock.

Because of the steepness of slope, the runoff is rapid to very rapid. Locally, this soil is known as sandy land because of the large amount of coarse sand left from the weathering of the parent granite and granite gneiss. Most of the soil has had about 25 to 75 percent of the original surface soil removed by accelerated erosion, and locally a few shallow gullies have developed.

Profile description:

- 0 to 8 inches, light yellowish-brown to brown very friable loam containing a few small angular fragments of granite and quartz.
- 8 to 18 inches, yellowish-brown to light yellowish-brown friable loam or sandy loam containing weathered pieces of granite that make up as much as 25 percent of the soil mass.
- 18 inches +, a mixture of yellowish-brown very friable sandy loam and pieces of weathered granite; the granite fragments become more numerous with increasing depth; this layer grades into more solid bedrock of granite and granitic gneiss.

As mapped, the phase includes small, elongated areas of the Chester and Catoclin soils underlain by narrow inclusions of greenstone schist in granite and small areas of the Eubanks soils underlain by massive greenstone dikes in granite. These inclusions occur chiefly in the western part of the granite belt. Some of the Brandywine soil in the Blue Ridge and the isolated outlying mountains and hills has a

surface soil much darker brown than usual that resembles the Porters loam of other areas. Areas near Wilson's Store and west of Conde appear to be lower in plant nutrients, lighter colored, and coarser textured than typical. These resemble somewhat Louisburg sandy loam. All of these inclusions are very small.

This hilly phase is generally moderately to strongly acid and rather low in organic matter. It includes occasional outcrops of solid rock. As a rule, the soil is thinner and more sandy near the bedrock outcrops. Stones and outcrops are common on the surface but are seldom sufficiently numerous to interfere with cultivation. The porous friable soil permits easy penetration of plant roots, free movement of air and water, and rapid internal drainage.

*Use suitability.*—Between 65 and 80 percent of the soil has been cleared. A little more than half of this is now cultivated, and the rest is chiefly in permanent pasture (pl. 2, A). Very little of the cleared land is idle. Mountain areas and isolated places remain in forest.

A number of characteristics make this soil poorly suited to cultivation. It occurs on hilly slopes and is generally shallow to bedrock. Thus, it has a limited capacity to provide water for plant growth, is readily susceptible to erosion when cultivated, and is poorly suited to the use of large machinery. Although it absorbs water readily, as compared with most hilly soils of the county, and apparently stores water fairly well, its shallowness limits the storage capacity. For a shallow soil, however, it seems to be unusually well supplied with plant nutrients and is productive of cultivated crops in seasons of sufficient rainfall. Crops will withstand short dry spells but suffer during longer droughts. The fairly high level of fertility seems to be directly related to the nature of the underlying rock and granite.

Because of the hilly slopes, general inaccessibility, and difficulty in controlling runoff and erosion under cultivation, permanent pasture is generally the best use for this soil. Under proper management, including adequate liming and fertilization, carefully controlled grazing, and adequate weed control, the soil can be rather easily maintained in good bluegrass sod. Lespedeza and clovers also grow well, although they seem to be more sensitive to the dry spells in summer. For a detailed discussion of use and management, see management group 13.

**Brandywine loam, rolling phase** (7 to 14 percent slopes) (Bm).—This phase differs from Brandywine loam, hilly phase, in occupying milder slopes on rolling ridgetops and near the foot of stronger slopes. Other differences commonly exist, such as slightly thicker surface and subsurface layers, less stones and solid rock outcrops, and less runoff. The soil is associated principally with the Chester and other Brandywine soils. Areas of Chester loam, rolling phase, too small to show on the map are included in places.

This soil is only slightly to moderately sheet eroded. A few shallow gullies occur locally. The surface soil is normally a yellowish-brown to brown very friable loam. The subsurface layer is a yellowish-brown very friable or sandy loam containing many fragments of weathered granite.

*Use suitability.*—About 80 percent of this phase has been cleared. A few areas are now idle, but most of the cleared land is about equally divided between crops and pasture (pl. 2, B).

This phase is fairly well suited to the production of the common crops. It is more retentive of soil moisture, less subject to excessive runoff and erosion, more accessible to farm machinery, and wider in its adaptation to most farm crops than Brandywine loam, hilly phase. Although it is naturally fertile, it responds to good management practices. Because of the shallowness and associated droughtiness of this soil, satisfactory yields of some crops, especially corn, are largely dependent on sufficient moisture during the growing season. Good management practices should include adequate liming, fertilization, and return of organic matter to the soil. The last-named practice, used with contour cultivation, will aid in increasing the moisture-holding capacity of the soil. For a discussion of use and management, see management group 9.

**Brandywine loam, steep phase** (25 percent + slopes) (Bn).—This soil occurs in the northwestern part of the county. It differs from Brandywine loam, hilly phase, primarily in occupying steeper slopes. It is also slightly shallower to bedrock and contains more loose and solid rock outcrops. Practically all of this phase is on steep mountain slopes in the Blue Ridge and on associated outlying mountains and foothills underlain by granitic rocks (pl. 3, A). It occupies rather large elongated areas in association with other Brandywine soils and with areas of the various stony land types derived from acidic rock. It is characterized by a yellowish-brown to brown very friable loam surface soil and a yellowish-brown very friable sandy loam subsurface layer containing many fragments of weathered granite.

*Use suitability.*—About 50 to 60 percent of this soil is in cutover hardwood forest. The cleared areas are used almost entirely for permanent pasture.

This phase is unsuited to cultivated crops because of steep relief, very rapid runoff, susceptibility to erosion, shallowness, droughtiness, and poor accessibility to farm machinery. However, it is moderately well suited to permanent pasture. Pasture management practices are the same as for the hilly phase, but yields are slightly less. For a discussion of use and management, see management group 14.

**Brandywine loam-Eubanks silt loam, hilly phases** (14 to 25 percent slopes) (Bk).—This complex consists of an association of the hilly phases of Brandywine loam and Eubanks silt loam. Brandywine soils occur on about 60 percent of the area, and the Eubanks soils on 40 percent. This complex is closely associated with the Brandywine, Montalto, and Chester soils in the northern part of the county. It is underlain by granite and gneiss profusely intruded by dikes of diabase or greenstone. Sheet erosion is moderate. There are no gullies. Runoff is rapid, and internal drainage is medium to rapid.

The Brandywine soil, overlying granite and granitic gneiss, has a dark yellowish-brown to brown very friable loam surface soil and a yellowish-brown friable stony sandy loam subsurface horizon. A reddish-brown friable silt loam surface soil and a red firm clay loam subsoil characterize the Eubanks soil, which is underlain by massive greenstone or diabase.

*Use suitability.*—Practically all of this complex was cleared and is now used for permanent pasture. The complex is not suited to cultivation, because of steepness of slope, poor accessibility to farm machinery, poor water-supplying capacity, and susceptibility to excessive runoff and erosion. Because of the relatively high fertility of the included soils, good pastures can be rather easily established and maintained. Pasture management is similar to that on Brandywine loam, hilly phase. For a discussion of use and management, see management group 13.

**Brandywine gritty loam, rolling phase (7 to 14 percent slopes) (Bh).**—This phase differs from the Brandywine loam soils principally in having a coarser texture. It is derived from granitic rocks, chiefly coarse-textured granite and granite gneiss. This soil is more or less restricted to a north and south belt, 3 to 5 miles in width, in the western part of the county (pl. 3, *B*). It is associated with other Brandywine soils and with the Chester and Myersville. A few slopes of less than 7 percent are included. Internal drainage is rapid and surface runoff is medium to rapid. Although erosion ranges from slight to severe, more than 80 percent of this phase has lost only 25 to 75 percent of its original surface soil through accelerated erosion. Gullies occur locally in scattered areas.

**Profile description:**

- 0 to 7 inches, dark yellowish-brown to dark-brown loose gritty loam; the grittiness is due to an abundance of small angular quartz fragments that comprise up to 20 percent of this layer.
- 7 to 30 inches, strong-brown to yellowish-red friable gritty loam; small angular quartz fragments are more abundant than in the layer above; the finer material contains a considerable amount of small mica flakes.
- 30 inches +, highly weathered coarse-grained granite that crumbles under slight pressure; in places this material has retained the original structure, texture, and color of the unweathered rock.

The soil varies from place to place, principally in color of the surface soil, depth to bedrock, and content of quartz fragments. In some fields the finer textured materials of the surface layer have washed away and left the coarser quartz fragments. Some areas, especially near Cresthill, are heavier in the subsoil and are browner in color throughout the profile. Small areas underlain by fine-grained schistose granite resemble the silt loams of the Myersville and Brandywine series.

This soil is locally called hominy land. It is strongly acid and rather low in organic matter and plant nutrients. Water-supplying capacity is very poor. The soil is very permeable and allows easy penetration of plant roots, air, and moisture. Ordinarily, tilth is good. A few stones and an occasional large flat bedrock outcrop are characteristic but do not interfere with cultivation.

*Use suitability.*—An estimated 50 to 70 percent of this phase was cleared; of this probably 30 to 40 percent is now idle and reverting to forest or is unimproved pasture. In general this soil supports a lower type of agriculture than Brandywine loam, rolling phase, and farmers recognize the superiority of the latter. The relatively high content of quartz fragments in the gritty loam gives rise to a looser and more porous soil, and the rate of water absorption is high. However, the gritty loam has less capacity to retain moisture and supply it to crops and has less inherent fertility than the Brandywine loam. Yields are

less, and problems of management are greater. Productivity is not easily restored to areas that have remained idle for a considerable time.

Despite its shallowness, fairly low level of fertility, and very poor water-supplying capacity, crop production is considered to be the best use for this soil. The soil can be conserved rather easily and be made more productive under proper management. For a detailed discussion of use and management, see management group 9.

**Brandywine gritty loam, hilly phase** (14 to 25 percent slopes) (Bg).—This phase differs from Brandywine gritty loam, rolling phase, chiefly in occupying steeper slopes. It is also, but less noticeably, shallower to bedrock, lighter in color, coarser in texture, and more stony. It occurs in moderately large elongated areas that are associated chiefly with Brandywine gritty loam, rolling phase, and the various stony land types from acidic rock (pl. 3, B). Accelerated sheet erosion ranges from almost none to severe, but more than 75 percent of the soil is moderately sheet eroded. A few gullies, both shallow and deep, occur locally. The soil is fairly uniform.

*Use suitability.*—Most of this phase was cleared, and of the cleared land about 70 percent is now in pasture, 15 percent in cultivation, and 15 percent in land left idle.

Because of shallowness, steepness, droughtiness, rapid runoff, susceptibility to erosion, and poor accessibility, this soil is poorly suited to cultivated crops. It is moderately well suited to permanent pastures, but these tend to be relatively unproductive during dry weather. Pastures are inferior to those on Brandywine loam, hilly phase, because of the lower natural fertility and lower moisture-holding capacity of the gritty loam soil.

The phase needs adequate lime and fertilizer for the satisfactory growth of desirable pasture grasses. For a discussion of use and management, see management group 13.

**Brandywine silt loam, hilly phase** (14 to 25 percent slopes) (Bo).—This is the shallow excessively drained brown soil developed over dikes of schistose greenstone that intrude granite. It occurs on hilly slopes in the lower northwestern part of the county in association with Chester silt loam, Chester-Brandywine silt loams, Eubanks loam, and other Brandywine soils. The most extensive areas are in the Glenora Valley and north of Cresthill. Internal drainage and runoff are rapid. The soil differs from Brandywine loam mainly in containing less silt and more sand, in being browner and more friable, and in being underlain by different parent material.

Profile description:

0 to 9 inches, brown to dark-brown mellow silt loam.

9 to 20 inches, strong-brown to dark reddish-brown friable silt loam; abundant small, finely divided mica flakes and a few small quartz fragments; has the appearance of highly weathered rock when in place.

20 inches +, strong-brown highly weathered and disintegrated schist material of an originally basic nature; abundant small quartz fragments; extremely friable and micaceous; varies from a loam to fine sandy loam in lower part and grades into solid bedrock at varying depths; material clearly exhibits the original rock texture and structure.

The horizons of the soil are not well defined. By far, most of the soil has developed from residuum weathered from dikes of schistose

greenstone that intrude granite, but small local areas appear to be underlain by schist, granite gneiss, or mixed greenstone schist, granite schist, or gneiss. An important variation occurs near Scuffleburg where the underlying schistose rocks appear to be of sedimentary origin and resemble the rocks underlying the Hazel, Manor, and Elioak silt loam soils. Here the soil is a little lighter colored and contains more rock fragments, but otherwise it resembles the typical soil. Areas of this phase underlain by massive coarse-grained granite occur in places, but they are too small to be shown separately on the map. Small areas of Brandywine silt loam, hilly phase, are included.

The soil is strongly acid in reaction, apparently moderately well supplied with organic matter, and relatively high in content of plant nutrients. It is highly permeable, highly absorptive of water, and allows free downward movement of plant roots and free movement of moisture and air throughout the profile. Tilt conditions are excellent. Loose surface stones occur only occasionally, and solid rock outcrops are small and inextensive. On the unfavorable side, however, the water-holding capacity is poor, and the soil dries out rapidly in periods of low rainfall. The soil responds to good management; but, as for most shallow soils, its capacity to accumulate and preserve plant nutrients supplied through good management practices is low. It is also very susceptible to both sheet and gully erosion. Steepness of slope; rapid runoff; the silty deflocculated condition of the soil material; the usual absence of rock fragments; and the general use of the soil for cultivated crops are factors that make the soil so erodible.

*Use suitability.*—Practically all of the phase is cleared and used for crops or pasture. Largely because of the hilly relief, rapid runoff, susceptibility to erosion, poor accessibility to farm machinery, shallowness, and droughtiness, the soil is not considered suitable for crops. It is fairly well suited to permanent pasture if properly managed. Good pasture management should include adequate liming and fertilization and careful control of grazing and weeds in order to maintain a good sod. For a discussion of use and management, see management group 13.

**Brandywine silt loam, rolling phase** (7 to 14 percent slopes) (Bp).—This phase differs from Brandywine silt loam, hilly phase, chiefly in having milder slopes. It is characteristically on rolling narrow crests, ridges, divides, and slopes in close association with the hilly phase and the Myersville soils. It occurs in small elongated areas in the lower northwestern part of the county. Accelerated sheet erosion ranges from slight to moderate, but about 95 percent of the soil is moderately sheet eroded. A few gullies, both deep and shallow, occur locally.

*Use suitability.*—Practically all of this phase is cleared and used for crops. Generally, the crops and yields are similar to those on Brandywine loam, rolling phase.

The soil is fairly well suited to the common crops if properly managed. Because of milder relief, runoff is less and the water-holding capacity is greater than for Brandywine silt loam, hilly phase. The soil, however, is susceptible to accelerated erosion, and contour tillage and stripcropping should be used when practicable to control runoff

and conserve moisture. A moderately long rotation that includes legumes and adequate liming and fertilization are necessary for continued moderately high yields of crops. For discussion of use and management, see management group 9.

**Bucks silt loam, undulating phase** (2 to 7 percent slopes) (Br).— This soil is characterized by its dark reddish-brown (with a purplish cast) subsoil and brown surface soil. It is a moderately deep well-drained upland soil developed over Triassic red shale and sandstone. It occurs throughout the Triassic plain in the southern part of the county in close association with the Penn, Calverton, Wadesboro, and Croton soils. The soil typically occupies moderately large areas on broad undulating ridges that adjoin the Penn soils on more sloping land. It resembles the closely associated Penn soils in color but differs in having a heavier textured, denser, and thicker subsoil and a greater depth to bedrock. Both of these soils have inherited their common color from the parent rock. A few areas of this soil have slopes of less than 2 percent. Runoff is slow to medium, and internal drainage is medium. Sheet erosion ranges from slight to moderate, and gullies are practically absent.

Profile description:

- 0 to 8 inches, brown friable granular silt loam that has a few small rounded quartz pebbles on the surface and in the soil.
- 8 to 21 inches, reddish-brown friable silty clay loam that breaks into small blocky pieces; contains a few small fragments of weathered shale.
- 21 to 32 inches, dark reddish-brown (with a purplish cast) friable heavy silty clay loam or silty clay; readily breaks into small blocky pieces that are firm when moist and hard when dry; contains a few small fragments of weathered shale.
- 32 inches +, highly weathered dark-red Triassic shale exhibiting the original platy structure of the shale; contains some dark reddish-brown friable silt loam soil material between the layers of shale; grades into more consolidated bedrock with increasing depth.

This soil varies considerably in physical characteristics and in origin. The depth to bedrock may vary from 18 to more than 40 inches. The surface soil varies from a brown or light brown where only slightly eroded to a reddish brown where erosion and cultivation have resulted in the mixing of the subsoil and remaining surface soil. The soil, where overlying interbedded or mixed shale and diabase, is much deeper and redder than normal and contains small black concretions in the lower subsoil. Locally, small areas totaling about 500 acres are included; they have a loam surface texture and are underlain by fine-grained sandstone.

In many places the soil occupies small areas in depressions or along small drainageways. Here the soil consists mainly of colluvium washed or sloughed from surrounding areas of the Penn or Bucks soils. In most places, this colluvium is deposited to a considerable thickness over areas of Croton or Calverton soils and the lower parts of the soil may show slight mottling. Most of these colluvial areas are flooded by runoff from the adjoining areas during heavy rains, but they are waterlogged for only a relatively short time. However, drowning of seeds and heaving of plants often result during prolonged extremely wet seasons. This variation, although probably as productive as the normal soil in dry seasons, is more difficult to work because of greater wetness and slower drying in spring.

The soil is strongly to very strongly acid in reaction and moderately low in plant nutrients, but apparently fairly high in organic-matter content. Its only fair natural fertility can be traced directly to the scarcity of plant nutrients in the parent rock. The soil absorbs water readily and stores it fairly well and is permeable to air and plant roots. It possesses good physical properties, is very responsive to good management practices, and can be brought to and kept at a fairly high level of productivity. Removal of organic matter, lime, and plant nutrients by leaching is not great. Tillth is good, and the soil is easily cultivated with heavy machinery.

*Use suitability.*—Practically all of this phase was cleared and is now in cultivation, although a few areas are idle or in pasture.

The soil is well suited to the growing of the common crops if properly managed. The range of crop adaptation is limited somewhat because of somewhat low fertility and high acidity. The soil needs heavy applications of lime and fertilizer to grow crops such as alfalfa satisfactorily. Among the many important good management practices are the proper choice and rotation of crops, growing of legumes, return of organic matter to the soil, and judicious use of amendments. Under good management, however, the soil is less productive than the undulating phases of Fauquier and Chester silt loams. For a more detailed discussion on use and management, see management group 4.

**Calverton silt loam, undulating phase** (2 to 7 percent slopes) (Ca).—This light-colored imperfectly drained moderately deep upland soil developed over Triassic red shale and sandstone. It occurs in irregular-sized elongated areas. It is associated chiefly with the Penn, Croton, Bucks, and Wadesboro soils in the southern part of the county on the Triassic plain. A few areas have slopes of less than 2 percent. Internal drainage and runoff are slow. Sheet erosion ranges from none to moderate; more than three-fourths of the soil is only slightly sheet eroded. Gullies are not characteristic of this soil.

Profile description:

- 0 to 10 inches, light yellowish-brown or yellowish-brown very friable silt loam.
- 10 to 20 inches, yellowish-brown friable to firm silty clay loam that breaks into small blocky pieces; contains a few small dark concretions and quartz pebbles.
- 20 to 42 inches, yellowish-brown, slightly mottled with strong brown and light brownish-gray, heavy silty clay loam or silty clay; firm when moist and plastic when wet; contains a few small dark mineral concretions and quartz pebbles.
- 42 inches +, mottled light yellowish-brown, reddish-yellow, and pale-yellow firm silty clay (highly weathered shale); grades into more solid and less weathered shale with increasing depth.

The depth to weathered shale varies considerably. In many places the subsoil is thicker and the depth to weathered shale may be 50 inches or more. Small areas with a thinner subsoil and shallower depth to weathered shale than normal are also included. The surface texture is locally a fine sandy loam or loam where the parent rock is sandstone rather than shale. Although the color of the surface soil is consistently uniform, the subsoil is locally browner than normal. The areas with browner subsoils have better drainage and typically occur where the soil adjoins and grades into areas of the Bucks or

Wadesboro soils. Some small depressed areas at the heads of drains are more poorly drained and have more mottled, heavier, and more plastic subsoils. Small areas resembling the Croton soil are included in places. Small, rounded, pink and white quartz gravel is locally strewn on the surface and in the soil. Where abundant enough to interfere with cultivation, the gravel is indicated on the map by a symbol.

The soil is very strongly to extremely acid in reaction and low in organic-matter and plant-nutrient content. Some organic matter occurs in the upper inch or two of the virgin surface soil, but this quickly disappears after cultivation. Air permeability is only fair, and water percolation is restricted somewhat by the dense subsoil. Nevertheless, water is readily absorbed and well retained. Tilt is good, and the soil can be worked under a fairly wide range of moisture conditions. Because of favorable relief, the accessibility to farm machinery is good. The fluctuating water table is fairly high during the wetter periods of the year; consequently, the depth of root penetration is limited, and the soil is rather poorly aerated during part of the growing season.

*Use suitability.*—An estimated 75 percent of the soil has been cleared; about 20 percent of this is now idle, and the rest is about equally divided between crops and pasture.

If properly managed the soil is fairly well suited to the common crops. It is not well adapted to alfalfa and other deep-rooted legumes. Low inherent fertility, high acidity, and moderately poor aeration are its worst features. Artificial drainage would be expected to broaden the use suitability and increase production. The soil is suited to intensive use if the organic-matter, lime, and fertility levels are maintained with crop residues, green manure, barnyard manure, lime, and commercial fertilizers.

The present use and management of the soil and the yields obtained vary considerably. Where the soil is associated with the Wadesboro soils in the northwestern part of the Triassic belt, a subsistence type of farming is generally followed. Here approximately half of the soil is in forest, and most of the rest is farmed only occasionally. No systematic rotation is followed, and little is done to improve the land.

In the central part of the Triassic belt, the soil is associated mainly with the Penn and Bucks soils. Dairy farming predominates in this area, and most of the soil is cleared, used for crops, and farmed under fairly good management practices. For a more detailed discussion on use and management, see management group 7.

**Catlett silt loam, eroded undulating phase** (2 to 7 percent slopes) (Cb).—This well-drained upland soil developed over bluish-gray baked Triassic shale. It is characterized by its grayish color and shallow profile. The conspicuous grayish color distinguishes it from the closely associated Penn soils, which it resembles in most other internal characteristics. Other associated soils belong to the Zion, Iredell, Croton, and Kelly series.

This Catlett soil is typically in rather narrow elongated strips that adjoin the Penn on one side and the Iredell or Zion soils on the other. It occurs in the southern part of the county in the Triassic plain along the contact zone between Triassic shale and intrusions of coarse-grained

Triassic diabase. A few slopes are between 7 and 14 percent. Runoff and internal drainage are medium. Sheet erosion varies from slight to moderate, and a few shallow gullies occur locally.

Profile description:

- 0 to 8 inches, light brownish-gray when dry and grayish-brown when wet, very friable floury silt loam containing small fragments of baked shale.
- 8 to 14 inches, gray, mingled with grayish-brown, friable heavy silt loam containing numerous fragments of baked shale.
- 14 inches +, weathered, gray, baked shale; grayish-brown and gray friable silt loam soil material between the layers of shale.

Small areas of the soil occupy depressed positions and are imperfectly to poorly drained. These areas are indicated on the map by wet-spot symbols. Small scattered areas have thin silty clay loam subsoils and are deeper to bedrock than normal. Other areas are stonier and shallower to bedrock than normal. Very narrow strips of the soil, too small to show on the map, are included in places with the Penn and Zion soils. The amount of shale on the surface and in the soil varies considerably and in some places is enough to interfere with tillage. Outcrops of solid rock are not common. Locally, small areas of this soil overlie material similar to that in the subsoil of the Iredell soils.

The soil is very strongly to extremely acid in reaction and poorly supplied with plant nutrients and organic matter. It has a poor water-supplying capacity. The natural shallowness results principally from the extreme hardness of the parent shale and its resistance to weathering. Where a part of the original surface soil has been removed by erosion, subsequent cultivation brings rather large quantities of baked shale to the surface. This shale, unlike that underlying the Penn soils, does not weather readily to soil material.

Largely because of the relatively high shale content in the plow layer, tilth is only fair, but the soil has favorable relief and is accessible to all types of farm machinery. Water and air penetrate and circulate freely, but the downward growth of plant roots is somewhat limited by the shallow depth to bedrock.

*Use suitability.*—Probably 70 to 75 percent of this soil was cleared. An estimated 65 percent of the cleared land is now in crops, and 30 percent in pasture. About 5 percent is lying idle. The idle land is largely old meadows and poor pastures that are reverting to forest.

The soil is only fairly well suited to crops, pasture, or forest, but it can be used for common crops if properly managed. It is not suited to alfalfa or other deep-rooted legumes. The soil needs rather large applications of lime, complete fertilizer, and organic matter. A crop rotation should be used that will add humus and increase the moisture-holding capacity. When cropped, the soil is used and managed like the closely associated Penn soils. For a more detailed discussion on use and management, see management group 8.

**Catoctin silt loam, hilly phase** (14 to 25 percent slopes) (Cd).—This is a shallow light-colored excessively drained upland soil that developed over all three varieties of greenstone. It occupies hilly slopes produced by deep dissection of an original plain and also occurs in the Blue Ridge, Rappahannock, Pignut, and less prominent mountains and hills that project above the general upland level (pl. 4, A). The soil occupies rather large elongated areas in close association with

other Catoctin soils, the Fauquier and Myersville-Orange soils, and the stony land types from basic rocks. It is one of the more extensive soils of the county. Internal drainage and runoff are rapid.

**Profile description:**

- 0 to 7 inches, light yellowish-brown to brown very friable floury silt loam containing a few scattered fragments of greenstone and quartz.
- 7 to 14 inches, brown to strong-brown friable heavy silt loam; breaks into weakly cemented small blocky pieces and contains highly weathered, easily crumbled, soft greenstone-schist fragments.
- 14 inches +, soft, highly weathered and partially disintegrated greenstone schist; yellowish brown with a greenish cast; friable brown silt loam soil material has developed between the cleavage planes of the weathered rock; grades into more solid greenstone bedrock.

Except for being consistently shallow in depth to weathered rock, the soil is quite variable in profile characteristics. Where the soil is underlain by agglomerate greenstone, the profile is much shallower, is lighter colored (more gray and less red), and has considerably more rock outcrops and loose stone scattered on the surface and throughout the soil. The agglomerate type of greenstone occurs in the mountains and prominent hills along the western border of the central greenstone belt. The soil in many places has browner surface soils and shallow yellowish-red silty clay loam subsoils.

Where the underlying greenstone rock contains bands, stringers, or inclusions of quartzite or mica gneiss, the soil may have a loam surface texture. Small scattered areas of shallow Fauquier soils occur but are too small to show on the map.

This phase is strongly acid throughout its profile. It appears to be poorly supplied with organic matter but possesses moderate fertility. Its capacity to conserve plant nutrients, organic matter, and moisture supplied through good management is rather low. The soil absorbs water readily, but its water retaining and supplying capacities are poor. Its permeability to roots, moisture, and air is excellent, although larger roots do not penetrate to any great depth. A scattering of loose rock and an occasional rock outcrop occur on the surface and are indicated by symbols on the map.

Most cleared areas of the soil have had much of the loose rock removed, and many fences have been constructed from the rock. Where the soil is sufficiently free of loose surface stones and solid outcrops, tilth is good. Approximately 85 percent of this phase is slightly eroded; sheet and gully erosion are severe on the rest.

*Use suitability.*—About 25 to 40 percent of the soil is in cutover forest (pl. 14, A), approximately 10 percent is idle, and the rest is in permanent pasture. There are a few small areas, mainly severely eroded, that have been or are now cultivated with poor success.

Largely because of the hilly relief, rapid runoff, susceptibility to erosion, poor accessibility to farm machinery, shallowness, and droughtiness, the soil is not considered suited to crops. It is fairly well suited to permanent pasture if properly managed. Good stands of bluegrass and white clover can be established and maintained by applying adequate quantities of lime and fertilizer (pl. 6, B). Yields, however, decline rapidly during the dry late-summer months. The adequate and regular liming of this soil for pasture is particularly important. For a discussion of use and management, see management group 13.

**Catoctin silt loam, rolling phase** (7 to 14 percent slopes) (Ce).— This phase differs from Catoctin silt loam, hilly phase, chiefly in having milder slopes. In addition, it is generally deeper to bedrock and less eroded. It occurs on rolling ridgetops and in areas near the foot of steeper slopes. It is associated principally with other Catoctin soils and with the Fauquier and Myersville-Orange soils. Accelerated sheet erosion ranges from slight to moderate, but more than three-fourths of the soil is moderately sheet eroded. A few shallow gullies occur locally. The surface soil is usually a yellowish-brown to brown very friable floury silt loam; and the subsurface layer is a strong-brown friable silty clay loam. Locally the soil has a thin yellowish-red silty clay loam or clay loam subsoil.

*Use suitability.*—Probably 75 to 85 percent of this soil has been cleared, and about 55 percent of this is now in cultivation, 40 percent in permanent pasture, and 5 percent in idle land. A moderately long rotation of corn, hay, and pasture is generally used.

This rolling phase is fairly well suited to common crops and is moderately well suited to permanent pasture. Compared with Catoctin silt loam, hilly phase, the soil has slower runoff, is less susceptible to erosion, has a greater moisture-supplying capacity, and is more accessible to heavy farm machinery. Although naturally moderately fertile, it responds well to good management. Contour tillage or stripcropping should be used to control erosion, minimize soil loss, and aid in retaining moisture for plant growth. If consistent with farm management, close-growing crops should be grown predominantly or entirely. Although the soil can be used for the cultivated crops, the pastured areas probably should remain in pasture. The soil needs adequate liming, fertilization, and return of organic matter for satisfactory crop growth. For a discussion of use and management, see management group 9.

**Catoctin silt loam, eroded steep phase** (25 + percent slopes) (Cc).— This phase differs from Catoctin silt loam, hilly phase, chiefly in having steeper slopes, in being more stony, and in having a shallower profile because of very rapid runoff and resulting erosion. It occurs largely in the Blue Ridge Mountains and isolated mountains in the central greenstone belt (pl. 4, A). The surface soil, normally a light yellowish-brown very friable floury silt loam, is underlain by a brown to strong-brown friable stony heavy silt loam subsurface layer.

*Use suitability.*—The soil is only fairly well suited to permanent pasture. Because of its steep slopes, it has a very poor moisture-supplying capacity and is less productive than Catoctin silt loam, hilly phase. It needs adequate lime and fertilizer, weed control, and carefully controlled grazing for satisfactory production. For a discussion of use and management, see management group 14.

**Chester loam, undulating phase** (2 to 7 percent slopes) (Cn).— This is a moderately deep well-drained brown soil derived principally from granite and granite gneiss. It occurs in the northern part of the county on undulating ridgetops, chiefly in association with other Chester soils, Brandywine soils, and Belvoir soils (pl. 4, B). Runoff is medium; internal drainage is medium to rapid because of the rather high topographic position and the permeable soil and substratum. Native vegetation was the oak-hickory type. White oak, black oak,

white hickory, pignut hickory, dogwood, black locust, and wild cherry predominated.

Following is a profile description for wooded areas:

- 0 to 8 inches, light yellowish-brown to brown, very friable, weakly granular loam.
- 8 to 28 inches, brown, yellowish-brown, or yellowish-red friable silty clay loam or clay loam of moderate medium blocky structure; contains many fine mica flakes, many small angular quartz grains, and a few weathered granite fragments.
- 28 to 40 inches, brown or dark-brown firm silty clay loam streaked with light yellowish brown and black.
- 40 inches +, streaked yellowish-brown, reddish-brown, and black friable highly disintegrated granite that still retains part of the original rock structure.

The soil varies somewhat from place to place in color, texture, and thickness of horizons. Locally there are areas with reddish-brown subsoils that are similar to those of Eubanks loam. These are widely scattered and generally small; perhaps the greatest concentration is near Delaplane. In the Glenora Valley and south of Upperville and Delaplane, the subsoil is browner and more micaceous than usual, and the surface is also slightly browner. These browner areas are underlain by interlayered granite gneiss and greenstone schist. Locally, texture of the surface soil may be a silt loam or sandy loam, although neither is common. As a rule the silt loam is somewhat browner than the loam or sandy loam. Small areas of Eubanks soils are included where massive greenstone occurs in the granitic rocks.

This soil is fertile and productive, although it is generally moderately acid throughout its entire thickness. It is readily permeable to air, water, and plant roots. The tilth is excellent, and tillage can be safely carried on over a wide range of moisture conditions. Loose stones and solid rock outcrops are uncommon. The moisture-supplying capacity is good, and surface relief is favorable for the absorption and retention of adequate soil moisture for growing plants.

*Use suitability.*—Practically all of this soil has been cleared, and most of it is now in cultivation. Only small isolated areas remain in forest. Perhaps 10 to 20 percent of the cleared area is in pasture, and only a negligible part is ever idle.

This soil is well suited to the common field crops and can be maintained under a short rotation if adequately limed and fertilized. Although originally moderately fertile, it is responsive to good management and is locally known as a soil that takes and holds improvement well. It is somewhat deficient in lime and nitrogen and less so in phosphate. Most crops show a marked response to these amendments. The soil is only slightly susceptible to erosion, and water control is not much of a problem when crops are rotated and adequately fertilized. For a detailed discussion of use and management, see management group 2.

**Chester loam, rolling phase** (7 to 14 percent slopes) (Cm).—This phase differs from Chester loam, undulating phase, chiefly in having stronger slopes, a slightly shallower profile, and slightly more erosion. It is closely associated with the Brandywine, Belvoir, and other Chester soils (pl. 4, B). The surface horizon is a loam and ranges from light yellowish brown to brown. The subsoil is a strong-brown to yellowish-red friable clay loam. Accelerated sheet erosion ranges

from slight to severe, but more than 85 percent of the soil is only moderately sheet eroded. Erosion losses have been uneven, however, and small eroded areas with brown or yellowish-red surface soils are numerous.

*Use suitability.*—Practically all of this phase was cleared; most of it is now in cultivation. It is physically well suited to a wide variety of crops, including alfalfa. Because of the stronger relief, the soil is more susceptible to erosion and is lower in water-supplying capacity than Chester loam, undulating phase. Its yields of crops are estimated to be from 5 to 10 percent lower, and its management requirements are more exacting. A crop rotation of moderate length that includes legumes and grasses is desirable for protection against erosion and for improving tilth and soil-moisture content. For a discussion of use and management, see management group 3.

**Chester-Brandywine loams, rolling phases** (7 to 14 percent slopes) (Cg).—This complex is made up of two soils—Chester and Brandywine—so intricately associated geographically that they cannot be separated at the map scale used. It is estimated that the Chester soil occurs on about 70 percent of the total area of the complex and Brandywine on about 30 percent. The Brandywine soil typically occupies small knobs or rises surrounding granite outcrops, whereas the Chester soil occupies the intervening spaces. These are well to excessively drained soils derived from material weathered principally from granite and granite gneiss. The complex occupies moderately large areas associated with the Chester, Brandywine, Belvoir, Eubanks, and Myersville soils in the northern and northwestern parts of the county (p. 5, A).

The Brandywine soil is uniform in most characteristics. The Chester soil in this complex, however, varies considerably in depth and in thickness and texture of its horizons. Most of it is shallower to bedrock and has a thinner and lighter textured subsoil than typical Chester loam, undulating phase.

This complex uniformly overlies granitic rocks in the eastern part of the granite belt. In the western part of this belt, however, the granitic rocks are variable in texture and locally are intruded and interbedded with diabase, greenstone, or greenstone schist. Here the complex may include small areas of Brandywine gritty loam underlain by coarse-textured granite, Chester silt loam or Brandywine silt loam underlain by greenstone schist, or Eubanks silt loam underlain by massive greenstone or diabase. These inclusions were too small to separate on the map.

The soils of this complex are moderately acid in reaction and high in organic matter and plant nutrients. Runoff is rapid, and internal drainage is medium to rapid. Although water absorption is excellent, this complex does not retain moisture so well as Chester loam, undulating phase. Tilth is good, and cultivation can be carried on safely over a wide range of soil moisture conditions. The porous friable soil material favors free movement of air, water, and plant roots and also tends to minimize excessive runoff and accelerated erosion. The water-supplying capacity is lower than that of Chester loam, undulating phase, but in most seasons it is sufficient to satisfy the normal moisture requirements of most plants.

*Use suitability.*—More than 85 percent of this complex has been cleared, and most of it is now used for cultivated crops. Generally, it is used in long rotations of corn, wheat, and meadow or pasture. Good management practices prevail, and yields are good.

This complex is moderately well suited to the common crops of the county. Compared with Chester loam, undulating phase, it is less retentive of improvement and probably 10 to 15 percent less productive. Its range of crop adaptation is slightly narrower, and alfalfa and other deep-rooted crops are not quite so well adapted. Good management practices should include adequate additions of lime, fertilizer, and organic matter. Contour tillage would increase the moisture-supplying capacity. For a discussion of use and management, see management group 3.

**Chester-Brandywine loams, undulating phases** (2 to 7 percent slopes) (Ch).—This complex differs from the Chester-Brandywine loams, rolling phases, chiefly in having milder slopes (pl. 4, B). In addition, the soils of this complex are less eroded, have slightly thicker surface soils and subsoils, and are probably slightly higher in natural fertility.

*Use suitability.*—Practically all of this complex has been cleared and is now cultivated. It is well suited to the common crops of the county. Largely because of the more favorable relief, this complex has a lower rate of runoff and is less susceptible to erosion than the rolling phases. It also has slightly better crop yields and fewer management problems. For a discussion of use and management, see management group 2.

**Chester-Brandywine loams, hilly phases** (14 to 25 percent slopes) (Cf).—This complex differs from Chester-Brandywine loams, rolling phases, principally in having stronger slopes. It also has greater runoff and has lost more of its surface horizon through accelerated erosion than the rolling phases. It is estimated that the Chester soils make up about 40 percent of the total area of the complex and Brandywine soils about 60 percent.

*Use suitability.*—Practically all of this complex was cleared and is now used for permanent pasture. Owing to the hilly relief, it is poorly adapted to crops and is best suited to pasture. Very good pastures can be established and maintained under a management that includes adequate liming, fertilization, weed control, and carefully controlled grazing. For a discussion of use and management, see management group 11.

**Chester loam-Eubanks silt loam, rolling phases** (7 to 14 percent slopes) (Cl).—The soils of this complex are well-drained moderately deep to deep upland soils. The complex includes areas of Chester loam, rolling phase, intermixed with smaller areas of Eubanks silt loam, rolling phase, that are too small and highly scattered to separate at the map scale used. The relatively light-colored Chester soil is underlain by granite, whereas the reddish-colored Eubanks soil is underlain by small narrow dikes of diabase or greenstone that profusely intrude the granite rocks. The proportions of the component soils vary considerably, but the Chester soil is typically predominant. The complex occupies small to moderately large areas in close association with the Chester, Eubanks, and Brandywine soils in the extreme

northern part of the county. A major concentration is south of Upperville.

The Chester soil has a light yellowish-brown loam surface soil and a brown to yellowish-red clay loam subsoil. The surface soil of the Eubanks soil is a brown to reddish-brown silt loam and the subsoil is a red clay loam. Although accelerated sheet erosion ranges from none to moderate, more than three-fourths of the complex is moderately sheet eroded. Gullies are uncommon. Where moderately eroded, cultivated fields have a spotted appearance resulting from the narrow elongated areas of reddish Eubanks surface soil scattered within areas of the lighter colored Chester surface soil.

*Use suitability.*—Practically all of this complex was cleared. Approximately 75 percent is now used for cultivated crops and 25 percent for pasture. When cultivated, it is used and managed like Chester loam, undulating phase, although its yields are lower.

This complex is well suited to the production of crops, including alfalfa. It can be maintained under a moderately short rotation if adequately limed and fertilized. Its management requirements are essentially similar to those of Chester loam, undulating phase, although it is more difficult to conserve. For a discussion of use and management, see management group 3.

**Chester silt loam, undulating phase** (2 to 7 percent slopes) (Co).—This is a brown well-drained deep friable soil developed in the lower northwestern part of the county over dikes of schistose greenstone that intrude granite. A few areas are rolling. The soil is principally associated with the Brandywine silt loam and the Chester-Brandywine silt loam soils but also less extensively with the Eubanks loam and Brandywine loam soils. The most concentrated areas of soil occur in the Glenora Valley and a few miles east of Hume and north of Crest-hill. Internal drainage is medium to rapid, and runoff is medium. The soil is only moderately sheet eroded and contains no gullies.

Profile description:

- 0 to 10 inches, brown to dark-brown mellow very friable silt loam.
- 10 to 28 inches, strong-brown, reddish-brown, or yellowish-red, slightly mottled with black, very friable heavy silt loam to light silty clay loam; contains abundant finely divided mica flakes that feel slick between the fingers.
- 28 to 46 inches, reddish-brown or yellowish-red very friable silt loam developed between the cleavage planes of highly weathered greenstone schist.
- 46 inches +, predominantly yellowish-red or strong-brown, highly weathered and disintegrated greenstone schist material that is very soft and easily crumbled.

The soil is rather uniform in characteristics. As for Brandywine silt loam, however, there is no definite line of demarcation between the soil horizons, as the color, texture, structure, and consistence of each are quite similar. A variation of the soil occurs between Paris and Delaplane where the soil overlies schistose rocks that resemble those under the Hazel, Manor, and Elioak silt loam soils. A considerable number of scattered areas too small to show on the map are included with Chester loam, undulating phase.

Although absorption and percolation of water throughout the soil are fairly rapid, loss of plant nutrients and organic matter through leaching apparently has not been great. The soil appears to be well supplied with them. Air and moisture move freely, although the

subsoil is not sufficiently heavy to retain large amounts of soil moisture. Plant roots penetrate freely. Tilth is excellent and easily maintained, and the soil can be worked under a wide range of moisture conditions. Loose stones and solid rock outcrops are small and scarce. The soil is moderately to strongly acid.

*Use suitability.*—The small total area has been cleared and is now in cultivation. The soil is suited to the common crops, and the productivity is quite high under the present management (pl. 5, *B*). Compared to its close associate, Chester loam, undulating phase, it is slightly less fertile and less retentive of soil moisture and plant nutrients. The soil has predominantly favorable physical properties, responds well to good management, and can be improved and maintained rather easily. It is quite susceptible to erosion, but if all tillage is on the contour it can be conserved in a 3- or 4-year rotation. For a discussion of use and management, see management group 2.

**Chester-Brandywine silt loams, rolling phases** (7 to 14 percent slopes) (Ck).—This complex is characterized by small areas of the rolling phases of Chester silt loam and Brandywine silt loam so intricately associated that they cannot be separated on a map of the scale used. It is estimated that the Chester soil occurs on 70 percent of the total area of the complex and the Brandywine soil on 30 percent. These are well-drained to excessively drained soils of the uplands underlain by bodies of schistose greenstone occurring in granite. The soils are similar in color and texture, but the Chester soil is more deeply developed. The complex is closely associated with the Chester and Brandywine soils in the western part of the granite area.

*Use suitability.*—Practically all of this complex has been cleared and is used for cultivated crops. Generally, it is used in a long rotation including corn, small grain, and at least 3 years of meadow or pasture. It receives about the same management as Chester silt loam, undulating phase, but it is less productive, mainly because of a lower moisture-supplying capacity.

This complex is moderately well suited to the common crops if properly managed. It is very susceptible to accelerated erosion, and good management is required to reduce erosion. In many small fields, shallow gullies have been stabilized by permanent vegetative cover. For a discussion of land use and management, see management group 3.

**Chewacla silt loam** (0 to 2 percent slopes) (Cp).—This is an imperfectly drained soil of the first bottoms (pl 6, *A*). It is associated with the Congaree and Wehadkee soils and like these soils consists of alluvium washed from uplands underlain by granite, greenstone, schist, gneiss, slate, or quartzite. It differs from the Congaree soils in being more poorly drained and from Wehadkee silt loam in having better drainage. The soil occurs extensively along the Rappahannock River and along most of the streams in the county with the exception of those within the Triassic belt. It is the most extensive soil of the first bottoms in the county.

Profile description: .

0 to 12 inches, brown to strong-brown mellow silt loam containing in places thin stratified layers of brown fine sandy loam.

12 to 25 inches, brown, faintly mottled with light brownish-gray, very friable fine sandy loam containing scattered small mica flakes.

25 inches +, mottled dark grayish-brown and light brownish-gray compact but friable silty clay loam; contains considerable small mica flakes and is often waterlogged; becomes more highly mottled and heavier in texture with increasing depth.

Along the larger streams, the soil typically occurs in rather wide strips between areas of the Congaree and Wehadkee soils. In a few places a thin layer of sandy material has been deposited on the surface of the soil and as a result the surface texture is a fine sandy loam. The depth to mottling varies from less than 6 inches to more than 15 inches from the surface, and the deeper layers vary considerably in texture and degree of mottling.

The soil is characteristically medium acid and is well supplied with plant nutrients and organic matter. It is free of stones, has excellent qualities of tilth under a wide range of moisture conditions, and is rather easily maintained in good tilth. Its accessibility to farm machinery is good, but during wet weather it may be too wet to accommodate heavy machinery. The open porous soil permits easy penetration of water and plant roots, but free movement of air is limited to the upper mottle-free layers during wet periods. The soil occupies level areas with a gradual downward slope in the direction of the flow of the streams. It receives large amounts of surface runoff brought down from the higher uplands by many intermittent streams. These drainageways carry considerable water during wet periods and serve to hold the soil water table at a fairly high level and saturate the subsoil during most of the winter and early spring months. The soil is also subject to stream overflow but not so much as the Congaree soils. The water-supplying capacity is high.

*Use suitability.*—Probably more than 80 percent of the soil has been cleared. About three-fourths of the cleared land is now used for pasture, and most of the rest is used for crops. Very little of the soil is lying idle.

Largely because of the flooding hazard and slow internal drainage, the soil is rather poorly suited to the common crops. Poor aeration of the lower soil layers results from the imperfect drainage and restricts the growth of most crops. Drainage is usually adequate for corn and many hay crops, but yields are less than on the Congaree soils.

The soil is well suited to permanent pasture (pl. 6). Pastures on the soil produce better growth during dry weather than pastures on many of the upland soils. Artificial drainage is locally attempted by constructing ditches connecting to the intermittent streams carrying runoff from the uplands. Little or no amendments are used, but applications of lime and phosphate fertilizer would increase the quality and yield of the pastures. Pastures on this soil tend to be weedy, and frequent mowing is necessary as a weed-control measure. For a more detailed discussion on use and management, see management group 10.

**Clifton stony silt loam, rolling phase** (7 to 14 percent slopes) (Cr).—This well-drained red soil has developed over massive greenstone on the smoother and less rocky ridgetops of the Blue Ridge Mountains. It occurs at 1,100 to over 2,200 feet above sea level. The soil occupies moderate-sized areas in close association with the stony land types from basic rock. The Clifton soil resembles Fauquier silt loam in

many characteristics but differs mainly in that it is shallower, considerably more stony, and less red in color.

**Profile description:**

- 0 to 7 inches, brown to reddish-brown, friable stony silt loam with strongly developed coarse granular structure; many angular greenstone rock fragments, 1 to 7 inches across, are on the surface and in the soil.
- 7 to 21 inches, yellowish-red to reddish-brown friable stony silty clay loam or clay loam that breaks into blocky pieces; contains abundant angular fragments of greenstone rock in many stages of weathering.
- 21 inches +, predominantly solid greenstone rock that has weathered in places to a yellowish-red friable silt loam soil material; loose quartz rock and weathered greenstone fragments are scattered throughout.

There is considerable variation from place to place in both the frequency of rock outcrops and amount of loose stone. Small areas with light yellowish-brown silt loam surface soils and yellowish-brown silty clay loam subsoils are included in places. These areas are too small to be shown on the map.

The entire profile is strongly acid. Runoff is medium to rapid, and internal drainage is medium. Owing largely to the porous and open condition of the surface soil and the favorable moisture-holding capacity of the subsoil, rainfall is readily absorbed and retained. The soil is easily permeable to air and only slightly less so to plant roots. Because of the high rock content, tilth conditions are very poor and cultivation is practically impossible. Most of the soil is only slightly eroded, and there are many forested areas that are uneroded. The content of organic matter appears to be moderate and that of plant nutrients is relatively high.

*Use suitability.*—Practically all of this phase at one time or another was cleared and used for pasture but is now largely abandoned and reverting to forest. A few acres are still in pasture, but these pastures are weedy, brushy, and poorly managed.

Largely because of its high rock content, the soil is poorly suited to crops. However, the good physical properties, especially water-holding capacity, natural fertility, and organic-matter content, make this soil moderately well suited to permanent pasture. Adequate applications of lime and fertilizer and frequent clipping are necessary to establish and maintain pastures that are productive and relatively free of undesirable vegetation. For a discussion of use and management, see management group 11.

**Congaree silt loam** (0 to 2 percent slopes) (Ct).—This is a well-drained brown soil of the first bottoms. It consists of stream alluvium washed from uplands underlain by granite, greenstone, quartzite, schist, gneiss, and slate. It occupies narrow elongated areas, principally along the Rappahannock River, Goose Creek, and other large streams except those in the Triassic plain. Chewacla and Wehadkee silt loams and Congaree fine sandy loam are the principal associated soils.

**Profile description:**

- 0 to 27 inches, brown or yellowish-brown mellow silt loam.
- 27 to 52 inches, dark-brown very friable very fine sandy loam containing a noticeable amount of small mica flakes.
- 52 inches +, very dark grayish-brown friable somewhat micaceous fine sandy loam.

Along the streams that flow through and from areas of Fauquier, Montalto, Davidson, and Mecklenburg soils, the surface layer may be more red than normal. In some places, especially along the Rappahannock River, small tracts of Congaree fine sandy loam are included. In a few places darker colored layers occur, and here and there areas having minor variation in content of mica and depth to mottling are included.

The soil is medium acid in reaction and rich in organic matter and most plant nutrients. Tilth is excellent under a wide range of moisture conditions, and the occurrence of stones is unusual. The soil is nearly level and has a slight grade toward the stream and in the direction of its flow. Internal drainage is medium but runoff is very slow. Because of the favorable relief and underdrainage, the soil is readily accessible to all farm machinery. The open and porous soil allows easy penetration of plant roots and free movement of air. Rainfall is readily absorbed, and the moisture-supplying capacity is high. All of the soil is subject to periodic stream flooding.

*Use suitability.*—Practically all of this soil has been cleared; it is now about equally divided between crops and pasture.

The soil is well suited to intensive crop production. The susceptibility to overflow somewhat limits its use suitability, but overflows serve to replenish the supply of organic matter and plant nutrients. The soil is well suited to corn and hay crops and is exceptionally well suited to truck crops. Small grains are poorly suited because of the flooding hazard and because they lodge when grown on such fertile soils. Little lime or fertilizer is used, but the soil apparently needs phosphate fertilizer and lime for continued high yields. For a more detailed discussion of use and management, see management group 1.

**Congaree fine sandy loam** (0 to 2 percent slopes) (Cs).—This soil differs from Congaree silt loam primarily in having lighter texture throughout the soil mass. It typically occurs in narrow strips adjacent to the banks of the larger streams, principally the Rappahannock River. In such places it has a levelike position slightly higher and nearer to the stream channel than that of the other first bottom soils.

As compared with Congaree silt loam, this soil has higher elevation; is slightly better drained; is more permeable to water, air, and plant roots; and is somewhat lighter in color because of a smaller content of organic matter. It is also slightly lower in plant nutrients and, in general, is a little less productive than the silt loam soil. The soil is subject to overflow; but because of its natural levelike position, it is not under water as long as the associated Chewacla, Wehadkee, and Congaree silt loam soils.

*Use suitability.*—All of this soil is cleared and used for crops or pasture; the use depends largely on the use of the associated soils.

The soil is well suited to the intensive production of crops, especially truck crops. Corn and hay are the main crops, and neither is ordinarily limed or fertilized. For a more detailed discussion on use and management, see management group 1.

**Croton silt loam** (0 to 5 percent slopes) (Cu).—This is the poorly drained light-colored member of the group of upland soils overlying Triassic red shale and sandstone. It occurs in rather large irregularly

shaped areas throughout the Triassic plain in the southern part of the county. It is closely associated with the Kelly, Penn, Bucks, and Wadesboro soils. Slopes are commonly less than 2 percent in gradient. Runoff is slow to very slow, and internal drainage is very slow. Most of the soil is uneroded, and none of it is more than slightly sheet eroded. It is characterized mainly by its light-colored surface soil that is mottled at or near the surface, its poor drainage, and its plastic heavily mottled subsoil.

Profile description:

- 0 to 8 inches, light yellowish-brown, faintly mottled with light gray, very friable silt loam; very pale brown when dry.
- 8 to 12 inches, mottled light yellowish-brown and gray, friable heavy silt loam containing a few small dark mineral concretions.
- 12 to 22 inches, highly mottled light-gray and yellowish-brown silty clay loam; breaks into blocky pieces that are firm when moist and hard when dry.
- 22 to 31 inches, predominantly yellowish-brown, highly mottled with gray, compact plastic silty clay or clay containing a few scattered fragments of weathered shale.
- 31 inches +, highly mottled light olive-gray, yellowish-brown, and yellowish-red plastic clay or silty clay containing abundant fragments of weathered shale; grades into more solid bedrock of shale.

The soil varies somewhat in degree of mottling, depth to mottling, and depth to bedrock. Some areas are shallow to bedrock and have subsoils showing a pinkish color inherited from the parent rock. In some of the more depressed areas, a covering of colluvial wash is deposited over the original surface. Most of this colluvium is light colored; but, where washed from the Penn or Bucks soils, it is reddish brown. Local areas are predominantly gray or dark gray and are underlain by blue-gray baked shale. Also included are small tracts of Kelly silt loam. A few included areas are very poorly drained.

This phase is very strongly to extremely acid in reaction and low in content of organic matter and plant nutrients. Its fluctuating water table is near or at the surface and the soil is often under water during winter and early spring. During the summer months, however, the water table is lower and the surface soil becomes dry and compact, but the heavy subsoil retains moisture well even in such dry periods. The compact subsoil or claypan is relatively impermeable to air, roots, and water. Productivity is affected by low inherent fertility and also by the lack of adequate aeration associated with the very slow internal drainage. Tilth is ordinarily only fair and depends a great deal on the wetness or dryness of the soil. Stones are uncommon.

*Use suitability.*—Approximately 35 percent of this soil is in crops, 25 percent in pasture, and 30 percent in forest. About 10 percent is idle. Corn, wheat, and hay are the common crops grown.

Most of the cropland and much of the pasture land on this soil are artificially drained by bedding, open ditches, or combinations of both. This drainage removes a good part of the excess surface and subsurface water, serves to lower the water table, and promotes better aeration. Drainage by tiling is probably too expensive to warrant its use, and it may not be effective because of the compact subsoil. Unless drained, the soil makes rather poor cropland and is probably best suited to pasture and hay crops. When drained, it is fairly well suited to the common crops if properly managed, but it is not adapted to alfalfa or other crops highly sensitive to excessive soil moisture.

The lime, fertilizer, and organic-matter requirements are high. The response to amendments probably will be less than on the better drained soils because of unfavorable moisture conditions and the limited root zone. Yields vary greatly mainly because of the wetness or dryness of the growing season and differences in management practices. In general the largest yields occur in growing seasons of low but adequate rainfall, but average yields on Croton silt loam are relatively low. For a further discussion of use and management, see management group 7.

**Culpeper fine sandy loam, rolling phase (7 to 14 percent slopes) (Cw).**—This soil is characterized by its light-colored, light-textured surface soil and red dense lower subsoil. It is the well-drained moderately deep upland soil derived from arkosic quartzite, principally the finer grained and higher iron-bearing variety. The soil occupies rather small areas scattered throughout the belt of arkosic quartzite but occurs principally near Orlean, Conde, and Old Tavern. It is closely associated with the Albemarle and Louisburg soils and with the rolling to steep stony land types from acidic rock. Internal drainage and runoff are medium. Sheet erosion ranges from almost none to moderate, but more than 85 percent of the soil is moderately sheet eroded.

Profile description:

- 0 to 9 inches, light yellowish-brown to yellowish-brown very friable fine sandy loam.
- 9 to 14 inches, reddish-yellow or strong-brown friable sandy clay loam that breaks into blocky pieces.
- 14 to 24 inches, yellowish-red friable clay loam; breaks into small blocky pieces; contains abundant small fragments of quartz.
- 24 to 38 inches, red friable to firm heavy clay loam; contains numerous small quartz fragments and occasional larger fragments of highly weathered quartzite; breaks into small blocky pieces less than 1 inch across.
- 38 inches +, same as above layer but contains considerably more quartz and quartzite fragments; becomes more friable with increasing depth and grades into weathered arkosic quartzite bedrock.

Although there is little variation in the depth and arrangement of the soil horizon, there are other variable features in this soil. Considerable variation occurs in the color of the subsoil, which ranges from light red to dark red. In uneroded or slightly eroded areas, the surface soil is consistently light colored; but in more eroded cultivated fields, regular plowing has brought to the surface more and more of the red clay loam subsoil. During tillage the subsoil material has become mixed with the remnants of the original surface soil, and as a result the surface layer is heavier, redder, and less friable. In the less eroded condition, the surface soil normally ranges from a fine sandy loam to a loam, the texture depending mainly on that of the quartz particles in the quartzite rock from which the soil was derived. The subsoil in some areas is underlain by schistose quartzite containing abundant finely divided mica flakes that give it a slick feel when rubbed between the fingers. Such subsoils are similar to those of the Elioak series.

Small scattered areas of the Louisburg soils are included. These usually occupy small knobs or rises and are too small to show on the map.

The soil is very strongly to extremely acid in reaction, low in organic-matter content, and poorly supplied with plant nutrients. As the underlying quartzite rock is composed chiefly of quartz and feldspar, which are low suppliers of lime and plant nutrients, the soil has a natural scarcity of these materials. It is much poorer in lime and other plant nutrients than the Chester and Fauquier soils because of the original scarcity of these materials and their depletion through severe leaching. It resembles the Cecil soil as mapped further south, but it is less fertile and less productive. Fragments of quartzite occur locally on the surface but do not interfere with cultivation. Areas so stony that tillage is difficult are indicated on the map by stone symbols. The less stony areas have excellent tilth and can be worked under a wide range of moisture conditions.

On the more favorable side, the soil has a good capacity to absorb, retain, and supply moisture. Plant roots and air move through the soil readily. The soil is very responsive to lime, fertilizer, and other good management practices and retains improvement well.

*Use suitability.*—Probably 55 to 65 percent of the soil has been cleared. Most of the cleared areas are now in cultivation, but a fairly large part is idle and in various stages of reforestation.

The soil is fairly well suited physically to the growing of the common crops. Although inherently poor in fertility and lime, it has good physical characteristics and responds well to good management. It can be made productive if it is adequately limed, fertilized, increased in organic-matter content, and otherwise properly managed. This soil is moderately susceptible to erosion, and management should include erosion control. Management practices and yields vary considerably on this soil. Many farms in the "Free State" area are of a low-level subsistence type; but on the better managed farms, systematic rotations and amendments are used. For a detailed discussion of use and management, see management group 5.

**Culpeper fine sandy loam, undulating phase** (2 to 7 percent slopes) (Cx).—This phase is essentially similar to Culpeper fine sandy loam, rolling phase, but differs chiefly in having milder slopes, slightly less erosion, and slightly thicker surface soil and subsoil.

*Use suitability.*—About 50 or 60 percent of this phase has been cleared and is now used mainly for cultivated crops. A considerable part of the forested area of this soil is on land that was formerly cleared and later abandoned. The cultivated soil is generally used in irregular rotations in which row crops are grown at frequent intervals.

This soil is moderately well suited to the common crops but requires good management for continued high yields. It has management requirements similar to those of the rolling phase, but it is more easily accessible to farm machinery and is slightly more productive. For a discussion of use and management, see management group 4.

**Culpeper clay loam, eroded rolling phase** (7 to 14 percent slopes) (Cv).—This phase has lost 75 percent of the original surface soil and up to 25 percent of the subsoil by accelerated erosion. In most places the subsoil is exposed, but locally the plow layer consists of some of the subsoil mixed with the rest of the original surface soil. Shallow gullies occur occasionally. The soil occupies small areas closely

associated with the Albemarle, Louisburg, and other Culpeper soils.

*Use suitability.*—All of this phase was formerly cleared and cultivated, but probably 40 percent is now lying idle or in various stages of pine reforestation. The remaining 60 percent is about equally divided between crops and pasture. The crop yields are lower than on Culpeper fine sandy loam, rolling phase.

The loss of the original porous surface soil by erosion has resulted in a loss of organic matter and plant nutrients, a lowering of the water-supplying capacity, and an increased difficulty of maintaining good tilth. The range of moisture conditions under which the soil can be tilled is narrow. Water is poorly absorbed and runoff is rapid. Largely because of these adverse features, the soil is considered rather poorly suited to intertilled crops. However, it is well suited to pasture or semipermanent hay crops. Although relatively poor in fertility, the soil is responsive to lime and fertilizer, and good stands of pasture grasses can be established and maintained under good management. Where practicable the cultivated areas should be placed in permanent pasture. For a discussion of use and management, see management group 12.

**Davidson clay, eroded rolling phase (7 to 14 percent slopes) (Da).**—This soil is characterized mainly by its dark red color, great depth, and heavy texture. It is well-drained upland soil developed from the residuum weathered from coarse-grained Triassic diabase. It occurs in the southern part of the county in close association with the Mecklenburg and Iredell soils. The largest concentration of the soil is a few miles east of Bealeton. Generally it occupies rolling upland ridges that are very prominent and higher than the surrounding areas of Mecklenburg, Iredell, and Penn soils. They consist of dikes of coarse-grained diabase that have intruded the Triassic shales. Although sheet erosion ranges from moderate to severe, more than half of the soil is severely eroded. Shallow gullies occur locally. The soil was originally Davidson clay loam, but practically all of the original clay loam surface soil has been removed by accelerated erosion. Internal drainage is medium, and runoff is medium to rapid.

**Profile description:**

- 0 to 20 inches, dark-red to dark reddish-brown clay or clay loam; breaks into small blocky pieces that are firm when moist and hard when dry; contains numerous small dark mineral concretions.
- 20 to 70 inches, dark-red smooth compact clay; breaks into small blocky pieces that are firm when moist and very hard when dry; contains a few small black mineral concretions.
- 70 inches +, red firm clay loam soil material containing abundant fragments of coarse-grained Triassic diabase in various stages of weathering.

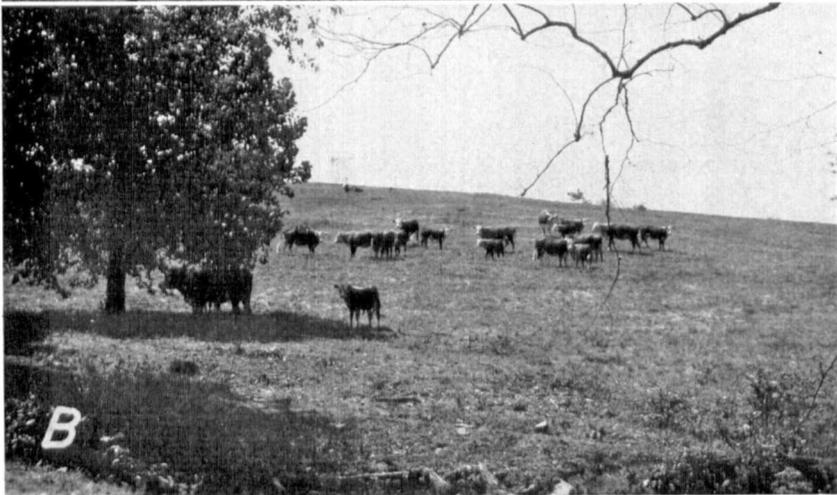
Except for varying degrees of erosion and incidental surface texture, the soil is rather uniform. Approximately one-third of the soil is much less eroded than normal. These areas have a reddish-brown friable clay loam surface soil about 8 inches thick. Many areas that were once Davidson soils have been so affected by sheet and gully erosion that they are mapped as Rough gullied land. These areas are lying idle.

The soil is slightly to moderately acid in reaction and relatively high in content of plant nutrients. Free movement of air and plant roots is possible throughout the profile, but the permeability to water



*A*, Old colluvial material washed and rolled from Bull Run Mountain slopes underlain by quartzite. The overlying soil is Braddock very stony loam, rolling phase. Pasture is best suited but requires good management.

*B*, A permanent pasture on Braddock very stony loam, rolling phase.



*A*, Permanent pasture on Brandywine loam, hilly phase. The solid outcrops of granite are characteristic of this phase. The low-lying area along the small drainageway is Worsham silt loam.

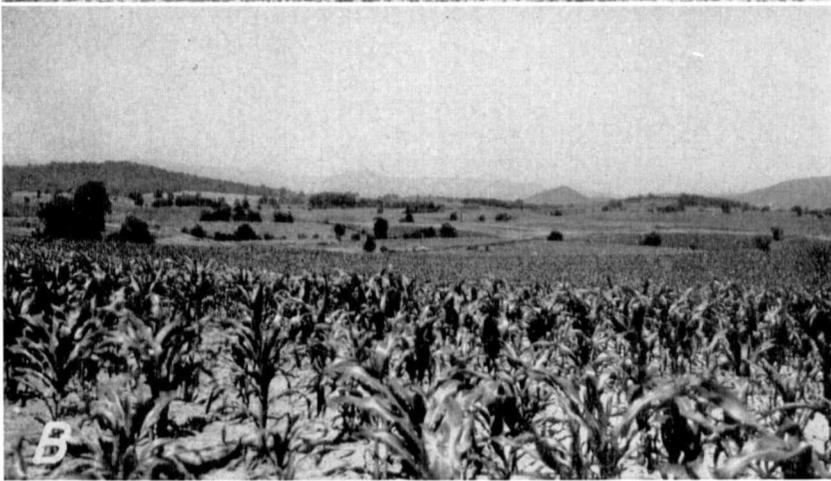
*B*, Hereford cattle grazing a rotation orchardgrass pasture on Brandywine loam, rolling phase.



- A**, Large apple orchard mainly on Brandywine loam, steep phase, and Stony steep land, acidic rock, in the Blue Ridge foothills. The less favorable tree growth is on the Stony (very stony) steep land, acidic rock, on the crest of the hill.
- B**, Characteristic rolling and hilly relief of the Brandywine gritty loam soils. Most of the hilly slopes are in permanent pasture. Seneca loam occurs along the small stream.



*A*, Hilly and eroded steep phases of Catoctin silt loam on the lower slopes of Viewtree Mountain. Chewacla silt loam shown in the foreground.  
*B*, Typical undulating to rolling relief of the Chester and Chester-Brandywine soils. The field in foreground is in rotation orchardgrass pasture.



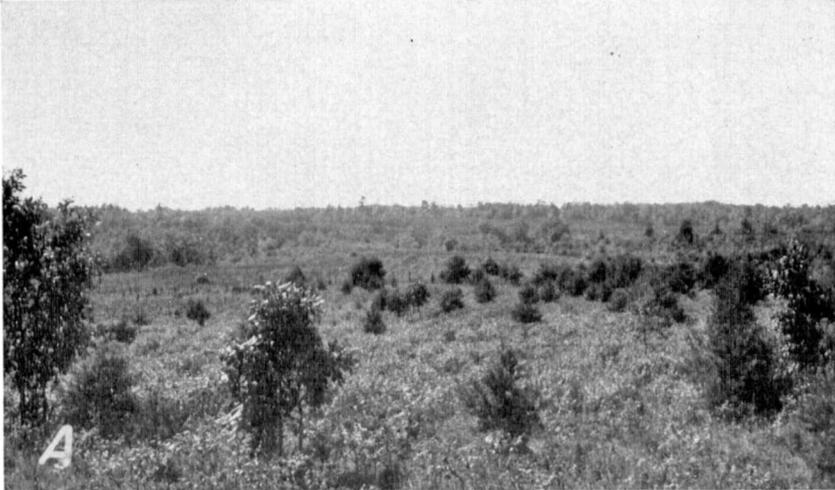
- A*, Typical relief of the Blue Ridge physiographic province. Soils in foreground are chiefly Chester-Brandywine loams, rolling phases. Blue Ridge Mountains, composed of greenstone and containing chiefly stony land types, are in background.
- B*, Corn on Chester silt loam, undulating phase in foreground. Landscape shows a part of the productive Glenora Valley in which the Chester, Brandywine, and Starr silt loam soils predominate. Blue Ridge foothills are in background.



*A*, Permanent pasture on Chewacla silt loam. Regular clipping to control weeds would increase the quality of this pasture.  
*B*, A well-managed productive bluegrass-white clover pasture of high quality on Chewacla silt loam in foreground and Catoclin silt loam, hilly phase, in background.



Pasture in foreground on Dyke silt loam, eroded rolling phase, which developed from old colluvial materials washed and rolled from Blue Ridge Mountain slopes underlain by greenstone.



**A**, An abandoned field reverting to forest, largely on the undulating and eroded rolling phases of Elioak silt loam. The growth consists mainly of scrub pine, sassafras, sumac, broomsedge, povertygrass, and dewberry, and blackberry.

**B**, Poorly managed pasture on Elioak silt loam, eroded rolling phase, adjoining the abandoned field shown above; part of area to the right has been clipped; no lime or fertilizer has been used on any of the area, and the cover is mainly broomsedge, briers, and pine seedlings.

has been affected by erosion, and greater runoff and susceptibility to erosion have resulted. Although moisture is poorly absorbed, that which is absorbed is well retained. Tilt is poor where the original clay loam surface soil has been removed by erosion. In such places the red clay of the plow layer does not scour readily and tends to stick to the moldboard. The soil is relatively free of stones and solid outcrops. Although originally quite fertile, it responds to and retains the effects of good management very well.

*Use suitability.*—All of this soil has been cleared. Probably over 90 percent is now used for crops and the rest for pasture.

The soil is generally recognized as being inherently one of the most productive soils of the Piedmont Plateau. Its greatest shortcoming is its extreme susceptibility to erosion.

Despite its handicaps the soil is well suited to the production of all the common crops of the county if it is properly managed. It is especially well suited to alfalfa and other deep-rooted legumes. Good management practices should include adequate applications of organic matter, fertilizer, and lime; a rotation selected to add humus to the soil and to control runoff; and contour cultivation. Rotations should include alfalfa, clovers, or other green-manure crops.

Owing to its heavy surface layer, the soil has an extremely narrow range of moisture conditions under which it can be worked and requires heavy machinery or heavy work animals for tillage. The soil can be readily improved because of its natural fertility and good water and plant-nutrient retaining qualities. For a more detailed discussion on use and management, see management group 6.

**Dyke silt loam, eroded rolling phase (7 to 14 percent slopes) (Db).**—This is a red well-drained deep soil developed from very old colluvial rock and soil materials that washed from mountain slopes underlain by greenstone (pl. 7). The colluvium has been locally deposited in hollows and at the base of gaps in both the Blue Ridge and Bull Run Mountains. The principal areas of the soil occur at the base of Manassas Gap and at Paris. In these areas the soil is associated with the Catocin soils and the various stony land types derived from basic rock. The soil is less extensive in the Bull Run Mountain-Baldwin Ridge area, where it is associated chiefly with the Braddock and Thurmont soils. A few slopes are between 2 and 7 percent. Internal drainage and runoff are medium. Sheet erosion varies from slight to severe, but most of the soil is only moderately sheet eroded.

**Profile description:**

- 0 to 8 inches, dark reddish-brown friable silt loam containing a few small rounded or subangular weathered greenstone fragments.
- 8 to 38 inches, red to dark-red silty clay loam or silty clay; breaks into small, blocky pieces that are friable when moist and slightly plastic when wet; contains a few scattered subangular fragments of highly weathered greenstone.
- 38 to 45 inches, red, streaked with reddish-yellow, silty clay loam that is friable when moist and slightly sticky when wet.
- 45 inches +, mingled reddish-yellow and red friable silty clay loam material representing highly weathered greenstone; overlies the original land surface at depths of 50 inches or more.

The most important variation of the soil occurs in scattered areas more or less surrounding and at the base of Baldwin Ridge near New Baltimore and in local areas on the western slope of the Bull Run

Mountains. Here the soil has a deeper, lighter colored, and more stony surface layer and is derived from old colluvial materials containing quartzite as well as greenstone. Generally, the thickness of the soil varies somewhat from place to place. Surface texture may be a silty clay loam on the more eroded areas or a loam in the Baldwin Ridge region.

The soil is moderately to strongly acid in reaction, high in plant-nutrient content, and apparently moderately well supplied with organic matter. It is permeable and allows easy penetration of plant roots and free movement of air and moisture. Tilt is ordinarily favorable. A few stones occur locally on the surface and in the soil mass but do not interfere with cultivation. The soil has a good moisture-holding capacity, responds to good management, and retains improvements well.

*Use suitability.*—Practically all of this phase was cleared; but because the town of Paris occupies a great part of it, a relatively small aggregate area is now in agricultural use. Elsewhere, the soil is largely in cultivation.

The soil is well suited to the production of crops, including alfalfa. It is naturally fertile, is not highly susceptible to erosion, and has good physical characteristics. A rather high level of production can be maintained by using a moderately short rotation and applying adequate amendments, particularly lime and a complete fertilizer. For a more detailed discussion of use and management, see management group 6.

**Elbert silt loam** (0 to 2 percent slopes) (Ea).—This light-colored poorly drained deep upland soil has developed over coarse-grained Triassic diabase in close association with the Iredell and Zion soils. It is characterized by its grayish surface soil and extremely dense, highly mottled, plastic and sticky subsoil. It occurs mainly on level and slightly depressed uplands, and less extensively along small drainageways. There is no evidence of accelerated erosion. Runoff and internal drainage are very slow. During the wetter parts of the year, the soil is often covered by shallow pools of water. It occupies small to moderately large areas that are usually surrounded by Iredell soils.

**Profile description:**

- 0 to 5 inches, gray, mottled with light brownish-gray and yellowish-brown, friable floury silt loam.
- 5 to 12 inches, mottled light-gray and light olive-brown friable heavy silt loam.
- 12 to 20 inches, highly mottled gray and yellowish-brown plastic and sticky clay.
- 20 to 39 inches, predominantly light olive-brown, mottled with gray, compact clay; very plastic and sticky when wet and extremely firm when moist.
- 39 inches +, highly weathered diabase rock material that is easily crushed; contains a high percentage of mottled olive-brown, black, and olive-yellow plastic and sticky clay in upper 2 or 3 inches.

This soil is similar to the Iredell soils but differs in that it is more poorly drained and more highly mottled. The surface soil and subsoil are very strongly acid, but the substratum ranges from slightly acid to neutral with increasing depth. The content of organic matter is very low, and the content of plant nutrients is presumably low. The compact, plastic, and sticky claypan is relatively impervious to plant roots, moisture, and air, and the high water table is at or near the

surface a good part of the year. Stones or solid outcrops are uncommon.

*Use suitability.*—Practically all of this soil is in forest. It has such extremely unfavorable physical characteristics that it is very poorly suited either to crops or to pasture and is best used for forestry. For a discussion of use and management, see management group 16.

**Elbert silt loam, concretionary phase** (0 to 2 percent slopes) (Eb).—This phase differs from Elbert silt loam principally in having thinner and less plastic, sticky, and compact subsoil layers; in containing abundant small dark mineral concretions throughout the soil profile; and in being derived from finer textured Triassic diabase. It occupies flat low-lying poorly drained positions along small drainageways in association with the Montalto soils derived from fine-grained diabase. In general this soil represents a poorly drained condition of the Zion soils rather than the poorly drained condition of the Iredell soils that Elbert silt loam represents.

The soil normally contains surface layers partially formed of colluvial materials that washed and sloughed from adjoining uplands underlain by fine-grained diabase. These colluvial materials are apparently well supplied with plant nutrients and lime, and thus the soil is more fertile than Elbert silt loam. Furthermore, although poorly drained, it has more favorable moisture relationships and other more favorable physical characteristics.

*Use suitability.*—Because of its usual occurrence as small elongated areas closely associated with more productive soils, most of this soil was cleared and used and managed like the associated soils. Most of the cleared land is now in cultivation.

The soil is poorly suited to cultivated crops but is fairly well suited to permanent pasture if properly managed. Good management should include artificial drainage by bedding, ditching, or both; adequate liming and fertilization; and weed control. For a discussion of use and management, see management group 15.

**Elioak silt loam, rolling phase** (7 to 14 percent slopes) (Ee).—This soil is characterized mainly by its fairly light-colored surface soil and its reddish micaceous subsoil. It is a well-drained deep micaceous upland soil derived from the residuum weathered from mica schist and mica gneiss. It occurs in close association with the Hazel, Manor, and other Elioak silt loam soils in rather small areas widely scattered throughout the belts of mica schist and gneiss. It is one of the soils locally called red clay land. Internal drainage and runoff are medium. Erosion ranges from slight to moderate, but more than 80 percent of the soil is moderately sheet eroded. Gullies are absent.

**Profile description:**

- 0 to 8 inches, brown to yellowish-brown very friable silt loam containing occasional small fragments of quartz and weathered schist; moderately well supplied with organic matter.
- 8 to 14 inches, brown, dark-brown, or yellowish-red friable silt loam; breaks into small easily crushed blocky pieces; contains many small weathered fragments of schist.
- 14 to 33 inches, red to dark-red firm to friable micaceous clay loam; breaks into small, well-defined, blocky pieces; contains a few soft highly weathered fragments of schist.
- 33 to 45 inches, red, slightly streaked with light yellowish-brown, friable silty clay loam; contains a few highly weathered schist fragments.

45 inches +, highly weathered soft mica schist that contains red friable silty clay loam soil material along the old cleavage planes; grades into less weathered rock with increasing depth.

The soil varies in minor characteristics. These variations are primarily caused by differences in the parent rock. Near Turnbull, the soil has deeper layers, denser subsoil, less mica throughout the profile, and a lighter colored and lighter textured surface soil. Beds of quartzite are common in the schists and gneisses of this area, and small elongated areas of Culpeper soils overlying quartzite are included in places. Some areas of the soil west and north of The Plains and near Orlean have a darker and browner surface soil than normal and are underlain by schist and gneiss that are intruded by dikes of greenstone. Other areas near Warrenton and New Baltimore are looser, more friable, and more micaceous throughout the profile and resemble the Madison soils. Southwest of Marshall areas are underlain by varved slate; here the soil is less micaceous and shallower.

The soil has rather low supplies of plant nutrients and organic matter, and is very strongly acid. It is more fertile than the Culpeper soils, which it resembles in physical characteristics, but is less fertile than the Fauquier soils. Small fragments of white quartz, originally occurring as veins in the parent rock, are on the surface and in the soil in most places but do not interfere with tillage. Solid rock outcrops rarely occur. The soil absorbs, retains, and supplies moisture well and allows free movement of air and plant roots throughout the profile. Tilt is good and rather easily maintained under a fairly wide range of moisture conditions.

*Use suitability.*—Probably 60 to 70 percent of the soil has been cleared and is now about equally divided as cropland, pasture, and idle land.

The soil is fairly well suited to growing the common crops if properly limed and fertilized. It has excellent physical properties but is low in lime and most plant nutrients. Fairly large amounts of lime and fertilizer are needed to produce good yields of crops. The soil responds very well to good management and retains improvements well. Its productivity is not so readily improved as that of Fauquier silt loam, rolling phase, but is more easily improved than that of Culpeper fine sandy loam, rolling phase. It is moderately susceptible to erosion. Good management practices should include such erosion control measures as contour cultivation and possibly contour strip-cropping. Present management practices and yields vary considerably. For a more detailed discussion of use and management, see management group 5.

**Elioak silt loam, eroded rolling phase** (7 to 14 percent slopes) (Ed).—This phase differs from Elioak silt loam, rolling phase, in being considerably more eroded. Accelerated sheet erosion has removed 75 percent or more of the original surface soil and up to 25 percent of the subsoil. Shallow gullies are rather widely distributed. The loss of soil material has been uneven. Most places have some remnant of the original surface soil that has been mixed with the subsoil during cultivation. In other places the subsoil is exposed. Consequently, the present surface layer is variable in color, texture, and depth. The present surface layer is commonly a yellowish-red heavy silt loam or

silty clay loam, the texture depending on the degree to which erosion has progressed. The subsoil is a red to dark-red clay loam.

*Use suitability.*—All of this soil has been cleared, although probably 40 percent is in various stages of pine reforestation (pl. 8, *A*). About 35 percent is in permanent pasture (pl. 8, *B*), and 25 percent is used for cultivated crops.

In its eroded condition, the soil is rather poor for the common crops but good for permanent pasture that is adequately fertilized and limed. Erosion and cropping have lowered the supplies of organic matter and plant nutrients and reduced the water-holding capacity. Tilt is poor, and the range of moisture conditions under which the soil can be tilled is narrow. The loss of the original porous surface soil has decreased permeability to water and increased runoff. Because of low natural soil fertility, productivity is not easily increased on this eroded soil. Heavy additions of lime, fertilizer, and probably organic matter are necessary in order to obtain and maintain pastures of a high carrying capacity. For a discussion of use and management, see management group 12.

**Elioak silt loam, undulating phase** (2 to 7 percent slopes) (Ef).—This phase is similar to Elioak silt loam, rolling phase, in all essential respects. It differs in having milder relief, slightly less erosion, and slightly thicker soil layers.

*Use suitability.*—Probably 75 percent of the soil has been cleared and is now used mostly for cultivated crops. Little of it is idle or in nonfarm uses.

The soil is moderately well suited to the common crops of the county. Because of milder slopes, it has a greater water-supplying capacity, less runoff, and less erosion than Elioak silt loam, rolling phase. Moderately good yields of crops can be maintained and soil material and fertility can be easily conserved if adequate lime and fertilizer are applied and a moderately long rotation that includes legumes is followed. For a discussion of use and management, see management group 4.

**Elioak silt loam, eroded hilly phase** (14 to 25 percent slopes) (Ec).—This soil differs from the rolling phase chiefly in having steeper slopes, but it is also much more eroded. In most places some of the subsoil has been mixed with the remainder of the original surface soil. Shallow gullies occur locally. The present surface layer is commonly a yellowish-red heavy silt loam or silty clay loam. The subsoil is similar to that of other Elioak silt loam soils.

*Use suitability.*—Practically all this soil has been cleared. Most of it is now in pasture, but small areas are used for cultivated crops or are covered with pines in various stages of growth.

Because it is eroded and strongly sloping, this phase is poorly suited to crops. It is low in fertility, lime, organic matter, and water-absorbing capacity. It is subject to rapid runoff and further erosion when cultivated. It is fairly well suited to permanent pasture, but adequate liming, fertilization, and probably additions of organic matter are needed to establish and maintain good stands of pasture grasses. For a discussion of use and management, see management group 12.

**Eubanks loam, rolling phase** (7 to 14 percent slopes) (Eh).—Although somewhat similar to Elioak silt loam, rolling phase, this soil differs in having a loam surface soil and a subsoil that is slightly shallower and less dense, micaceous, and friable. In addition, it is underlain by different rocks and is more fertile and productive. The rocks underlying the soil are variable, but they are mainly granite or granodiorite in the massive, schistose, or gneissic forms. In places dikes of massive greenstone or diabase have contributed some material to the development of the soil.

The soil occurs in the northern and northwestern part of the county in association with the Chester, Brandywine, and Belvoir soils and Eubanks loam, eroded rolling phase. The largest concentration of areas is in the southern part of the granite belt near Orlean. A few slopes are between 2 and 7 percent. Runoff and internal drainage are medium. Accelerated sheet erosion varies from slight to moderate, although over 90 percent of the soil is moderately sheet eroded. Gullies are uncommon. Small eroded areas with reddish-brown clay loam surface soils are numerous.

**Profile description:**

- 0 to 6 inches, light-brown to brown very friable fine granular loam.
- 6 to 10 inches, light reddish-yellow friable loam.
- 10 to 30 inches, red clay breaking into small blocky pieces that are firm when moist and hard when dry.
- 30 to 42 inches, reddish-brown to light-red, splotted with yellow, friable light clay loam; contains some small fragments of weathered granite.
- 42 inches +, predominantly highly weathered granite; grades into less weathered granite bedrock with increasing depth.

The soil is typically strongly acid in reaction and moderately well supplied with plant nutrients, but apparently low in organic matter. The surface soil seems to be quite leached of organic matter and assumes a light color when dry.

Eubanks loam, rolling phase, is more fertile than Elioak silt loam, rolling phase, largely because its granitic parent material contains more plant nutrients and lime than the parent materials of the latter soil. The soil has a good capacity to absorb, retain, and supply moisture. Plant roots and air penetrate it with ease. Besides being moderately inherently fertile, it responds to good management, retains improvements well, and becomes quite productive under good practices. Stones are virtually absent, and good tilth can be maintained over a wide range of soil moisture conditions. The soil appears to be less subject to erosion than Elioak silt loam, rolling phase, but is more erosive than its close associate, Chester loam, rolling phase.

*Use suitability.*—Practically all of this soil has been cleared and is now used for cultivated crops. Moderately long rotations of corn, small grain, and meadow or pasture are usually followed.

If properly managed, the soil is well suited to the production of crops, including alfalfa. Good management should include systematic rotations of moderate length, legumes in the hay crop, and adequate applications of lime and fertilizer. Erosion may be a problem on some of the steeper slopes. For a discussion of use and management, see management group 3.

**Eubanks loam, eroded rolling phase** (7 to 14 percent slopes) (Eg).—Accelerated sheet erosion has removed 75 percent or more of the

original surface soil and up to 25 percent of the subsoil of this phase. The loss of soil material has been uneven. In many places the subsoil is exposed, but in most places the remnants of the original surface soil have been mixed with the subsoil by tillage. Consequently, the present surface layer is variable in color, texture, and depth. It is commonly a light reddish-yellow to yellowish-red heavy loam or clay loam. The subsoil consists of a red to reddish-brown clay.

*Use suitability.*—Practically all of this soil has been cleared and is now used for crops or pasture. Yields are considerably less than on Eubanks loam, rolling phase.

The soil is only fairly well suited to cultivated crops but is well suited to pasture or semipermanent hay crops. Because of erosion, a considerable part of the original supply of organic matter and plant nutrients has been lost, tilth has been impaired, and the rate and capacity of water absorption have been decreased. Besides adequate liming and fertilization, good management practices should include use of moderately long rotations; return of more organic matter to the soil; growing a greater proportion of close-growing crops and legumes; and practice of contour tillage, and, if practicable, contour stripcropping. For a discussion of use and management, see management group 6.

**Eubanks silt loam, rolling phase** (7 to 14 percent slopes) (E1).—This reddish well-drained soil occurs on rolling uplands in the northwestern part of the county in close association with the Chester and Brandywine soils. It has developed over dikes of massive diabase or greenstone that intrude granite and locally outcrop. Characteristically, it occupies rather small elongated areas surrounded by Chester loam or Brandywine loam. It is readily distinguished from those soils by its brown silt loam surface soil and red clay subsoil. A few slopes are less than 7 percent. Runoff is medium to rapid and internal drainage is medium. The soil is only slightly to moderately sheet eroded, but very small eroded, or galled, areas with reddish-brown clay loam surface soils are numerous. Gullies are almost entirely lacking.

**Profile description:**

- 0 to 8 inches, brown to reddish-brown friable weak granular silt loam; contains a few small angular rock fragments.
- 8 to 18 inches, red friable clay loam; breaks into small angular blocky pieces.
- 18 to 65 inches, red to dark-red firm clay; breaks into well defined angular blocky pieces; contains a few scattered angular rock fragments; layer streaked with yellowish-brown in lower part.
- 65 inches +, mingled reddish-brown, yellowish-brown, and black highly weathered and disintegrated basic rock material that grades into solid bedrock of massive diabase or greenstone.

In places this rolling phase has a loam surface texture. Such areas occur near the borders of the soil where granite has contributed appreciable material to the soil mass. Small areas resembling the Chester and Brandywine loams are included in places where the underlying basic rocks are mixed or interbedded with granite.

The soil is medium to strongly acid in reaction and fairly high in plant nutrients and appears to be fairly well supplied with organic matter. In uneroded fields the original organic matter is thoroughly incorporated in the plow layer. Locally, rounded diabase or greenstone rocks are strewn over the surface and may interfere with cultiva-

tion; otherwise the tilth of the soil is good to fair. Care, however, must be exercised in working the more eroded areas at the proper moisture content to prevent excessive clodding. The soil is permeable and permits rather easy penetration of plant roots and movement of air and moisture. Water is readily absorbed and retained, and the moisture-supplying capacity is good.

*Use suitability.*—Practically all of this phase has been cleared and is now in cultivation. The soil is physically suitable for all locally grown crops, including alfalfa. Although naturally relatively fertile, the soil responds to lime and fertilizer. Relatively high yields of crops can be maintained if tilth and moisture relations are favorable, and the supplies of plant nutrients, lime, and organic matter are kept at a high level. However, the use of the soil is limited because it usually occurs in scattered areas that are too small to receive individual attention. The soil is most abundant near Upperville, and some areas in this vicinity are large enough to be handled as individual units. It is susceptible to accelerated erosion in most places, but it can be maintained in a crop rotation of short length if contour farming is practiced. Except for surface texture and conditions of erosion, this soil compares favorably in physical characteristics to Davidson clay, eroded rolling phase. For a detailed discussion of use and management, see management group 3.

**Eubanks silt loam, eroded hilly phase (14 to 25 percent slopes) (Ek).**—This soil differs from Eubanks silt loam, rolling phase, chiefly in having stronger slopes and a somewhat thinner surface soil and subsoil. It occurs in widely scattered small areas closely associated with Brandywine loam, hilly phase.

*Use suitability.*—Practically all of this soil has been cleared and is now used for permanent pasture. It commonly occupies areas too small to be handled individually.

Largely because of the steep slope and susceptibility to erosion, this soil is poorly suited to cultivated crops but is well suited to permanent pasture. It has pasture management requirements similar to those of Brandywine loam, hilly phase, but is less subject to drought and is more productive. For a discussion of use and management, see management group 11.

**Eubanks stony silt loam, rolling phase (7 to 14 percent slopes) (Em).**—This phase differs from Eubanks silt loam, rolling phase, chiefly in having numerous loose rocks and solid outcrops on the surface and loose rocks throughout the profile. It also differs in having somewhat thinner horizons. The loose rocks of diabase or greenstone are typically rounded or spheroidal in shape and are sufficiently numerous to interfere with tillage. The soil occupies small elongated areas in close association with the Brandywine, Chester, and other Eubanks soils. Slopes range from 2 to 25 percent, but more than 60 percent of the soil has slopes between 7 and 14.

*Use suitability.*—Most of this phase has been cleared and is now used for permanent pasture. Because of the high stone content, the soil is poorly suited to cultivated crops and is best used as pasture. It is naturally fertile, has a good moisture-supplying capacity, and is well suited to bluegrass and legumes. It produces pasture of good quality

and quantity if adequately limed and fertilized. For a discussion of use and management, see management group 11.

**Fauquier silt loam, rolling phase** (7 to 14 percent slopes) (Fd).—This is a well-drained reddish-brown upland soil locally known as red clay land. It has developed over both schistose greenstone (chloritic) and massive greenstone (epidotic). The underlying rocks are locally called ironrock or bluestone. The soil occurs largely in a belt extending from north to south across the central part of the county. It occupies rather large areas in association with other members of the Fauquier series and with the Catoctin and Myersville-Orange soils (pl. 9, A). The internal drainage and runoff are medium.

**Profile description:**

- 0 to 7 inches, dark reddish-brown very friable weak granular silt loam.
- 7 to 15 inches, dark-red or dark reddish-brown friable silty clay loam; breaks in small blocky pieces; contains a few small greenstone rock fragments.
- 15 to 39 inches, dark-red firm clay or clay loam; breaks in rather large blocky pieces; contains a few small greenstone fragments; plastic when wet.
- 39 inches +, highly weathered soft greenstone schist containing a dark-red silty clay loam soil material between the rock cleavage planes; the greenstone becomes less weathered with increasing depth and includes large veins that are less weathered; depth to solid rock is variable.

The soil varies principally in thickness of the horizons and in depth to substratum. Areas of the soil underlain by the massive epidotic type of greenstone are usually slightly more red, contain more mica, have a thicker subsoil, and are more friable throughout the profile than those developed over the schistose chloritic type.

A few included areas underlain by the agglomerate greenstone are shallower, paler red, and more stony than normal. These areas are small and occur along the western border of the greenstone belt where the Myersville-Orange and Catoctin soils predominate.

On the whole the areas of this rolling phase in the southern part of the greenstone belt are somewhat more red, heavier in subsoil texture, and deeper than those in the northern part, and they resemble the Davidson soils more closely.

Some tracts of this soil are too small to show on the map and are included with the Myersville-Orange soils.

The soil is moderately to strongly acid. Most areas are free of surface stone except for occasional rock outcrops or a few scattered greenstone and quartz fragments. These fragments do not interfere with cultivation. They are indicated by symbols on the map. The soil is probably more fertile than the other soils of the uplands except the Chester, Davidson, and Myersville soils. It absorbs water readily and allows both moisture and air to move freely in the profile. It is easily penetrated by plant roots and has good tilth. The water-supplying capacity is good, and plant nutrients and organic matter can be readily conserved under good management.

*Use suitability.*—Practically all of this phase has been cleared and is now used for crops or pasture. More than 70 percent of the cleared area is in crops and very little is idle. Only scattered isolated woodlots remain.

This soil is well suited to the common crops and especially well suited to alfalfa and other deep-rooted legumes if properly limed and fertilized. Crop yields are high in comparison to those of the other

upland soils and are only slightly lower than those of the rolling phase of Chester loam.

Because of rolling topography and physical characteristics that make this soil highly susceptible to erosion, management practices should include the control of excessive runoff and erosion. Erosion has progressed rapidly on the Fauquier soils; and much of what was originally Fauquier silt loam is now severely eroded and is mapped as Fauquier silty clay loam. In spite of the erosion hazard and unfavorable acidity, the soil is one of the better upland soils. It has good physical characteristics, responds well to good management, and retains the effects of good management for a long time. The soil, however, has a rather high lime requirement and needs proper fertilization for continued high yields. Minor difficulties in the use of farm machinery are caused by the rolling topography. For a discussion of use and management, see management group 3.

**Fauquier silt loam, undulating phase** (2 to 7 percent slopes) (Fe).—This phase is essentially similar to Fauquier silt loam, rolling phase, but differs in having milder slopes, generally less erosion, and a slightly deeper soil profile. It occupies small to moderately large areas on ridgetops and undulating divides in association with other Fauquier soils and with the Catoctin and Myersville-Orange soils (pl. 9, A). In places small areas resembling the Davidson soils occur, but these are too small to show on the map.

*Use suitability.*—Practically all of this soil was cleared and is now used for cultivated crops. All the common crops are generally grown and yields are rather high.

This soil is very well suited to the production of crops, including alfalfa and other deep-rooted crops. Because of the smoother relief, it absorbs and retains water more favorably, is less exacting in management and conservation requirements, and is slightly more productive than Fauquier silt loam, rolling phase. Rather high yields of crops can be maintained if the soil is adequately limed and fertilized and a moderately long rotation that includes legumes is used. For a discussion of use and management, see management group 2.

**Fauquier silt loam, hilly phase** (14 to 25 percent slopes) (Fc).—This soil has steeper slopes than Fauquier silt loam, rolling phase, and generally more loose greenstone rocks and solid outcrops. Largely because of the steeper slopes, this phase is more shallow and is slightly more eroded than the rolling phase. Although rocks have often been removed from the soil, enough remain to interfere with cultivation. This phase occurs in moderately large elongated areas in close association with the Catoctin and other Fauquier soils, largely in the area between Warrenton and The Plains. It is characterized by a reddish-brown friable silt loam surface soil and a dark-red to red, firm to friable clay subsoil, plastic when wet. Most of the soil has developed over massive epidotic greenstone rather than the chloritic schist variety.

*Use suitability.*—Most of this soil has been cleared and cultivated but it is now in permanent pasture. These pastures are commonly plowed every 10 to 25 years. A rotation of corn, small grain, and meadow-pasture is used after plowing. The plowing is done primarily to keep the pastures clean of briars, bushes, tree seedlings, and other undesirable vegetation.

Largely because of the hilly relief and susceptibility to excessive runoff and erosion, this soil is unsuited to cultivated crops and is best suited to permanent pasture. If adequately limed, fertilized, clipped, and protected from excessive grazing, pastures on this soil will be of good quality and have a high carrying capacity. For a discussion of use and management, see management group 11.

**Fauquier silty clay loam, eroded rolling phase** (7 to 14 percent slopes) (Fg).—This phase differs from Fauquier silt loam, rolling phase, chiefly in being more highly eroded. Accelerated erosion has removed 75 percent or more of the original surface soil and up to 25 percent of the subsoil. Shallow gullies occur locally. The present surface soil, to plow depth, is largely a mixture of the remaining original surface soil with part of the subsoil. In places the subsoil may be exposed. Besides being much heavier in texture and redder in color, the present surface soil is lower in plant nutrients and organic matter than that of Fauquier silt loam, rolling phase. This soil occurs in moderately large areas throughout the central greenstone belt in close association with the Catoctin and other Fauquier soils (pl. 9, B).

**Profile description:**

- 0 to 8 inches, reddish-brown or red friable silty clay loam.
- 8 to 28 inches, dark-red clay or heavy clay loam breaking into rather large blocky pieces that are firm when moist and plastic when wet; contains a few small fragments of weathered greenstone.
- 28 inches +, highly weathered soft greenstone schist containing a dark-red friable silty clay loam soil material between the rock cleavage planes; the greenstone becomes less weathered with increasing depth.

A variation that occurs to considerable extent is underlain by greenstone interlayered with mica schist and gneiss. This variation represents severely eroded Fauquier-Elioak silt loams, rolling phases. It is generally deeper and has a more micaceous and friable subsoil than the normal soil.

Fauquier silty clay loam, eroded rolling phase, is moderately to strongly acid. In its eroded condition, most of the original organic matter and much of the plant nutrients have been lost. In comparison with Fauquier silt loam, rolling phase, the soil is lower in capacity to absorb and retain moisture, has less favorable tilth, has greater runoff, is lower in productivity, and is more susceptible to further erosion unless properly managed. All the Fauquier soils appear to be very susceptible to accelerated erosion. Although they have a rather wide range in slope and degree of runoff, they have internal physical characteristics that favor high erodibility of the soil material. Where improperly used and inadequately managed like this eroded rolling phase, the Fauquier soils erode severely.

**Use suitability.**—All of this soil has been cleared and cultivated. At present, probably 80 percent of the soil is in cultivation, about 10 to 15 percent is in pasture, and the rest is lying idle. General field crops are grown (pl. 14, A), but yields are estimated to be 10 to 15 percent less than on Fauquier silt loam, rolling phase.

The soil is fairly well suited to crops, including alfalfa, if properly managed. The natural fertility and predominantly favorable physical characteristics enable the soil to respond well to good management. Lime and fertilizer requirements are about the same as for Fauquier silt loam, rolling phase, although the eroded phase needs more nitrogen

and organic matter to replace losses through erosion. The soil must be managed and conserved carefully to control further erosion. Long rotations that include a large proportion of close-growing crops, the returning of organic matter to the soil, contour cultivation, and contour stripcropping will serve to control losses of fertility and soil material. The slopes are fairly uniform and appear to be well suited to contour-farming operations. For a discussion of use and management, see management group 6.

**Fauquier silty clay loam, eroded undulating phase** (2 to 7 percent slopes) (Fh).—This soil differs from Fauquier silty clay loam, rolling phase, chiefly in having a milder slope, a slightly thicker soil profile, and fewer gullies. The present surface layer is a red moderately friable silty clay loam. The subsoil is a dark-red firm to friable clay or clay loam, plastic when wet.

*Use suitability.*—All of this soil has been cleared, and practically all of the cleared land is now in cultivation. Its present use and management are similar to those on Fauquier silty clay loam, eroded rolling phase.

The soil is moderately well suited to crops, including alfalfa, but it must be managed very carefully to minimize further erosion. It has good physical characteristics and responds well to good management. Soil material and fertility can be conserved in a rotation of moderate length if all tillage is on the contour, cover crops follow intertilled crops, and adequate lime and fertilizer are used. Continued rather high yields of crops can be obtained under adequate management. For a discussion of use and management, see management group 6.

**Fauquier silty clay loam, eroded hilly phase** (14 to 25 percent slopes) (Ff).—This phase differs from Fauquier silty clay loam, eroded rolling phase, chiefly in having steeper slopes. It differs also in containing more numerous outcrops and loose surface greenstone rock, in being slightly shallower to bedrock, and in being more gullied. The gullies are mainly shallow, but a few are sufficiently deep to prohibit crossing with heavy farm machinery. Most of this phase is in an area between The Plains and Broad Run Post Office. It occupies moderately large areas in close association with the Catoclin and other Fauquier soils. The present surface soil is a red moderately friable silty clay loam; and the subsoil is a dark-red firm to friable clay or clay loam, plastic when wet. This phase is underlain by the massive epidotic variety of greenstone. Small areas of Catoclin soils are included.

*Use suitability.*—All of this soil was cleared of the original forest. Some of it is now cultivated (pl. 14, A), and small areas are idle, but most of the soil is in permanent pasture.

This soil is too steep, is too susceptible to erosion, and has too rapid runoff for the feasible production of crops over a considerable period. It is better suited physically to permanent pastures. High-quality and high-producing pastures can be obtained and maintained by adequate liming and fertilization and by controlling weeds and grazing. For a discussion of use and management, see management group 11.

**Fauquier-Elioak silt loams, rolling phases** (7 to 14 percent slopes) (Fa).—The two soils of this complex are so intricately associated

geographically and so gradational in character that it was considered impractical to delineate each soil on the map. The complex has developed over greenstone containing bands, stringers, and inclusions of mica schist and mica gneiss. These rocks occur in all degrees of mixing. The complex includes: (1) Small areas of Fauquier silt loam, undulating phase, developed over greenstone; (2) small areas of Elioak silt loam, undulating phase, developed over mica schist and gneiss; and (3) larger areas of soil, gradational in character between the Fauquier and Elioak soils, developed over interbedded greenstone and mica schist or mica gneiss in varying degrees of mixing.

They are well-drained deep upland soils characterized chiefly by their reddish relatively thick subsoil. They are closely associated with the Fauquier, Elioak, Catoclin, and Manor soils along the southern border of the greenstone belt southwest of Warrenton. Runoff and internal drainage are medium.

The soils that have developed over the mixed or interbedded greenstone and mica schist or gneiss commonly have a brown very friable silt loam surface soil 7 to 9 inches thick. The subsoil layers are similar to those of Fauquier silt loam, rolling phase, in color, arrangement, texture, and structure, except that they are thicker, more micaceous, and more friable. The subsoil extends to a depth of about 45 inches, where it grades into highly weathered interbedded greenstone and mica schist or mica gneiss containing a red friable silty clay loam soil material. The surface soil is locally a loam in texture, especially where coarse-grained gneiss predominates among the underlying mixed parent rocks.

The soils of this complex are moderately or strongly acid in reaction and moderately low to high in organic-matter and plant-nutrient content. Moisture is well absorbed and retained. The soils are readily permeable to plant roots and air. Surface stones are uncommon, and tilth is good. Accelerated sheet erosion ranges from slight to moderate, but gullies are uncommon.

*Use suitability.*—Probably 75 percent of this complex has been cleared. An estimated 75 to 85 percent of the cleared land is now in cultivation, 10 to 15 percent in permanent pasture, and the rest idle. The crops grown and management practiced are similar to those on Fauquier silt loam, undulating phase.

This complex is moderately well suited to crops. It is adapted to about the same crops as Fauquier silt loam, undulating phase, although it is slightly less fertile and productive and has greater management and conservation requirements. Proper liming and fertilization are necessary for continued satisfactory yields of crops. Soil material and fertility can be adequately conserved through contour tillage and a rotation of moderate length. For a discussion of use and management, see management group 3.

**Fauquier-Elioak silt loams, undulating phases** (2 to 7 percent slopes) (Fb).—This complex differs from Fauquier-Elioak silt loam, rolling phases, chiefly in having milder slopes and slightly thicker horizons.

*Use suitability.*—Practically all of this complex was cleared and is now used for crop production. It is well suited to cultivated crops if properly managed. Because of the milder slopes, this complex has less runoff, is less susceptible to erosion, has a higher moisture-

supplying capacity, is more easily accessible to farm machinery, and is slightly more productive than the rolling complex. Continued high yields of crops can be obtained, and soil material and fertility can be conserved by applying adequate amounts of lime and fertilizer and using a moderately long rotation that includes legumes. For a discussion of use and management, see management group 2.

**Goldvein gritty silt loam, undulating phase** (2 to 7 percent slopes) (Gb).—This is a light-colored moderately well drained deep upland soil developed over quartz monzonite or high-quartz granite in the extreme southern part of the county. The parent rocks occur as intrusive bodies in the associated sericitic schist and gneiss. The soil is characterized by its light color, the high content of quartz grit in the profile, and the occurrence of a semicemented subsurface layer. It occurs in close association with Goldvein gritty silt loam, rolling phase, and the Nason, Tatum, and Lignum soils. The larger concentrations of the soil are near Goldvein, Sommerville, Cromwell, White Ridge, and David. Internal drainage is ordinarily medium, and runoff is medium.

Profile description:

- 0 to 10 inches, light yellowish-brown or yellowish-brown very friable gritty silt loam; the grittiness is caused by the rather high content of fine quartz particles.
- 10 to 22 inches, yellowish-brown, compact, firm, very gritty clay loam; this is the semicemented layer and contains abundant small quartz particles that comprise up to 50 percent of the soil mass.
- 22 to 32 inches, mingled yellowish-brown and reddish-yellow, compact firm gritty clay loam; more friable and less compact and contains less grit than above layer.
- 32 inches +, mingled brownish-yellow, reddish-yellow, and yellowish-brown friable very gritty clay loam material from highly weathered granitic rock; grades into more solid bedrock of granite or quartz monzonite at great depths.

The soil varies somewhat in certain features. The quartz particles in the surface soil range from almost none to half of the soil mass. The semicemented layer ranges from extreme compactness to moderate looseness. In places small areas resembling the Nason soils are included. These have developed over mixed or interbedded granite and sericite schist. The subsoil locally is strong brown, and in some areas, especially those on more level or depressed relief, it is lighter colored and slightly mottled.

Although the soil is readily permeable to water, favorable aeration and root penetration are probably restricted somewhat by the compactness of the semicemented layer. The soil is extremely acid in reaction, is very low in plant-nutrient and organic-matter content, and has only a fair water-supplying capacity. Its low natural fertility can be attributed to the original scarcity of plant nutrients in the parent rock and to the long and severe leaching of the soil. Tilth is good and easily maintained, and the soil can be cultivated under a wide range of moisture conditions. Surface stones and outcrops are uncommon. Accelerated sheet erosion ranges from none to severe, but more than 50 percent of the soil is only moderately sheet eroded. Gullies rarely occur.

*Use suitability.*—Approximately 20 to 25 percent of this soil has been cleared, and the rest is in forest. Most of the cleared land is

used for crops. Generally the cropland is farmed by subsistence methods under poor management. Much of it lies idle for considerable periods and is used only occasionally for crops, mainly corn. Some of the cleared land, however, receives better management.

The soil is fairly well suited to the common crops if properly managed. Its main handicap, aside from its semicemented layer, is its extremely low natural fertility and high acidity. It requires large amounts of lime, complete fertilizer, and organic matter for the satisfactory growth of crops. Although it is very responsive to good management, it does not retain the effects of good management for any considerable time. Largely because of the semicemented layer, the range of crop adaptation is limited, and deep-rooted plants such as alfalfa and sweetclover are unlikely to grow successfully. For further discussion on use and management, see management group 4.

**Goldvein gritty silt loam, rolling phase** (7 to 14 percent slopes) (Ga).—This phase differs from the undulating phase chiefly in having stronger slopes. It also differs in having a slightly thinner subsoil, in being less compact in the semicemented layer, and in having medium internal drainage.

*Use suitability.*—Only about 30 to 35 percent of the soil has been cleared. The larger part of the cleared land is now used sporadically as cropland. The type of farming followed and management used are similar to those of the undulating phase, but yields are somewhat lower.

This soil is fairly well suited physically to the production of crops. Owing to the stronger relief, however, it is more susceptible to erosion, has higher runoff, and is lower in water-supplying capacity than the undulating phase. Some sheet and shallow gully erosion are already evident on about 20 percent of the cleared areas. Proper management is more difficult on this phase. Included on the map are about 50 acres that occupy slopes of more than 25 percent. These steeper areas are in forest and probably are best suited to this use. For a discussion of use and management, see management group 5.

**Hazel silt loam, hilly and steep phases** (14 to 40 percent slopes) (Ha).—These phases are shallow, excessively drained, and light colored. They were derived from mica schist, mica gneiss, and slate. Like most of the shallow soils of the county, they occupy both mountain slopes and upland slopes produced by deep dissection of a former upland level. Their occurrence on mountain slopes is restricted to the Bull Run Mountain region.

The soil areas are scattered throughout the regions underlain by schist, gneiss, and slate. Locally they are called slate land and typically occur in moderately large areas in association with the Manor, Elioak, and other Hazel soils. Generally slopes are from 14 to 25 percent but a few are from 25 to 40.

Owing to the permeable nature of the soil and substratum, internal drainage is rapid. Runoff is rapid to very rapid. Although sheet erosion ranges from slight to severe, more than 75 percent of these phases is moderately sheet eroded, and less than 1 percent is severely eroded. Shallow gullies have developed locally.

**Profile description:**

0 to 9 inches, brown to yellowish-brown very friable floury almost loose silt loam containing noticeable mica flakes and a few small weathered fragments of schist and slate.

- 9 to 15 inches; same as above but containing more weathered slate and schist fragments.
- 15 to 36 inches, brown to dark yellowish-brown friable micaceous heavy silt loam containing abundant soft highly weathered fragments of schist and slate.
- 36 inches +, highly weathered soft slate and schist containing yellowish-brown friable silt loam soil material between the rock cleavage planes; grades into less weathered rock with increasing depth.

These phases vary considerably in many characteristics but are consistently shallow in profile. In general very shallow areas are on the steeper slopes or the small knobs or rises that may surround solid rock outcrops. Some areas, especially those of less steeply sloping relief, have shallow, reddish clay loam subsoils 2 or 3 inches thick. Local areas in the Carter's Run valley have browner surface soils than normal. In many scattered areas the surface soil is a fine sandy loam or loam. Here the parent rocks contain thin beds of quartzite or coarse-grained mica gneiss. Near Turnbull and Fauquier White Sulphur Springs, the underlying rock contains less slate and the soil is usually deeper to bedrock and lighter in color and texture.

A few miles south of Marshall, these phases are underlain by a varved slate and are generally shallower, stonier, siltier, and considerably less micaceous than normal. Where these hilly and steep phases are derived from extremely micaceous schist and gneiss in close association with the Manor soils, they are looser, more micaceous, more yellow, and contain fewer slate and quartz fragments. This variation occurs mainly between Warrenton and New Baltimore. In general the slate and mica content of both the soil and parent rock varies considerably.

This mapping unit is very strongly to extremely acid in reaction and rather low in plant-nutrient and organic-matter content. The capacity to retain and supply soil moisture is very poor, and the soils are extremely droughty in dry growing seasons. They are very permeable to roots, moisture, and air, which move freely throughout the profile. Tilth is good. A few small scattered fragments of quartz and slate may be strewn on the surface and in the soil, but not enough to interfere with cultivation if cultivation were otherwise feasible. Solid rock outcrops are small and scarce. Largely because of steep relief, these phases are poorly accessible to farm machinery and subject to accelerated erosion. They respond well to good management practices but the effects of good management are not lasting.

*Use suitability.*—Probably 75 percent of these phases has been cleared, but a considerable part of the land once cleared is lying idle or in various stages of reforestation. A small part is in cultivation, but about 55 to 65 percent of the cleared land is in permanent pasture. The forested areas that were never cleared are largely in the Bull Run Mountains.

Mainly because of steepness, shallowness, rather low fertility, poor accessibility, very poor water-supplying capacity, and erosion hazard, these phases are considered unsuited to crop production. They are fairly well suited to permanent pasture if properly managed. Good pasture management should include adequate liming, fertilization, weed control, and careful control of grazing to maintain a good sod. Poorly managed pastures become eroded and gradually lose organic matter, plant nutrients, and water-holding capacity. Subsequently,

plant production decreases and the susceptibility to erosion increases. For a discussion of use and management, see management group 14.

**Hazel silt loam, rolling phase** (7 to 14 percent slopes) (Hb).—This soil has milder slopes, a slightly thicker surface soil, slightly less erosion and greater depth to bedrock than the hilly and steep phases of Hazel silt loam. The surface layer is a brown to yellowish-brown very friable floury silt loam, and the subsurface layer is a brown to dark yellowish-brown, friable, micaceous, slaty silt loam. In places the soil contains a reddish-brown clay loam subsoil 4 to 5 inches thick.

*Use suitability.*—Probably from 75 to 85 percent of this soil has been cleared. An estimated 10 to 20 percent of the cleared land is now lying idle or reverting to forest, and the remaining area is about equally divided between crops and pasture.

The soil has more favorable relief and less runoff, is less susceptible to erosion, and has a greater moisture-supplying capacity than the hilly and steep phases. It is fair for the common crops if properly managed. Besides adequate liming and fertilization, good management practices should include use of a long rotation designed to conserve fertility and moisture and to add organic matter to the soil. Contour tillage or contour stripcropping should be used where practicable to conserve moisture and soil material. The soil tends to be droughty during dry growing seasons. For a discussion of use and management, see management group 9.

**Hiwassee loam, undulating phase** (2 to 7 percent slopes) (He).—This well-drained deep soil of the stream terraces is characterized by its reddish-brown surface soil and dark-red sticky subsoil. The parent materials from which the soil formed were washed from uplands underlain by a wide variety of rocks common to the county. This soil was derived from alluvium containing a higher proportion of fine-textured materials, such as silts and clays, than the alluvial material from which the light-colored phases of Hiwassee were developed. Most of the soil occurs along the Rappahannock River, usually within the larger bends of the stream. A few areas occur on some of the other larger streams, however. The soil is moderately sheet eroded. Gullies are uncommon. Internal drainage is medium, and a medium amount of rainfall is removed through surface runoff.

Profile description:

- 0 to 8 inches, dark reddish-brown to reddish-brown friable granular loam or silty clay loam that is slightly sticky when wet.
- 8 to 18 inches, dark-red or dark reddish-brown heavy silty clay loam or clay loam; breaks into small blocky lumps that are friable when moist and slightly plastic and sticky when wet.
- 18 to 43 inches, dark-red or dark reddish-brown clay; breaks into small blocky lumps that are firm when moist and sticky and plastic when wet.
- 43 inches +, red, spotted with reddish-yellow, firm clay loam that overlies the old land surface.

The soil is moderately to strongly acid in reaction, high in plant nutrients, and apparently high in organic-matter content. The organic matter seems to be rather durable and is lost more rapidly through erosion than through any other cause. The soil has a narrow range of moisture conditions under which it can be cultivated. However, its physical character and permeability favor movement of

air and moisture and free penetration of plant roots. The water-holding and water-supplying capacities are good, and the soil responds well to good management. Waterworn pebbles are not common on or in the soil, but a stratum of gravelly material locally occurs at the bottom of the profile. Tilth is good to fair in the less-eroded areas but less favorable in more eroded areas, where a part of the sticky clay loam subsoil is included with the plow layer. Small eroded areas with red clay loam surface soils are numerous.

This soil greatly resembles Davidson clay in many characteristics, particularly in the thickness, color, and texture of the subsoil. It differs from the light-colored variants of the Hiwassee soil principally in having a redder and heavier textured surface soil; a redder, denser, and more sticky subsoil; and a scarcity or absence of waterworn pebbles and sand in the profile. It is more productive than these variants.

*Use suitability.*—Practically all of this soil was cleared and used for crops, but a few areas are now in pasture.

The soil is well suited to the production of the common crops, as it is fertile and has predominantly favorable physical characteristics and favorable relief. Alfalfa is especially well suited, but lime and fertilizer are needed for its successful growth. The soil seems to be rather susceptible to erosion, but runoff and erosion could be controlled under a good system of management. The soil is too deficient in lime and most plant nutrients for continued high yields of most crops, but it retains improvement very well. For a discussion on use and management, see management group 2.

**Hiwassee silty clay loam, eroded rolling phase** (7 to 14 percent slopes) (Hf).—This soil is essentially similar to Hiwassee loam, undulating phase; it differs chiefly in having stronger slopes and more erosion. A considerable part of the original loam surface soil has been lost through erosion, and subsequent tillage operations have incorporated the rest with the upper part of the subsoil. Erosion losses have been uneven, however, and in many areas the plow layer is entirely within the original surface soil.

Largely because of stronger slopes and more erosion, this soil has greater runoff and is more susceptible to further erosion than Hiwassee loam, undulating phase. In addition, it is lower in organic matter and less absorptive of soil moisture, has less favorable tilth, and is less accessible to farm machinery.

*Use suitability.*—Practically all of the soil has been cleared and is now in cultivation. Its use suitabilities are, with certain exceptions, similar to those of the undulating phase. The same crops are grown, but yields are slightly less. Amendment requirements are about the same for both soils, but other problems of management are slightly different. This phase should be managed and conserved more carefully. It requires longer rotations that contain a greater proportion of legumes and close-growing crops, the return of more organic matter to the soil, and contour cultivation or contour stripcropping. It responds very well to good management. For a discussion of use and management, see management group 6.

**Hiwassee loam, undulating light-colored variant** (2 to 7 percent slopes) (Hd).—This well-drained deep soil has developed on stream

terraces. It is characterized mainly by its light-colored and light-textured surface soil, reddish subsoil, and sandy and gravelly parent material. The alluvial materials from which the soil developed have been washed from uplands underlain by a wide variety of rocks common to the county. However, the materials giving rise to this variant contain a much larger proportion of sand and gravel than those underlying Hiwassee silty clay loam, eroded rolling phase.

Most of the soil occurs on old high isolated terrace remnants that are rather far removed from the present stream channel. These areas occur along the Rappahannock River in the southern part of the county and are associated principally with soils of the Masada, Nason, Tatum, and Manteo series. The soil in some areas along the Rappahannock River is on lower and apparently younger terraces. These terraces occur largely in the granite and greenstone belts.

Internal drainage and runoff are medium. Erosion ranges from slight to severe, but about three-fourths of the total area is moderately sheet eroded. Gullies are uncommon.

Profile description:

- 0 to 11 inches, light yellowish-brown to yellowish-brown very friable loam; contains a few rounded quartz gravel up to 2 inches in diameter.
- 11 to 22 inches, yellowish-red or strong-brown clay loam; breaks into small blocky pieces that are friable when moist and slightly hard when dry; contains some rounded gravel and pebbles.
- 22 to 45 inches, yellowish-red to reddish-brown clay loam or sandy clay loam; breaks into small blocky pieces that are firm when moist and hard when dry; contains numerous rounded gravel and pebbles.
- 45 inches +, highly weathered bedrock representing the old land surface.

The soil resembles the Culpeper soil in general appearance. Typically, the areas on the higher terraces show a more distinct differentiation between surface soil and subsoil than the areas on the lower terraces. The surface soil is lighter in color and the subsoil is redder on the higher terraces. Locally, the surface soil is a fine sandy loam, and some small areas have thicker and redder subsoils. The amount of water-rounded rock on the surface and throughout the soil varies considerably. On some areas the stones are sufficiently numerous to interfere with cultivation. These areas are indicated on the map by stone symbols. When dry, the surface soil is considerably lighter in color.

The soil is very strongly acid and low in organic matter and plant nutrients. Its rather low natural fertility is due partly to the original scarcity of plant nutrients in the sandy and gravelly parent material but probably results mostly from long and extreme leaching. Air circulates freely. The moisture-holding and moisture-supplying capacities are good. Because of its favorable porosity and the relatively low runoff, the soil is only moderately susceptible to accelerated erosion. The surface soil has been partly removed in places but still constitutes most of the plow layer. Where sufficiently free of stones, the soil has excellent tilth under a wide range of moisture conditions. It is readily accessible to all farm machinery.

*Use suitability.*—Practically all this soil has been cleared. About 65 percent of this is now in crops, 30 percent in pasture, and 5 percent in idle land.

The soil is well suited to the production of all the common crops if properly managed. It is exceptionally responsive to good manage-

ment practices and retains improvement well. Rather heavy regular applications of complete fertilizer and lime are essential for continued high yields. Expected yields are somewhat less than on the undulating phase of Hiwassee loam. For a further discussion on use and management, see management group 4.

**Hiwassee loam, eroded rolling light-colored variant** (7 to 14 percent slopes) (Hc).—This soil differs from Hiwassee loam, undulating light colored variant, chiefly in having stronger slopes and more erosion. Accelerated erosion caused by the greater runoff or more unfavorable use and management has removed a considerable part of the original surface soil. Subsequent tillage has incorporated the remaining surface soil with the upper part of the subsoil. Erosion losses have been uneven, however, and in many areas the plow layer is entirely within the original surface soil. A few severely eroded areas are included and are conspicuous because of subsoil exposures.

The present surface soil ranges in texture from a loam to clay loam and in color from a yellowish brown to yellowish red. The subsoil is a yellowish-red to reddish-brown firm to friable clay loam.

*Use suitability.*—All of this soil was cleared, although a few areas are now idle or reverting to forest. About 25 percent of the farmed area is in pasture and 75 percent in crops. The same crops are grown as on the undulating phase, but yields are somewhat lower.

This soil is fairly well suited to the production of the common crops. In general its use suitability and management requirements are similar to those of the undulating phase, but conservation of soil and water is a greater problem. As a result of stronger and more eroded slopes, runoff is greater and the water-supplying capacity is less. Longer rotations, more legumes, more organic matter, adequate lime and fertilizer, and contour tillage are recommended. For a discussion of use and management, see management group 5.

**Iredell silt loam, undulating phase** (2 to 7 percent slopes) (Ic).—This is a light-colored imperfectly drained deep upland soil characterized by its dense extremely plastic and sticky subsoil that shrinks and cracks when dry and expands when wet. It is locally called blackjack land. It has developed over Triassic diabase, principally the coarser textured variety. It occurs in the southern part of the county, typically on large to very large areas on wide upland flats, and is rather extensive. Runoff is slow; internal drainage is also slow and is impeded by the relatively impervious heavy subsoil. Although the Iredell soils are very susceptible to accelerated erosion, this phase is uneroded or only slightly sheet eroded and is not gullied.

Profile description:

- 0 to 13 inches, light brownish-gray when dry and grayish-brown when wet very friable floury silt loam containing numerous small dark mineral concretions; a silty clay loam containing more concretions in lower 3 or 4 inches.
- 13 to 49 inches, olive-brown, specked with black, heavy clay that is extremely plastic and sticky when wet, hard when dry, and firm when moist; contains a few small black concretions.
- 49 inches +, highly decomposed diabase rock material retaining the original structure of the rock; friable and rather loose; grades into more solid bedrock at a depth of 5 feet or more.

More than 80 percent of this soil was derived from the coarse-grained Triassic diabase and is associated with the Mecklenburg, Davidson, and Elbert soils. Where derived from fine-grained Triassic diabase, the soil usually has a thinner subsoil, is slightly more imperfectly drained, and occupies smaller and more elongated areas that commonly surround small drains. This variation occurs in association with the Montalto and Zion soils and with Elbert silt loam, concretionary phase. A few areas resembling Orange silt loam are included with the Iredell soil because of their small extent. These inclusions occur in the extreme southern part of the county, where they are underlain by interbedded greenstone and sericite schist; and throughout the central greenstone belt, where they are underlain by greenstone. The soil is locally a loam in surface texture when developed over coarse-grained diabase. Where occurring along the contact zone of coarse-grained diabase and baked shale, the soil is shallower than normal and overlies baked shale at rather shallow depths.

Iredell silt loam, undulating phase is very low in organic matter. The surface soil and subsoil are slightly to medium acid, but the substratum is mildly alkaline. The surface soil is ordinarily readily permeable to moisture, air, and roots, but the tightness and imperviousness of the subsoil restrict absorption and percolation of water and the movement of air. The subsoil holds water with great tenacity and retards its upward movement and its movement from soil to plants. Tilth is ordinarily good except on more eroded spots where a part of the plastic subsoil is included with the plow layer. The soil is free of stones and solid rock outcrops.

*Use suitability.*—Probably only 20 to 25 percent of this soil has been cleared. The cleared land is about equally divided as cropland, pasture, and idle land. The cultivated and pastured areas are usually small and are associated with more desirable soils. Most of them are located along the borders of large forested areas of the Iredell soil. The soil is typically farmed under subsistence methods and supports a rather poor type of agriculture, but a few areas are better managed. Corn, wheat, and hay are the chief crops.

The soil is rather poorly suited to most crops, to pasture, and to forest. However, the soil can be used for hay, such as timothy and lespedeza, or for pasture if properly managed. Corn and wheat are rather poorly adapted to the soil, and their yields are low. Good management practices should include adequate applications of lime and complete fertilizers, particularly those high in potash and phosphate. The forest growth is scrubby and consists largely of undesirable trees. For a further discussion on use and management, see management group 7.

**Iredell silt loam, eroded undulating phase (2 to 7 percent slopes) (1a).**—A brownish-gray moderately firm silt loam surface soil and an olive-brown dense extremely plastic and sticky subsoil characterize this phase. It differs from Iredell silt loam, undulating phase, chiefly in being more eroded. A considerable part of the original surface soil has been removed by erosion, and in many places the remnants have been mixed by tillage with a part of the heavy subsoil. In some places, however, the plow layer is entirely within the original surface soil. Gullies occur locally. Most of them are shallow and short, but a few are too deep to be crossed by farm machinery.

*Use suitability.*—All of this soil has been cleared, but probably 50 percent is now lying idle or in coniferous forest. The remaining cleared land is about equally divided between cropland and pasture.

Like all Iredell soils, this phase is rather poorly suited to most crops, pasture, or forest. The present surface layer has poor tilth and a very narrow range of moisture conditions under which it can be safely tilled. Under present conditions the soil is probably best suited to pasture. For a discussion of use and management, see management group 15.

**Iredell silt loam, level phase** (0 to 2 percent slopes) (1b).—This soil is essentially similar to Iredell silt loam, undulating phase, but has more level slopes. It also differs in having less erosion, less runoff, and a slightly mottled surface soil. After heavy rains shallow ponds often occur on the depressed flat areas of this soil. Soil material washed from adjoining Iredell soils has been deposited in these flat areas, and as a result they have a deeper surface soil than the undulating phase. A few small areas of Elbert silt loam are included on the map with this phase, especially in the wooded areas.

*Use suitability.*—Not more than 25 percent of the soil has been cleared. The cleared land is about equally divided between crops and pasture. The use suitability, adapted crops, and management requirements are similar to those of the undulating phase, although yields are slightly lower and more irregular because of the poorer drainage. The soil is best suited to pasture. For a discussion of use and management, see management group 15.

**Iredell stony silt loam, undulating phase** (2 to 7 percent slopes) (1d).—This soil differs from Iredell silt loam, undulating phase, in containing numerous rounded boulders of diabase scattered on the surface and within the soil. The rocks range in size from a few inches to as much as 4 feet in diameter and practically prevent cultivation. A few slopes are greater than 7 but less than 14 percent. Almost all of the soil is uneroded or only slightly sheet eroded.

*Use suitability.*—Only a small total area of this soil has been cleared and used for pasture. Because of the high stone content, the soil is unsuited to cultivation and is probably best suited to forest. Stone removal is not practicable on such an unproductive soil. Wooded areas are probably best left in forest unless a great need for pasture exists. Fair to good pastures can be established under good management that includes adequate applications of lime and fertilizer. For a discussion of use and management, see management group 16.

**Kelly silt loam, level and undulating phases** (0 to 7 percent slopes) (Ka).—These phases are light-colored, poorly drained, and deep, and have developed over interbedded Triassic shale and coarse-grained diabase. They are characterized by heavy plastic and sticky highly mottled clay subsoil. They occur in the southern part of the county in close association with the Croton, Iredell, Catlett, Zion, Calverton, and Penn soils. Although closely resembling Croton silt loam, these phases differ in having a more plastic and sticky subsoil and in being derived from different parent material. They typically occupy broad upland flats or depressed elongated areas surrounding small drainageways. The largest concentration is on the wide flats south of Remington. They are one of the more extensive mapping units of the county.

More than 50 percent of the slopes are less than 2 percent in gradient. Internal drainage is very slow, and runoff is slow to very slow.

Profile description:

- 0 to 6 inches, light brownish-gray, slightly mottled with light yellowish-brown, very friable floury silt loam.
- 6 to 13 inches, mottled light-gray and light yellowish-brown compact silty clay loam; breaks into small blocky pieces that are firm when moist and hard when dry.
- 13 to 26 inches, highly mottled light yellowish-brown and light-gray massive compact clay that is very plastic and sticky when wet and very firm when moist.
- 26 to 40 inches, predominantly yellowish-brown, mottled with light gray, massive compact clay that is plastic and sticky when wet and firm when moist; contains a few small fragments of bluish baked shale.
- 40 inches +, highly weathered interbedded diabase and shale containing streaks of plastic gray clay.

These phases occur near the border zones of coarse-textured diabase and shale. The shale component of the parent rocks is usually bluish and baked, and the proportion of shale and diabase varies from place to place. In general the subsoil becomes less plastic and sticky as the content of diabase decreases or more plastic and sticky as it increases. Some areas appear to be underlain mainly by shale. A few areas occupy colluvial positions where they have received surface wash from the higher uplands. Here the surface soils vary considerably in color, thickness, and degree of mottling. Dark mineral concretions are present in the soil in places, usually where diabase predominates in the parent rock.

These phases are strongly acid in reaction and low in content of organic matter and plant nutrients. The fluctuating water table is at or near the surface during winter and early spring but is considerably lower during the dry summer months. The heaviness and often waterlogged condition of the subsoil restrict penetration of plant roots and air and normal percolation of water. Although natural fertility is rather low, productivity is largely influenced by the lack of adequate aeration. However, the subsoil holds water very well and ordinarily contains sufficient moisture for plant growth in extremely dry seasons. Tith is only fair because of the relatively narrow range of moisture conditions under which these phases can be cultivated with safety. The surface soil puddles, or runs together, when wet and becomes hard, dry, and compact during dry summer weather. Largely because of the favorable relief, these phases are only slightly subject to erosion. Stones and outcrops are uncommon.

*Use suitability.*—An estimated 60 to 75 percent of this mapping unit has been cleared and is now used for crops or pasture.

Most of the cleared land is artificially drained by bedding, open ditches, or combinations of both. Such drainage removes a good part of the excess surface and subsurface water and lowers the water table. As a result, better aeration and other more favorable conditions for plant growth are provided. When drained, these phases are fairly well suited to the production of the common crops but not well suited to alfalfa and other crops highly sensitive to excessive soil moisture. Yields vary greatly with the season; the largest yields occur in growing seasons of low rainfall. Besides drainage, good management practices should include the proper choice and rotation of crops, adequate

applications of lime and complete fertilizer, and the return of organic matter to the soil. For a further discussion on use and management, see management group 7.

**Lignum silt loam, undulating phase** (2 to 7 percent slopes) (La).—This light-colored imperfectly drained upland soil has developed over sericite and biotite schist, and gneiss, in the extreme southern part of the county. It occupies low-lying slightly depressed areas. It is chiefly associated with the Nason soils, but also with the soils of the Worsham, Goldvein, Tatum, and Manteo series. The slopes rarely exceed 4 percent. Internal drainage and runoff are slow.

Profile description:

0 to 9 inches, pale-brown or light yellowish-brown very friable silt loam.

9 to 22 inches, pale-yellow or light yellowish-brown, slightly mottled with gray, clay loam; breaks into small blocky pieces that are firm when moist and slightly plastic when wet; contains a few small quartz particles.

22 to 36 inches, light olive-brown and yellowish-brown, mottled with gray, clay loam or clay; plastic when wet and firm when moist; contains a few weathered fragments of schist and numerous small quartz particles.

36 inches +, highly weathered schist containing light yellowish-brown and reddish-yellow friable silt loam soil material between the cleavage planes.

Included with the soil are a few small areas underlain by high-quartz granite rather than schist. These resemble Goldvein gritty silt loam but are more imperfectly drained.

The soil is extremely acid in reaction and very low in plant nutrients and organic matter. The water table is high during a considerable part of the year; consequently, the root zone is limited and the soil is rather poorly aerated during part of the growing season. The water-supplying capacity is fair.

*Use suitability.*—Most of this soil is in forest. Only small local areas associated with the Nason soils have been cleared and cultivated. Yields are very low and management is poor.

If properly managed, this soil is fairly well suited to the common crops. It is not well adapted to alfalfa and other deep-rooted legumes. The inadequate drainage and associated moderately poor aeration, the high acidity, and the very low inherent fertility are the chief undesirable characteristics of this soil. If it is to produce crops satisfactorily, the soil needs abundant quantities of fertilizer, lime, and organic matter and a suitable crop rotation. For a discussion of use and management, see management group 7.

**Lloyd silt loam, rolling phase** (7 to 14 percent slopes) (Lc).—This very deep well-drained red soil occupies rolling uplands in close association with the Fauquier and Elioak soils. It occurs mainly along the southern and eastern border of the central greenstone belt. Here the greenstone makes contact with a belt of quartzites, mica gneisses, and mica schists and is interbedded with these rocks. The soil occupies small elongated areas that occur most extensively near Meetz and St. Paul's Church and near Broad Run post office, and Georgetown.

This phase is characterized mainly by its fairly light-colored surface soil and relatively thick heavy-textured red subsoil that resembles that of the Davidson soil. It has some physical properties common to both the Elioak and Davidson soils. This soil differs from the Davidson mainly in having a lighter colored and lighter textured surface soil; from the Fauquier in having a redder, thicker, and

heavier subsoil and a lighter colored surface soil; and from the Elioak in having a heavier, redder, and thicker subsoil. A few areas have slopes of less than 7 percent. Internal drainage and runoff are medium. Erosion ranges from slight to moderate.

Profile description:

- 0 to 7 inches, light-brown, brown, or yellowish-red friable granular silt loam; contains numerous small quartz particles in places.
- 7 to 16 inches, red to dark-red firm clay loam or silty clay loam that is plastic when wet; breaks into small, blocky pieces; contains a few small scattered fragments of quartz, mica gneiss, and greenstone.
- 16 to 46 inches, red to dark-red, firm, brittle clay that is plastic when wet; breaks into small blocky pieces; contains some small mica flakes.
- 46 inches +, red, slightly mottled with yellowish-brown, friable silty clay loam; contains considerable small mica flakes and a few fragments of highly weathered greenstone and mica gneiss; this layer is quite deep and overlies bedrock of greenstone and mica gneiss at a depth of 6 feet or more.

The soil varies but little in characteristics. Locally it is a loam or fine sandy loam, the texture depending largely on that of the underlying rocks. Small eroded areas with red clay loam or silty clay loam surface soils occur.

The soil is strongly to very strongly acid throughout its profile and is moderately well supplied with organic matter and plant nutrients. It is less fertile and less readily improved than Fauquier silt loam, rolling phase, but is much more fertile and productive than Elioak silt loam, rolling phase. Largely because of its greater depth, the soil is injured less by erosion than the Fauquier soil. Stones are absent in most places, and tilth conditions are favorable. The soil is readily permeable to plant roots and allows free movement of air and moisture throughout the profile. The water-holding and water-supplying capacities are good.

*Use suitability.*—An estimated 75 to 85 percent of the soil has been cleared and is used mostly for crops. Only a few areas are idle or used for pasture.

The soil is well suited to all the common crops of the county if adequately limed and fertilized. It has favorable physical characteristics and responds well to good management. The use and management problems on this soil are similar to those on Fauquier silt loam, rolling phase, but the need for amendments, particularly lime, is greater and expected yields are slightly less. The soil is moderately susceptible to erosion, but it can be conserved in rotations of moderate length if tillage is on the contour and if cover crops follow intertilled crops. For a discussion on use and management, see management group 3.

**Lloyd clay loam, eroded rolling phase** (7 to 14 percent slopes) (Lb).—This phase differs from Lloyd silt loam, rolling phase, chiefly in being more eroded. A considerable part of the original surface soil has been lost, and subsequent tillage has incorporated the rest with the upper part of the subsoil. Erosion losses have been uneven, however, and in many severely eroded areas the subsoil is exposed. The greatest concentration of the small total area is near St. Pauls Church, where the soil occurs in close association with the Fauquier soils and Lloyd silt loam, rolling phase.

*Use suitability.*—Practically all of this soil has been cleared, and most if it is now used for crops and pasture. It is fairly well suited for a wide variety of crops, including alfalfa. Because of its eroded condition, however, it has less favorable tilth and is lower in plant nutrients, organic matter, and water-supplying capacity than Lloyd silt loam, rolling phase. It is also less permeable to water and less productive. The soil is susceptible to further erosion.

A crop rotation of moderate length that includes grasses and legumes is desirable not only for protection against erosion, but also for supplying organic matter and nitrogen and improving tilth and soil-moisture conditions. Adequate additions of lime and fertilizer are necessary for the continued successful growth of crops. For a discussion of use and management, see management group 6.

**Louisburg sandy loam, hilly and steep phases** (14 to 40 percent slopes) (Ld).—These phases, locally called white sandy land or steep sandy land, are the hilly and steep, shallow, excessively drained, relatively light-colored upland soils derived from arkosic quartzite and conglomerate. They occur throughout the arkosic quartzite belts, but most abundantly in the hilly "Free State" region between Marshall and Orlean (pl. 10, A). Like most shallow soils of the county, these phases are on mountain slopes, hill slopes, and slopes formed by deep stream dissection. Their occurrence on mountain slopes is largely restricted to the "Free State" region.

Runoff is rapid largely because of the relief, and internal drainage is rapid to very rapid because of the porous nature of the soil and substratum. Although sheet erosion ranges from slight to moderate, about two-thirds of this unit has been moderately eroded. Shallow gullies locally occur but are inextensive.

Profile description:

- 0 to 10 inches, light yellowish-brown or yellowish-brown loose mellow sandy loam containing a few small quartzite fragments; in the virgin condition, has a tough dark mat of grass roots, forest litter, and leaf mold on the surface.
- 10 to 22 inches, yellowish or dark yellowish-brown loose sandy loam; contains abundant weathered quartzite fragments of varying size.
- 22 inches +, highly weathered rather soft arkosic quartzite grading into more solid bedrock.

These hilly and steep phases vary considerably in quantity of stone on the surface and in the soil. The more stony areas are shown on the map by stone symbols. Some areas, usually those that are steeper and more stony, have lighter colored grayer surface soils than normal. Generally there is considerable variation in thickness and depth to solid bedrock. Near Conde and Selone, narrow strips of the Hazel soils underlain by mica schist or varved slate are included. Some small areas with thin yellowish-brown sandy clay loam subsoils resemble the Albemarle soils and are unavoidably included in places.

Louisburg sandy loam, hilly and steep phases, has a number of undesirable features. The soils are very strongly to extremely acid in reaction and very low in organic-matter and plant-nutrient content. In addition they are shallow, extremely low in water-holding and water-supplying capacity, and relatively high in stone content. Largely because of their hilly and steep relief, they are poorly accessible to ordinary farm machinery. On the more favorable side, however,

these hilly and steep phases have excellent tilth where sufficiently free of stones. Because of the extremely loose and open soil, they are not very susceptible to accelerated erosion. They respond well to good management, but the improvements are not lasting.

*Use suitability.*—Probably 50 to 60 percent of these phases has been cleared. Most of the cleared land is in permanent pasture; only a few areas are in cropland or lying idle.

Because of their undesirable features, these phases are considered unsuitable for crops. They are fairly well suited to permanent pasture if properly managed. Good pasture management should include adequate applications of lime and fertilizer, careful control of grazing, and weed control. The fertilizer and lime requirements are quite large. Unless pastures are to be properly managed, the uncleared areas are probably best left in forest. For a discussion of use and management, see management group 14.

**Louisburg sandy loam, rolling phase** (7 to 14 percent slopes) (Le).—This phase differs from Louisburg sandy loam, hilly and steep phases, chiefly in having milder slopes. It also differs, generally, in being somewhat deeper to bedrock and in having fewer stone fragments and outcrops. The soil occupies rolling ridgetops and areas near the base of steeper slopes. It is closely associated with Louisburg sandy loam, hilly and steep phases, and the Culpeper and Albemarle soils. Small areas of Albemarle loam, rolling phase, are unavoidably included in places because of their similarity to this phase in surface characteristics.

*Use suitability.*—Probably 60 to 75 percent of this soil has been cleared and is now used mostly for crops or pasture. Small areas are lying idle. Largely because of its milder relief and deeper profile, the soil has less runoff and a greater moisture-supplying capacity than Louisburg sandy loam, hilly and steep phases. It also has a wider range of crop adaptation and is more productive. The same crops are grown as on Albemarle loam, rolling phase, but yields are higher on the Albemarle soil, chiefly because of its thicker and denser subsoil and its greater water-supplying capacity.

The soil is only fairly well suited to the production of the common crops, if properly managed. Besides adequate fertilization and liming, management practices should include a moderately long rotation designed to add organic matter and conserve moisture. For a discussion of use and management, see management group 9.

**Made land** (variable slopes) (M).—This land type consists of small areas that have been filled in with refuse or soil material, leveled off for building sites and athletic fields, or stripped of their upper soil layers to provide materials for roadbeds. This land type has little or no agricultural value.

**Manor silt loam, rolling phase** (7 to 14 percent slopes) (Mb).—This is a somewhat excessively drained moderately deep brownish very micaceous upland soil that developed over mica schist and mica gneiss. It is associated with the Hazel soils, Elioak silt loam, and Manor silt loam, eroded hilly phase. The soil is locally called soapstone land and is characterized chiefly by the large content of small mica flakes that give it a slick feel.

The soil occurs in rather small to moderate-sized areas in the several belts of mica schist and gneiss that traverse the central part of the county from north to south. Areas of the soil are most concentrated on the western slope of the Bull Run Mountains and between Warrenton and New Baltimore. Other rather large concentrations occur west of The Plains and Halfway and near Turnbull. Small areas are scattered throughout the central greenstone belt, where they are underlain by inclusions of mica schist and gneiss in greenstone.

A few slopes are less than 7 percent. Internal drainage and runoff are medium to rapid. Sheet erosion ranges from slight to moderate, but more than half of the soil is moderately eroded. A few gullies occur locally, but they are relatively shallow.

Profile description:

- 0 to 9 inches, yellowish-red to strong-brown very friable almost loose silt loam containing considerable small mica flakes.
- 9 to 25 inches, yellowish-red friable heavy silt loam or light micaceous silty clay loam breaking into small blocky pieces; material has a slick, slippery, or greasy feel because of the abundant small mica flakes.
- 25 to 42 inches, strong-brown or yellowish-brown very friable slick heavy silt loam; contains abundant small mica flakes and has a few highly weathered mica schist fragments in lower part.
- 42 inches +, yellowish-brown highly weathered and disintegrated mica schist that breaks into easily crushed platy fragments; highly weathered to great depths.

In places small quartz fragments, locally called flint rock, occur on the surface and in the soil but do not interfere with tillage. The parent rocks under these areas contain veins of quartz. When developed over mica gneiss, the soil is usually a very fine sandy loam or loam in surface texture. These areas are not extensive but occur locally near New Baltimore. The soil has considerable variation in thickness of its subsoil. In scattered places the subsoil is thicker, browner, and heavier in texture than normal and is similar to that of the Glenelg soils as mapped in Maryland. Solid rock outcrops are scarce and are of quartz rather than schist.

The soil is very strongly to extremely acid in reaction and naturally fair to poor in organic-matter and plant-nutrient content. The horizons do not differ greatly in color or texture. The subsoil is relatively thin and low in clay content, and these features serve to decrease the moisture-retaining capacity. The soil is therefore subject to droughtiness in dry seasons. Ordinarily it has excellent tilth and can be worked under a wide range of moisture conditions. The soil is very permeable to air, moisture, and plant roots. It responds well to good management but retains improvement only fairly well.

Besides occupying rolling slopes, the soil has physical properties that make it susceptible to erosion. They are principally the scarcity of rock fragments, clay, and other cementing materials, and the loose deflocculated condition throughout the profile.

*Use suitability.*—Approximately 60 percent of the soil is cleared. More than half of the cleared area is in cultivation, and the rest is about equally divided between pasture and idle land. Practically all of the soil was cleared and cultivated at one time or another. However, following the Civil War, much of it was abandoned and allowed to revert to forest.

When properly managed, the soil is fairly well suited to the common crops and well suited to permanent pasture. Present management practices are generally inadequate. Among the many important good management practices are the proper use of lime and fertilizer, following suitable rotations that include legumes, and the return of organic matter to the soil. Contour tillage and possibly stripcropping should be used on the more rolling and eroded slopes. For a discussion of use and management, see management group 9.

**Manor silt loam, eroded hilly phase** (14 to 25 percent slopes) (Ma).—This phase differs from the rolling phase chiefly in being more severely eroded and in having stronger slopes. The original silt loam surface soil has been almost entirely removed by erosion. The yellowish-red and strong-brown very friable extremely micaceous silt loam subsoil now constitutes most of the plow layer. In many places the present surface soil contains numerous small platy fragments of highly weathered mica schist. The soil occurs mainly in the area between New Baltimore and Warrenton. It is closely associated with Manor silt loam, rolling phase, and the Elioak and Hazel soils.

*Use suitability.*—Practically all of this soil was at one time cleared and cultivated. Probably 40 percent is lying idle or reverting to forest, 45 percent is in pasture, and 15 percent is in cultivation.

Largely because of its steep slopes and eroded condition, the soil is considered unsuited to cultivated crops and is probably best suited to permanent pasture. It has more rapid runoff, is more susceptible to further erosion, has a poorer moisture-supplying capacity, and is less fertile and productive than Manor silt loam, rolling phase. Adequate lime and fertilizer and probably additions of organic matter are necessary to establish and maintain good pastures on this soil. For a discussion of use and management, see management group 13.

**Manteo shaly silt loam, hilly and steep phases**<sup>9</sup> (14 to 40 percent slopes) (Mc).—This unit consists of shallow excessively drained yellowish-brown upland soils that have developed over sericite and biotite schist and gneiss. It occurs in the extreme southern part of the county in association with the Tatum, Nason, and Lignum soils. It occupies small elongated areas, principally along the escarpments of the Rappahannock River and Deep Run and their tributaries. Accelerated sheet erosion ranges from slight to severe, but more than 50 percent of the unit is only slightly sheet eroded. Shallow gullies occur locally.

**Profile description:**

- 0 to 8 inches, light yellowish-brown to strong-brown very friable silt loam containing numerous small fragments of weathered schist and small mica flakes.
- 8 to 16 inches, highly weathered sericite schist containing a yellowish-red very friable micaceous silt loam soil material along the rock cleavage planes; grades into less weathered bedrock of schist with increasing depth.

A few areas of this unit contain solid rock outcrops, mainly of quartz, or have numerous quartz fragments of various sizes strewn on the surface. These areas are inextensive and are usually near the

<sup>9</sup> In areas farther north, these phases would be recognized as Manteo channery silt loam because of the composition and shape of the rock fragments.

larger streams. A few very severely eroded areas of the Nason and Tatum soils are included in places. These have yellowish-red or reddish-brown silty clay loam surface soils and are shallow to weathered schist material.

This unit is extremely acid in reaction and very low in plant-nutrient and organic-matter content. It is very permeable to plant roots, moisture, and air but is very poor in water-holding and water-supplying capacity. Runoff is very rapid, and internal drainage is rapid to very rapid. Tilth is good where the unit is sufficiently free of stones.

*Use suitability.*—More than 65 percent of this unit never has been cleared. Most of the land once cleared is now abandoned and in various stages of pine reforestation. Probably not more than 10 percent is in poor grade pasture and not more than 5 percent in cultivation. The cultivated areas are noticeably much less productive than the associated Nason and Tatum soils.

Largely because of steepness of slope, natural poverty of lime and plant nutrients, droughtiness, shallowness, inaccessibility, and difficulty in controlling runoff and erosion, forestry is considered the best use for this unit. For a discussion on use and management, see management group 16.

**Masada loam, undulating phase** (2 to 7 percent slopes) (Md).—This light-colored moderately well drained soil has developed on old high stream terraces. It is characterized by its light-colored, light-textured surface soil, reddish-yellow or brown compact gravelly subsoil, and sandy and gravelly parent material. The alluvial parent materials were washed from uplands underlain by a wide variety of rocks common to the county.

The soil occurs on old, high, isolated Rappahannock River terrace remnants that are far removed from the present stream channel. The soil is associated with the light-colored phases of the Hiwassee soils and the Nason, Tatum, and Manteo soils in the southern part of the county. Runoff is medium. Internal drainage is medium but apparently somewhat impeded by the compact subsoil. The soil is mainly only slightly sheet eroded.

**Profile description:**

- 0 to 9 inches, light yellowish-brown loose loam containing a few waterworn pebbles and gravel of various sizes.
- 9 to 16 inches, light yellowish-brown compact fine gravelly loam or coarse sandy loam.
- 16 to 27 inches, reddish-yellow or brown compact semicemented gritty clay loam; breaks into small blocky pieces that are firm when moist and hard when dry; the grittiness is due to abundant small rounded quartz particles that make up about 40 percent of this layer.
- 27 inches+, yellowish-red compact but friable sandy clay loam directly overlying the old land surface.

Waterworn gravel and pebbles typically occur on the surface and in the soil. In places these pebbles interfere with cultivation. The soil varies considerably in depth to the old land surface. Some areas are not more than 2 feet deep to residuum weathered from sericite schist and gneiss. The surface soil is locally a fine sandy loam or gravelly loam.

Included with this soil are small areas on low terraces along the Rappahannock River and other major streams. These areas have a

light yellowish-brown loam or silt loam surface soil; strong-brown or yellowish-brown friable silty clay loam or clay loam subsoil; and yellowish-brown, slightly mottled with light brownish-gray, clay loam or silty clay loam substratum. They also differ from the normal soil in being underlain by finer textured materials, in containing considerably less gravel and pebbles, and in being slightly more poorly drained.

The soil is strongly to extremely acid in reaction and low in plant nutrients and organic matter. Besides being severely leached, the soil was derived from coarse-textured parent materials that were originally low in lime and plant nutrients. The soil is permeable to water, air, and plant roots, but its permeability may be slightly retarded by the compact subsoil. The water-supplying capacity is fair. Although the soil is very responsive to liming, fertilizing, and other good management practices, it does not retain improvement well. Most amendments are lost rather rapidly through leaching. Tilt is good where the soil is sufficiently free of stones. This soil is not very susceptible to accelerated erosion.

*Use suitability.*—Mainly because this soil occurs as scattered areas associated with less desirable soils, probably 65 to 75 percent of it is in forest. The cleared areas are used mostly for crop production.

The soil is fairly well suited to the common crops or to pasture. It needs liberal applications of lime and complete fertilizer and additions of organic matter for satisfactory yields of crops. It is used and managed very much like the light-colored variants of the Hiwassee series, but yields are lower on this Masada soil. For a further discussion on use and management, see management group 4.

**Meadowville silt loam** (0 to 7 percent slopes) (Me).—This is a well-drained reddish-brown deep soil of the recent colluvial lands. It occupies level or gently undulating areas at the base of slopes, in depressions, or along small drainageways. It consists of materials that have washed and sloughed from upland soils underlain by greenstone. The colluvial materials are recent and have been deposited largely since the adjoining uplands were first cleared and cultivated. Since the soil is so young, it has not developed distinct profile layers. It is associated with the Rohrsersville, Fauquier, Myersville-Orange, and Catoctin soils. The slopes are largely more than 2 and less than 5 percent. Although the runoff is slow, internal drainage through the soil is medium and sufficiently free to permit the normal growth of crops.

**Profile description:**

0 to 24 inches, reddish-brown to yellowish-red friable silt loam or heavy silt loam.

24 inches+, yellowish-red to dark reddish-brown, friable when moist and slightly sticky when wet, silty clay loam; material overlies the old land surface at depths of 40 inches or more.

Depth to the old land surface varies from about 20 to more than 60 inches. The surface texture may be a silty clay loam if erosion is severe on the associated uplands. In many places the soil is located at the base of slopes and grades into poorly or imperfectly drained stream alluvium. Small areas of these alluvial soils are included with the soil. Locally a slight mottling appears in the subsoil at depths of

24 inches or more. The wetter areas are indicated on the map by symbols.

This is one of the most productive soils in the county. It is normally slightly to medium acid in reaction and high in organic-matter and plant-nutrient content. Its physical properties favor tillage and good permeability to roots, air, and water. The water-supplying capacity is good.

The soil maintains its productivity well and constantly receives highly fertile materials from the surrounding upland areas of Fauquier and Catoctin soils. Although not subject to erosion, the soil may be injured and made less productive by excessive deposition of heavy-textured soil materials washed from severely eroded upland slopes. The soil is relatively free of stones and occupies relief favorable to the use of all farm machinery.

*Use suitability.*—Nearly all of this soil has been cleared; probably 60 percent is now in crops and 35 percent in pasture. About 5 percent is idle. The soil normally occurs in long narrow areas that are difficult to use and manage as individual units.

The soil is very well suited to all the common crops of the county, including garden and other special crops. It is not well suited to alfalfa, although this crop is grown successfully in places. Adaptation to crops is wide and rotation and soil amendment requirements are not rigid. Lodging of small grains may be a problem because of the high fertility of this soil. Yields of other crops are high in comparison to those on the upland soils of the county. For a discussion on use and management, see management group 1.

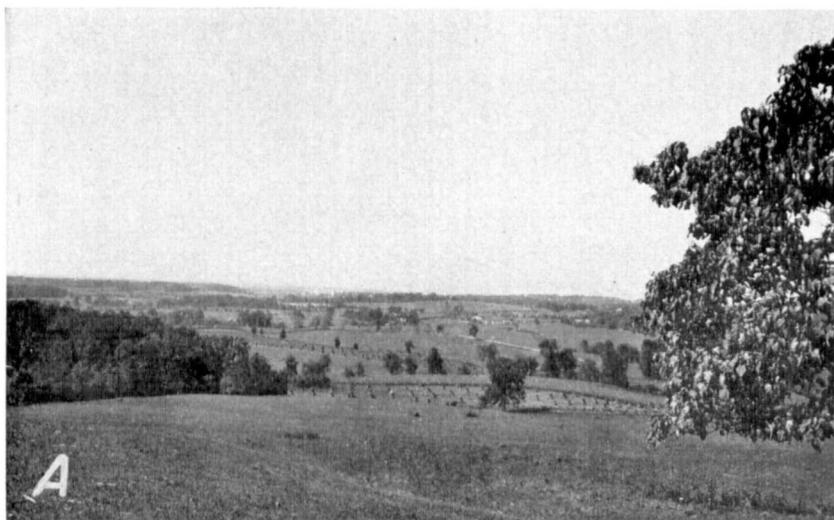
**Mecklenburg loam, undulating phase** (2 to 7 percent slopes) (Mg).—This is a moderately well drained moderately deep upland soil derived from residuum that weathered from coarse-grained Triassic diabase. It occupies small to moderately large areas in the southern part of the county, principally a few miles south of Catlett, Bealeton, and Calverton. It is locally known as red jack land. It is characterized chiefly by its brownish surface soil and its plastic and sticky reddish subsoil. The subsoil is similar to that of the associated Davidson soil in color but resembles the closely associated Iredell soils in consistence.

The soil typically occurs at elevations higher than the Iredell and slightly lower than the Davidson soils. Internal drainage is medium to slow, and runoff is medium. Sheet erosion ranges from slight to severe, but about 75 percent of the soil is only moderately sheet eroded.

**Profile description:**

- 0 to 10 inches, yellowish-red to dark reddish-brown friable granular loam or silt loam containing a few small dark mineral concretions.
- 10 to 26 inches, reddish-brown clay that breaks into blocky pieces that are very firm when moist and plastic and sticky when wet; contains numerous small dark mineral concretions.
- 26 to 32 inches, reddish-brown to yellowish-red clay slightly mingled with yellowish brown; friable when moist but slightly sticky and plastic when wet; mixed with highly weathered black diabase rock material.
- 32 inches +, highly weathered and disintegrated diabase containing mingled reddish and brownish slightly plastic soil material; grades into solid diabase bedrock.

In general the degree of plasticity and stickiness of the subsoil vary considerably from place to place. In some areas the subsoil is less dense and more friable; in others, it is lighter or paler red and

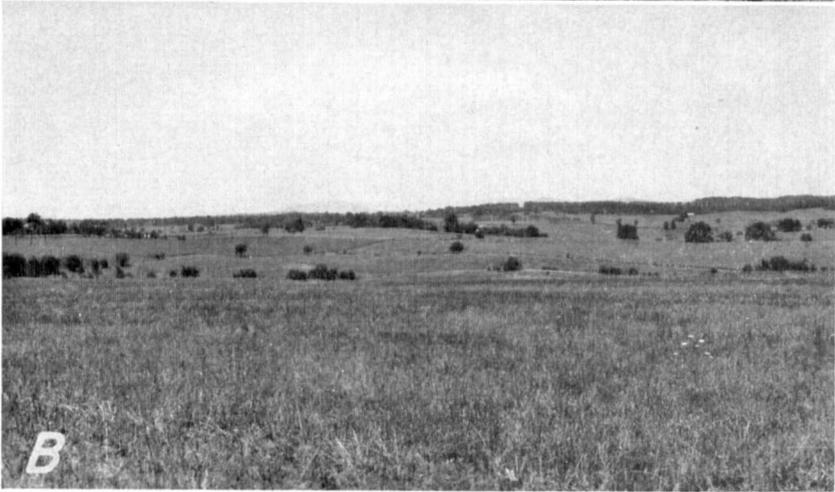


*A*, Landscape of predominately undulating and rolling phases of Fauquier soils.  
*B*, Typical landscape of Fauquier silty clay loam, eroded rolling phase. Bull Run Mountains in background contain largely the various stony land types underlain by acidic rock (quartzite).



*A*, Typical hilly relief of Louisburg sandy loam in "Free-State" region. Quartzite stones on surface in foreground. Corn growing at base of slopes along small drainageways on Seneca loam.

*B*, Field of young corn on Montalto silt loam, undulating moderately shallow phase, in foreground, and Zion silt loam, undulating phase, in background (light colored areas). These soils, underlain by fine-grained Triassic diabase, are commonly adjoined in the Montalto soil association.



*A*, An excellent crop of orchardgrass, harvested for seed, on Myersville-Orange silt loams, undulating phases.

*B*, Typical undulating to rolling relief in the northern Piedmont upland. Meadow in foreground is on Myersville-Orange silt loams, undulating phases, underlain by greenstone. The rolling areas in background are largely Elioak soils underlain by mica schist and gneiss.



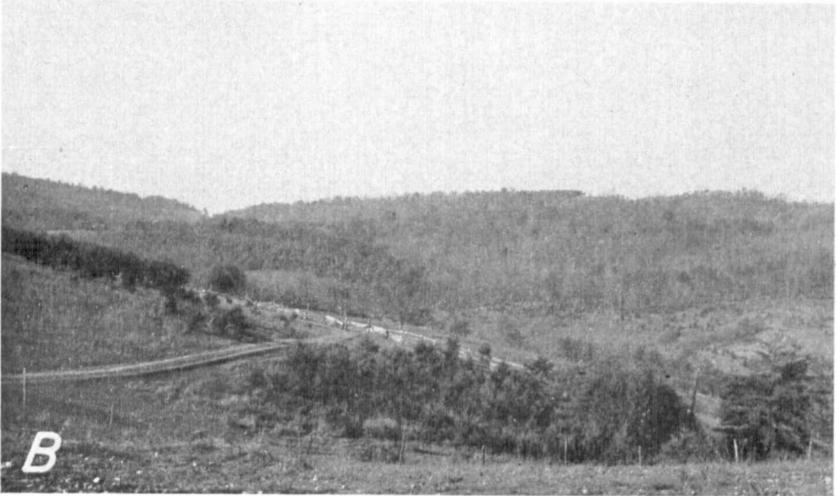
A cutover hardwood-pine forest on Nason silt loam, undulating phase.



Profile of Penn silt loam, undulating phase, overlying Triassic shale. The depth of soil material over bedrock is about 12 inches in this picture.



- A*, An excellent and well-managed bluegrass pasture on drained Rohrersville silt loam. The rolling cropland in the background is largely the eroded rolling and eroded hilly phases, of Fauquier silty clay loam, whereas the forest land is chiefly Catoctin silt loam, hilly phase.
- B*, Dairy cattle grazing on a well-managed permanent pasture on Rowland silt loam. The small clumps of water-tolerant vegetation are growing in wet-spots of poorly drained Bowmansville silt loam.



*A*, Stony colluvium at base of a hollow in Blue Ridge Mountains.

*B*, Typical relief, land use, and management on the Louisburg soils and stony land types of the Louisburg-Stony land-Culpeper soil association in the "Free-State" region. The almost pure stands of pine are on previously cultivated but subsequently abandoned land.



Two types of stoniness of Stony rolling and hilly land, acidic rock:  
*A*, Mainly loose stone strewn over the surface and in the soil.  
*B*, The more common type of stoniness, large solid outcrops of rock in addition to surface stones.

more plastic and sticky than normal and approaches the Iredell subsoils in consistence. In the virgin condition this soil has a 2- or 3-inch dark reddish-brown friable loam surface horizon that contains considerable organic matter. This organic matter is lost rapidly under cultivation, and as a result the surface soil is lighter colored. In the more eroded areas, the present surface soil is highly variable in thickness and color. In many small areas all of the original surface soil is missing, and the reddish clay subsoil is exposed. In other places a part of the subsoil has been mixed by tillage with the remnants of the original surface layer. As a result the present surface layer is heavier and less friable. Very small areas have loose rounded diabase rocks on the surface and in the soil, but elsewhere stoniness is not characteristic.

The soil is medium to strongly acid and apparently fairly well supplied with plant nutrients. Tilth is good where the soil is not too severely eroded, but the range of moisture conditions for tillage is rather narrow in the more eroded areas. Owing largely to the heavy more or less structureless condition of the subsoil, the permeability of the profile to air and water is only fair. Plant roots, however, apparently penetrate freely. The soil has a rather high water-holding capacity, responds well to good management, and retains improvement well.

*Use suitability.*—The soil is typically surrounded by lower lying areas of the Iredell soils much inferior in agricultural value. The early pioneers, however, recognized the superiority of the Mecklenburg soil. Consequently, practically all of it is cleared and in cultivation, whereas the Iredell soils are largely in forest.

The soil is moderately well suited to the common crops of the county if properly managed. Good management practices should include adequate applications of lime, fertilizer, and organic matter and use of a rotation designed to add organic matter and control erosion. For a more detailed discussion on use and management, see management group 4.

**Mecklenburg loam, rolling phase** (7 to 14 percent slopes) (Mf).—Although essentially similar to the undulating phase, this phase differs chiefly in having stronger slopes, a slightly thinner and less plastic subsoil, and slightly more erosion. Most areas of the soil are moderately sheet eroded. A few more severely eroded areas, conspicuous because of the exposure of the reddish-brown subsoil, are included. Some areas have occasional shallow gullies, and others are more stony than normal. The soil is closely associated with Mecklenburg loam, undulating phase, and the Iredell and Davidson soils. Small areas resembling the Iredell and Davidson soils are included with this phase.

*Use suitability.*—Practically all of this soil has been cleared. Most of it is now in cultivation, but small areas are lying idle or are used for pasture. The soil is fairly well suited to the production of crops if properly managed. The same crops are grown as on the undulating phase, but yields are less. This rolling phase must be managed and conserved more carefully to control erosion and loss of fertility. For a discussion of use and management, see management group 5.

**Mixed alluvial land** (0 to 2 percent slopes) (Mh).—This land type consists of stream alluvium that is so complex in color, texture, drain-

age, and gravel content that the individual soil units cannot be shown on the map. The alluvial material washed from uplands underlain by a wide variety of rocks common to the county.

This land type occurs largely along the Rappahannock River but also in places along Goose Creek and Town Run. It is typically in small elongated areas along the banks and within the bends of the larger streams. Here the material has been deposited by rapidly moving floodwaters and varies in texture from a sandy loam to coarse gravel within short distances. In many places it has covered areas of the Congaree soils and has ruined them for crops. In other places swift flood currents have cut shallow channels in which sand and coarser materials, hummocky in appearance, were deposited.

Some first bottom lands along many of the smaller streams are included. They have very complex drainage that changes several times in short distances from well drained to poorly drained. Although drainage varies widely from place to place on this land type, extreme variations are of such limited extent that their separation on the map is not justified. Most of the sandy and gravelly areas of this land type are excessively drained and are very low in organic matter and plant nutrients.

*Use suitability.*—Very little of this land type is cropped. Under present conditions, it is very low in productivity, and cleared areas are used mostly for pasture. It is poorly suited to intertilled crops because of stoniness, low supply of organic matter and plant nutrients, extremes of drainage and water-supplying capacity, or various combinations of these features. It is probably best suited to permanent pasture. For a further discussion on use and management, see management group 10.

**Montalto silt loam, undulating moderately shallow phase** (2 to 7 percent slopes) (M1).—This is a moderately shallow reddish-brown, well-drained, upland soil that developed over fine-grained Triassic diabase. It occupies rather large elongated areas throughout several disconnected fine-grained diabase belts that traverse the county south of Warrenton and New Baltimore from northeast to southwest. It is associated chiefly with the Zion, Iredell, Penn, Buck, Elbert, and other Montalto soils. As the soil occurs only in the Triassic plain part of the county, most of the associated landscape is nearly level to gently undulating. Internal drainage and runoff are medium. Accelerated erosion ranges from none on uncleared to moderate on cleared areas, but about 65 percent of this soil is moderately sheet eroded. Gullies are absent.

**Profile description:**

- 0 to 7 inches, dark reddish-brown to yellowish-red very friable silt loam containing numerous small angular fragments of partially weathered diabase; in the virgin condition, an inch or two of dark-brown friable silt loam is on the surface.
- 7 to 20 inches, dark-red to dark reddish-brown firm to friable silty clay loam or silty clay; breaks into firm small blocky pieces; contains a few scattered fragments of yellowish highly weathered diabase.
- 20 inches +, dark-red, streaked with yellowish-brown, firm to friable silty clay loam or clay loam mixed with fragments of diabase in various stages of weathering; the rock fragments compose 50 percent or more of this horizon; grades into solid bedrock with increasing depth.

This soil has surface characteristics, such as the scattered small diabase fragments and the reddish-brown color of the surface soil, so markedly different from those of the surrounding and associated soils that it is easily recognized. These features change but little from place to place, but thickness of the surface soil and subsoil and depth to bedrock vary considerably. Small areas with thicker and denser subsoils somewhat resemble the Davidson soil, whereas larger scattered areas are more shallow and less dense. Areas of Montalto stony silt loam, rolling moderately shallow phase, are included and shown on the map by stone symbols. Also included are small areas of Zion soils.

The soil is moderately well supplied with organic matter and plant nutrients and therefore relatively fertile. It is medium to strongly acid. Mainly because of its dark color, shallowness, moderate internal drainage, and favorable permeability to air and water, the soil warms and dries sufficiently in the spring to permit early plowing. It is considered by many farmers the "earliest" soil in the county. Plant roots penetrate freely, but the shallowness to bedrock limits their penetration.

The soil responds to good management practices and holds improvement fairly well. On the other hand, its shallow depth is not favorable to the retention of large amounts of soil moisture. The moisture-holding capacity is, nevertheless, greater than that of the other shallow soils of the county. Plants grown on the soil seem to suffer from drought only during exceptionally dry growing seasons. The tilth is good; and, as the soil lies favorably, it is readily accessible to heavy farm machinery. Rock outcrops are not common, and the small scattered diabase fragments that occur on the surface and in the soil do not interfere with tillage.

*Use suitability.*—An estimated 90 percent of the soil has been cleared. Perhaps 75 percent of this is now in cultivation, and 20 percent in pasture. The rest is idle.

The soil is moderately well adapted to the production of the common crops if properly managed (pl. 10, *B*). It is an excellent soil for small grains, clovers, and alfalfa. Because of its relatively low moisture-holding capacity, it is less well suited to corn. Corn is sensitive to soil moisture conditions, and satisfactory yields are dependent on sufficient rainfall, especially during July and August.

Despite its shallowness, thin subsoil, and relatively low moisture-holding capacity, the soil has dominantly favorable characteristics, is rather easily conserved, and is productive under good management practices. Such practices should include the proper choice and rotation of crops, growing of legumes in the hay crop, return of organic matter to the soil, and the proper use of amendments. For a more detailed discussion on use and management, see management group 2.

**Montalto silt loam, rolling moderately shallow phase** (7 to 14 percent slopes) (Mk).—This phase differs from the undulating moderately shallow phase chiefly in having stronger slopes. Other slight differences exist, such as a somewhat thinner surface soil and subsoil and a lower content of organic matter. This soil occurs typically adjacent to streams and small drainageways. It occupies small elongated areas in close association with other moderately shallow

Montalto soils and with the Zion and Penn soils. Included with this phase are small areas having slopes ranging from 14 to 25 percent.

*Use suitability.*—Probably 80 percent of the soil has been cleared; about 60 percent of the cleared land is now in cultivation, 35 percent is in pasture, and 5 percent is land left idle.

The soil is fairly well adapted to the common crops, but management requirements are more exacting than on Montalto silt loam, undulating moderately shallow phase. Because of the stronger slopes, the soil has higher runoff, lower moisture-supplying capacity, greater erosion hazard, and less accessibility to farm machinery than the undulating moderately shallow phase. To maintain crop yields at a comparable level will require a longer rotation including more legumes and grasses and probably somewhat heavier and more frequent applications of lime and fertilizer. For a discussion of use and management, see management group 3.

**Montalto silty clay loam, eroded rolling moderately shallow phase** (7 to 14 percent slopes) (Mm).—A reddish-brown to dark-red moderately friable silty clay loam surface soil and a dark-red firm stony silty clay subsoil characterize this phase. It differs from Montalto silt loam, undulating moderately shallow phase, chiefly in having more erosion, more stoniness, and stronger relief. Slopes range from 2 to 14 percent, but more than half the slopes measure less than 7 percent. Erosion has removed most of the original surface soil. In most places the present surface layer, to plow depth, consists of remnants of the surface soil mixed with a part of the subsoil.

*Use suitability.*—Practically all this soil has been cleared and used for pasture or crops. Crop production is now affected by the eroded condition. Erosion has caused the loss of a considerable part of the plant nutrients and organic matter contained in the original surface soil and decreased the water-supplying capacity. In addition, impaired tilth, decreased water absorption, and increased runoff and susceptibility to further erosion have resulted. As this soil was naturally shallow in its virgin state, it is necessary to protect it against further erosion. Consequently, it is considered best suited to permanent pasture. The soil is moderately fertile and produces a good growth of pasture grasses if adequately limed and fertilized. For a discussion of use and management, see management group 11.

**Montalto stony silt loam, rolling moderately shallow phase** (7 to 14 percent slopes) (Mn).—This phase differs from Montalto silt loam, undulating moderately shallow phase, in having considerably more diabase rock fragments on the surface and in the soil and in having a somewhat thinner subsoil. It is also slightly more shallow to bedrock and has a wider slope range. The diabase fragments are usually flat and angular but in places are rounded. They vary in quantity from place to place but in all places are enough to interfere with cultivation. The soil typically occurs on the long narrow diabase dikes or along the borders of the larger and wider dikes and sills of diabase. In either place the rock appears to be finer grained, harder, and more resistant to weathering than the rock underlying the Montalto silt loam soils. These characteristics of the rock probably account for the stoniness and shallowness of the soil.

Considerable variation occurs in slope range and degree of erosion. Approximately 50 percent of the soil is on rolling slopes of 7 to 14 percent, about 35 percent on undulating slopes of 2 to 7 percent, and the rest on steep slopes of 14 to 25 percent. Sheet erosion varies from none to severe, but most of the soil is only slightly or moderately eroded. A few shallow gullies occur locally.

*Use suitability.*—Probably more than 70 percent of the soil has been cleared. Approximately 55 percent of this is now in pasture, 40 percent is in crops, and 5 percent is idle.

Because of the high stone content of this soil, tith is poor and satisfactory cultivation is practically impossible. Stone removal is ordinarily not economically feasible, but some of the larger more rounded rocks have been removed and used in constructing fences.

The soil is fairly well suited to permanent pasture if properly managed. Pastures should receive adequate and regular applications of lime and fertilizer, and grazing and weed growth should be controlled. Because of the flat fragmental character of the surface rock and absence of rock outcrops, there is no interference with mowing. The steeper and more eroded areas are deficient in organic matter and low in water-absorbing and water-retaining capacity and should receive additional organic matter. For a more detailed discussion on use and management, see management group 11.

**Myersville-Orange silt loams, rolling phases** (7 to 14 percent slopes) (Mo).—The Myersville member of this complex is a relatively light-colored moderately shallow well-drained soil developed over agglomerate greenstone. A few slopes are greater than 14 but less than 25 percent. Internal drainage and runoff are medium.

The Orange silt loam member includes the more nearly level spots and slight depressions that occur on the crests of the small local divides or as heads of drains. The soil is yellow to gray and less well drained and finer textured than the Myersville member. It is plastic when wet and tough when dry.

Soil profiles are variable, since they cover the range of profile conditions from the Orange to the Myersville.

This soil complex occurs in close association with Myersville-Orange silt loams, undulating phases, the Fauquier and Catoclin soils, and the rolling to steep stony and very stony land types. It typically occupies rather small elongated areas scattered along the western edge of the central greenstone belt. A somewhat large concentration of areas occurs near The Plains. Sheet erosion ranges from slight to moderate, but more than 75 percent of the soil is moderately sheet eroded. Shallow gullies occur locally, mainly on the steeper slopes, but they are not extensive.

Profile description of Myersville silt loam:

- 0 to 7 inches, light yellowish-brown to brown very friable silt loam containing numerous small fragments of greenstone.
- 7 to 14 inches, strong-brown friable heavy silt loam containing abundant fragments of greenstone in various stages of weathering; breaks into small, blocky pieces.
- 14 to 25 inches, yellowish-red to strong-brown firm to friable silty clay; breaks into small angular blocky pieces; contains a few highly weathered soft platy greenstone fragments.

- 25 to 31 inches, mingled strong-brown and light yellowish-brown friable silty clay loam soil material containing abundant soft highly weathered greenstone fragments.
- 31 inches +, highly weathered soft greenstone schist grading into less weathered bedrock.

In many places the soil is shallower, more stony, and less dense in the subsoil than normal. Locally a few rock outcrops may occur. Small scattered areas have considerable loose rock on the surface and throughout the soil. These are indicated by stone symbols on the map. Near The Plains the soil characteristically contains areas of shallow Fauquier soils that are too small to show on the map.

The Myersville soil is medium to strongly acid and apparently contains only a fair supply of organic matter and plant nutrients. Except for the more stony areas, the soil has good tilth and is fairly accessible to farm machinery. Water, air, and plant roots penetrate freely, but the moisture-holding and moisture-supplying capacities are only fair. The soil is responsive to good management practices and holds improvement fairly well.

Profile description of Orange silt loam:

- 0 to 1 inch, dark-gray silt loam relatively low in organic matter.
- 1 to 6 inches, pale-yellow to light-gray silt loam.
- 6 to 16 inches, yellow to pale-yellow silty clay loam that is firm in place but is brittle and crumbles fairly easily.
- 16 to 24 inches, brownish-yellow clay mottled with gray, yellow, and brown; tough when dry and plastic when wet.
- 24 inches +, soft, broken, light-colored basic rock or masses of broken rock and clay.

*Use suitability.*—An estimated 50 percent of this soil complex has been cleared. Probably 50 percent of this is now in cultivation, 25 percent is in permanent pasture, and 25 percent is idle and in various stages of reforestation.

Since the Myersville member is predominant in extent, this complex is fairly well suited to crops. Apparently the complex is not more extensively cleared and cultivated because of the presence of the Orange areas and the close association with the steeper more shallow Catoctin soils. The Myersville soil may be somewhat droughty in dry growing seasons, largely because of its moderately shallow profile and only fair water-holding capacity. The Orange soil is definitely droughty in dry seasons.

Although the complex occupies dominantly rolling relief, it does not seem to be so susceptible to erosion as the associated Fauquier silt loam, rolling phase. It is used and managed like Fauquier silt loam, rolling phase, but yields of crops are probably 15 to 20 percent lower. For a discussion of use and management, see management group 5.

**Myersville-Orange silt loams, undulating phases** (2 to 7 percent slopes) (Mp).—This soil complex differs from the Myersville-Orange silt loams, rolling phases, principally in having milder slopes and a somewhat greater proportion of Orange profiles (pl. 11, A). The surface soil of the Myersville member is a brown very friable silt loam, and the subsoil is a yellowish-red to strong-brown firm silty clay. The Orange soil member occurs at the heads of drains or in slight depressions and has a profile similar to that of the Orange soil described under Myersville-Orange silt loams, rolling phases. Erosion ranges from slight to moderate in this complex.

*Use suitability.*—Approximately 75 percent of this complex has been cleared. About half the cleared area is now in cultivation, a few areas are idle, and the rest is in pasture (pl. 11, *B*).

This soil complex is fairly well suited physically to the production of crops. Because of milder relief, these phases have less surface runoff, less susceptibility to erosion, and a more favorable soil moisture condition than the rolling phases. Control of erosion is not a great problem. Generally the use suitability and management requirements are about the same as for the rolling phases, since the slightly greater proportion of the Orange soil offsets the advantages of its smoother relief. For a discussion on use and management, see management group 4.

**Nason silt loam, undulating phase** (2 to 7 percent slopes) (Nb).—This is a well-drained yellowish-brown moderately deep upland soil derived from the residuum weathered from sericite and biotite schists and gneiss. It is closely associated with the Tatum, Lignum, Manteo, Goldvein, and other Nason soils in that part of the Piedmont Plateau extending across the extreme southern part of the county. The soil is characterized by its low fertility and poor productivity. It supports a rather poor type of agriculture. The soil has medium internal drainage and runoff. Erosion ranges from none to moderate, but about three-fourths of the aggregate area is uneroded or only slightly sheet eroded. Shallow gullies occur locally.

**Profile description:**

- 0 to 7 inches, light yellowish-brown to pale-brown very friable silt loam containing numerous small angular quartz fragments.
- 7 to 11 inches, yellowish-brown or strong-brown friable silty clay loam; breaks into small blocky pieces; contains a few small angular quartz fragments.
- 11 to 32 inches, strong-brown to yellowish-red clay; breaks into small blocky pieces that are friable when moist and slightly hard when dry; contains considerable number of small mica flakes.
- 32 inches +, predominantly highly weathered sericite schist and gneiss; contains yellowish-red friable silt loam soil material between the cleavage planes and a considerable quantity of quartz fragments that originally were veins of quartz in the bedrock; grades into less weathered schist and gneiss with increasing depth.

Although in most places the small angular quartz fragments that occur on the surface and in the soil are not numerous enough to interfere with tillage, some areas are included that contain many.

These stony areas are shown on the map by symbol. A few small tracts of the Tatum and Goldvein soils are included, especially in wooded areas. The surface texture is locally a loam or fine sandy loam where the soil is underlain by coarse-grained gneiss rather than schist. The color of the subsoil varies from yellowish brown to red; and locally there is a mixing or mingling of colors in the lower subsoil. The main difference between this soil and the closely associated Tatum soil is in subsoil color. The Nason subsoil is typically yellowish red, whereas the subsoil of the Tatum soil is a comparatively bright red.

This soil has a number of qualities favorable for the production of crops. It is well drained; has good tilth; is readily permeable to water, air, and roots; has a good water-supplying capacity; occupies favorable relief; and is responsive to good management practices

and retentive of their results. However, these desirable qualities are largely overshadowed by the extremely low content of organic matter and plant nutrients, extremely acid reaction and low lime content, and susceptibility to erosion. The low inherent fertility is traceable directly to the original extremely low content of lime and plant nutrients in the parent rock.

*Use suitability.*—Probably not more than 25 percent of this soil is now cleared, although a considerable part of what is now in pine forest was once cultivated and later abandoned. Idle and unimproved pastures, or browse, cover probably 50 percent of the cleared land, and the rest is used for crops. Cleared areas are largely on subsistence farms where management practices are inadequate. They may be used periodically for crops or may be cropped continuously. Yields are probably lower than on any other well-drained upland soil in the county. Very little lime and fertilizer are used, and systematic rotations are usually not followed. Generally speaking, the extreme southern part of the county where the Nason soils predominate is the poorest section and the place where subsistence farms are most concentrated.

The soil is fair for crops if properly managed. However, the maintenance of good productivity is probably the most difficult problem of soil management in the county. The present management practices are obviously inadequate. A different system needs to be adopted. The inherent fertility of the soil is so low that it is questionable whether proper management would pay. Apparently, the soil needs abundant and regular additions of lime, complete fertilizer, and organic matter for continued high production. A rotation of moderate length that includes soil-building crops should be used. Unless good management practices are followed, the uncleared areas should be left in forest (pl. 12). For a discussion of use and management, see management group 4.

**Nason silt loam, rolling phase** (7 to 14 percent slopes) (Na).—This phase differs from the undulating phase chiefly in having stronger slopes and somewhat more erosion. Erosion ranges from none to severe, but more than 80 percent of the soil has now lost more than three-fourths of its surface soil. A few gullies, both shallow and deep, occur locally. This soil is in the southern part of the county in association with Nason silt loam, undulating phase, and the Tatum, Manteo, and Lignum soils. Where uneroded or only slightly eroded, it is a light yellowish-brown or pale-brown friable silt loam to plow depth. The subsoil is a strong-brown to yellowish-red friable clay loam.

*Use suitability.*—About 25 percent of the soil has been cleared. Most of the cleared areas are on small subsistence farms. They are used either sporadically for crops or for unimproved pasture. Most of the areas now forested were once cleared and cultivated but subsequently impoverished or eroded and later abandoned. They are now in pine forest. The crops grown on the soil and the general farming practices used are similar to those of the undulating phase, but yields are somewhat lower.

The soil is only fairly well suited to the production of the common crops. Because of its stronger relief, it is considerably more susceptible to erosion and excessive runoff than the undulating phase. Some

severe sheet and gully erosion are already evident in places. The proper management of this soil is more difficult than that of the undulating phase. The same principles of fertilization and rotations apply, but the soil should be kept in close-growing crops for longer periods and be cultivated on the contour.

Included with the soil are about 250 acres of uneroded forested soil that occupy slopes of more than 14 percent. These, as well as the other forested areas, are probably best left in forest under present conditions. For a discussion of use and management, see management group 5.

**Penn silt loam, undulating phase** (2 to 7 percent slopes) (Pf).—This is a well-drained upland soil derived from Triassic red shale. It is characterized by its "Indian red" color and shallow profile (pl. 13). It is associated with the Bucks, Calverton, Croton, Catlett, Wadesboro, and other Penn soils and occupies rather large areas throughout the Triassic plain in the southern part of the county. It is one of the most extensive soils in the county. Runoff is medium, and internal drainage is medium to rapid. Sheet erosion ranges from slight to moderate, and locally a few shallow gullies occur.

**Profile description:**

- 0 to 6 inches, reddish-brown when dry and dark reddish-brown when wet very friable silt loam; (has a purplish cast).
- 6 to 15 inches, reddish-brown to dark reddish-brown (with a purplish cast) friable silty clay loam; contains a large quantity of weathered reddish-brown shale fragments.
- 15 inches +, reddish-brown to dark reddish-brown (with a purplish cast) soft weathered Triassic shale; contains some reddish-brown friable silt loam soil material; grades into solid shale bedrock at relatively shallow depths.

The soil varies somewhat in characteristics. The surface soil is browner in places and in some areas contains a few scattered water-rounded quartz gravel. Where part of the original surface soil has been removed by erosion, cultivation has brought to the surface a relatively large quantity of shale fragments that appear to disintegrate into soil material after a few years of freezing and thawing.

Some areas have thin rather heavy subsoils 2 to 4 inches thick. Small areas of the Bucks soils too small to show on the map are included in places. Also included are scattered areas of Penn loam that overlie interbedded shale and sandstone.

A few areas of the soil are imperfectly drained and are indicated on the map by symbol. Such areas would have been mapped as Readington silt loam if their extent had justified separation. Another important variation includes small areas of light-colored shallow silt loam soils overlying yellowish or olive-green Triassic shale.

Penn silt loam, undulating phase, is strongly to very strongly acid in reaction, low in organic-matter content, and apparently poorly supplied with plant nutrients. The rather low inherent fertility is traceable directly to the scarcity of lime and plant nutrients in the parent rock. Permeability to water, air, and roots is very good, but the water-supplying capacity is poor. The soil is subject to droughtiness. It is responsive to good management practices but has a poor capacity to retain the lime, plant nutrients, and organic matter that are supplied. Large surface stones or outcrops are not common, and

tilth is ordinarily good. Largely because of its good drainage and favorable relief, the soil is accessible to all farm machinery.

*Use suitability.*—Probably 95 percent of this soil has been cleared, but about 20 percent of this cleared land is now in various stages of pine reforestation. Virgin hardwood forest areas are small and widely scattered. Most of the cleared land is used for crop production.

If properly managed the soil is fairly well suited to the common crops. There is a wide variation in management and yields, as the soil occurs both on subsistence farms and on well-managed dairy farms.

A 5-year rotation of corn, small grain, and hay and pasture for 3 years is followed by the more successful farmers. The hay and pasture are mainly lespedeza grown alone or in mixtures with timothy, orchardgrass, or clover. Some alfalfa is grown, but its production on this soil is rather costly because of the short life of the stands.

Because the soil is shallow and poor in water-supplying capacity, yields of all crops are dependent on the amount and distribution of rainfall during the growing season. Corn, especially, is largely dependent on the amount of moisture received during July and August.

Farmers report that, aside from the moisture requirement, the physical condition of the surface soil must be favorable for satisfactory crop growth. Surface soil structure is rather easily destroyed by continuous use, even in rotations in which organic matter is returned and adequate amendments are applied to the soil. In such cases the surface soil becomes chaffy or deflocculated and less absorptive of water. As a result, runoff, droughtiness, and susceptibility to erosion are greater. The more successful farmers remedy this condition by using a rotation that includes at least 2 years of pasture. These farmers report that the trampling of the pastured soil by cattle serves to improve soil structure and physical condition by encouraging flocculation of the individual silt particles to larger soil aggregates. The resulting crumblike structure is maintained throughout the rotation.

Excessively deep plowing should be avoided on the shallow and more eroded areas. When too much shale is plowed up and mixed with the surface soil, droughtiness is more apparent and productivity and tilth are seriously affected. For additional information on use and management, see management group 8.

**Penn silt loam, rolling phase** (7 to 14 percent slopes) (Pe).—This phase differs from Penn silt loam, undulating phase, mainly in having stronger relief. It also differs, generally, in having thinner surface and subsurface layers, slightly more shale fragments throughout the profile, and more gullies. About one-third of the soil contains shallow gullies. The soil is closely associated with other Penn soils and typically occurs on slopes or breaks adjacent to drainageways that have dissected the original plain.

*Use suitability.*—Probably 65 percent of the soil is cleared and mostly used for cultivated crops. Small areas are in pasture or idle. The crops grown, rotations used, and methods of management are similar to those of the undulating phase, but estimated crop yields are lower.

This phase is suitable for crops, but it must be managed and conserved more carefully than the undulating phase. It is susceptible to excessive runoff and erosion and has a poor water-supplying

capacity. Few or no conservation practices such as contour tillage are followed. The general practice is to plow up more of the underlying soft shale as erosion progresses. Rotations need to be moderately long and consist chiefly of close-growing crops and grasses. Adequate liming, fertilization, and contour tillage are also necessary if productivity is to be maintained or increased. Such management serves to control runoff and erosion and increase fertility, organic-matter content, and moisture-holding capacity. For a discussion of use and management, see management group 9.

**Penn silt loam, eroded rolling phase** (7 to 14 percent slopes) (Pd).—This phase differs from Penn silt loam, undulating phase, in having stronger slopes and considerably more erosion. Sheet erosion has removed most or all of the original surface soil and in some places a considerable part of the subsurface layer. Gullies, both shallow and deep, are abundant. In most places the remaining soil mantle is very thin over consolidated shale bedrock and is largely weathered shale fragments. The soil typically occurs on slopes along streams and drainageways. It is associated chiefly with other Penn soils.

*Use suitability.*—Although all of this soil has been cleared and cultivated, most of it is now abandoned and reverting to pine forest. A few of the less eroded areas, however, have been reclaimed and are in permanent pasture.

Largely because of its rolling slopes and eroded condition, this soil is poor in tilth and in water-absorbing and water-supplying capacity, relatively inaccessible to farm machinery, and subject to rapid runoff and further erosion. Because of these undesirable features, it is poorly suited to crops. Permanent pastures are best suited but require good management and adequate moisture. For a discussion of use and management, see management group 13.

**Penn shaly silt loam, eroded hilly phase** (14 to 25 percent slopes) (Pc).—This phase differs from Penn silt loam, undulating phase, chiefly in having stronger slopes and in being shallower and considerably more eroded. It typically occurs where the larger drainageways have deeply dissected the originally level Triassic plain. Although erosion has been uneven, in most places it has removed all the original surface soil and part of the subsurface layer. The present surface layer to plow depth is a reddish-brown (with a purplish cast) loose shaly silt loam. This is underlain by soft weathered shale mixed with a reddish-brown silt loam. Consolidated shale bedrock is seldom more than 10 inches from the surface, and the entire profile is composed largely of shale fragments.

*Use suitability.*—Approximately half of this soil is cleared and used mainly for permanent pasture. Small areas are cultivated or lying idle and reverting to forest.

This soil is not adapted to crop production, primarily because of extreme shallowness, very poor water-supplying capacity, high susceptibility to excessive runoff and erosion, poor fertility, and steepness and associated poor accessibility to farm machinery. It is also rather poorly suited to pasture. Under present conditions it is probably best used for forestry. Pastures on this soil are generally poor during the dry late summer. If grazing is controlled during

dry weather, fair pastures can be established and maintained, provided adequate lime and fertilizer are applied. For a discussion of use and management, see management group 16.

**Penn loam, undulating phase** (2 to 7 percent slopes) (Pb).—This is a shallow reddish-brown (with a purplish cast) well-drained upland soil developed over fine-textured Triassic red sandstone. It differs from Penn silt loam, undulating phase, chiefly in having lighter textured soil horizons, in containing considerably fewer rock fragments, and in being more micaceous and slightly deeper to consolidated bedrock. The parent sandstone usually occurs as a stratum in Triassic shale and outcrops only locally.

The soil typically occupies ridges in close association with the Penn silt loam soils. The most concentrated areas are in a narrow belt lying roughly between Liberty Church, near Opal, and the Rappahannock River. Other less extensive areas are near Greenville, St. Stephens, Auburn, Cassanova, and the United States Army Signal Corps Station at Vint Hill. The soil is slightly to moderately sheet eroded and contains a few shallow gullies in places.

Profile description:

- 0 to 7 inches, reddish-brown (with a purplish cast) very friable loam.
- 7 to 18 inches, dark reddish-brown (with a purplish cast) friable silty clay loam; contains a few small weathered pieces of sandstone.
- 18 inches +, largely highly weathered softened Triassic sandstone.

The individual soil horizons are not distinctly different in color and texture. The underlying sandstone is deeply weathered and soft and closely resembles soil material when crushed. The surface soil has a few rounded quartz pebbles and gravel in places but does not ordinarily contain the platy rock fragments that are so characteristic of the Penn silt loam soils. The surface soil texture is often a fine sandy loam. In some areas the soil is lighter colored and more micaceous throughout the profile. These areas are underlain by Triassic schist conglomerate that is locally exposed along the contact of the Triassic and greenstone rock formations. Other scattered areas of lighter colored soil are underlain by light-brown sandstone. Small tracts of the soil are included with Penn silt loam, undulating phase.

The soil is strongly to very strongly acid in reaction, low in content of organic matter, and apparently rather poorly supplied with plant nutrients. It is permeable to water, air, and roots, but the shallow profile limits the depth of penetration. Largely because of shallowness and scarcity of clay, the water-holding and water-supplying capacity is poor, and crops commonly suffer from drought during the growing season. The soil has excellent tilth, is readily accessible to farm machinery, and can be tilled under a wide range of soil moisture conditions. It responds well to good management practices but retains their effects poorly.

*Use suitability.*—Practically all of this soil has been cleared. A few areas are now idle or in pasture, but most of the cleared land is in cultivation.

The soil is considered fairly well suited to the common crops if properly managed. The crops, yields, amendment needs, and management requirements are about the same as for Penn silt loam, undulating phase. However, tilth and physical condition of the

surface soil are more favorable and more easily maintained than on the latter soil. For a discussion of use and management, see management group 8.

**Penn loam, eroded rolling phase** (7 to 14 percent slopes) (Pa).—This soil differs from Penn loam, undulating phase, chiefly in having stronger slopes and more erosion. Accelerated sheet erosion ranges from moderate to severe, and shallow gullies are common. The present surface layer to plow depth is a dark reddish-brown (with a purplish cast), loose loam. This is underlain by soft highly weathered red sandstone mixed with reddish-brown silt loam.

*Use suitability.*—Practically all this soil has been cleared and cultivated under poor practices long enough to become eroded. At present, some of the more severely gullied areas are abandoned, but most of the soil is in crops.

Largely because of the stronger slope and more severe erosion, the soil has greater surface runoff, a lower water-holding and water-supplying capacity, and a lower fertility and organic-matter content than the undulating phase. Under existing conditions it is probably best suited to permanent pasture. Pasture management requirements are similar to those of Penn silt loam, eroded rolling phase. For a discussion of use and management, see management group 13.

**Rohrersville silt loam** (0 to 2 percent slopes) (Ra).—This is a poorly drained soil of the recent colluvial lands that formed from materials washed and sloughed from upland slopes of Fauquier and Catoctin soils. The colluvial areas are small and are at the base of slopes, along small drainways, and in seepy spots fed by springs at the heads of small drains. The relief is low to somewhat depressed. The soil is closely associated with the Meadowville, Fauquier, Catoctin, and Myersville-Orange soils throughout the greenstone belts. Internal drainage is slow, and surface runoff is very slow.

**Profile description:**

- 0 to 9 inches, strong-brown to reddish-brown, slightly mottled with light brownish-gray, friable silt loam.
- 9 to 19 inches, mottled yellowish-brown, gray, and light brownish-gray friable silty clay loam containing abundant small, dark mineral concretions.
- 19 to 28 inches, highly mottled strong-brown and gray silty clay loam that is firm when moist and plastic and sticky when wet; contains a few small fragments of weathered greenstone.
- 28 inches +, mottled yellowish-red and light brownish-gray friable silty clay loam mixed with considerable weathered fragments of greenstone; this horizon is often waterlogged.

Locally the soil is covered by shallow reddish-brown silt loam overwash from severely eroded Fauquier soils. These surface deposits seldom exceed 10 inches in thickness. The soil is variable in depth, degree of mottling, depth to waterlogging, and degree of plasticity of the subsurface layers. Small areas of Meadowville silt loam are included in places.

The soil is medium to strongly acid and moderately well supplied with plant nutrients and organic matter. It is wet during winter and early in spring when the water table is highest but becomes hard and dry late in summer when the water table is relatively low. The permeability to roots, moisture, and air is low, especially when the soil is wet. Tilth is ordinarily good, but both tilth and accessibility

to heavy farm machinery are unfavorable when the soil is wet. The soil occupies small elongated areas that are typically too small to be handled as individual units. Most of the soil is not drained artificially.

*Use suitability.*—An estimated 70 to 80 percent of the soil has been cleared. Of the cleared land, probably 75 percent is in pasture, 20 percent is in cultivated crops, and 5 percent is idle.

Largely because of the poor drainage, poor accessibility to farm machinery, poor aeration, and difficulty in establishing artificial drainage, this soil is poorly suited to the common crops. It is moderately well suited to permanent pasture (pl. 14, A). Good pasture management should include adequate liming, fertilization, weed control, and possibly artificial drainage. The pastures are usually more productive during the dry summer months than those on the well-drained upland soils. For further discussion on use and management, see management group 10.

**Rough gullied land** (variable slopes) (Rb).—This land type consists of areas that accelerated erosion has reduced to a network of gullies. Most of it represents what was once the rolling and hilly phases of the Davidson, Fauquier, Brandywine, Penn, and Elioak soils. The areas are small and cover a small total acreage.

This land type may occur on any of the steeper soil types where accelerated erosion is permitted to continue unchecked. Most of it was once productive, but it has been cleared, placed in cultivation, and permitted to erode. All of it was once well suited to permanent pasture. It has since been abandoned to nearly worthless pasture or idle land or has naturally reseeded to scrub pine. In its present condition, this land is worthless for either pasture or crops and consequently is best suited to forestry. Shortleaf pine and black locust are probably the best adapted trees. The main purpose in getting a stand of trees is to minimize further erosion and prevent the gullies from spreading to adjoining less eroded areas. For a discussion of use and management, see management group 16.

**Rowland silt loam** (0 to 2 percent slopes) (Rc).—This is an imperfectly drained brown soil on first bottoms in the Triassic area. It consists of materials washed mainly from Penn, Bucks, Wadesboro, and Calverton soils. It occurs in rather narrow elongated areas along Cedar, Licking, Turkey, Elk, Town, Marsh, Tinpot, and Kettle Runs and other streams in the part of the county underlain by Triassic shale and sandstone. This soil differs from the closely associated Bermudian soil in being more poorly drained, and from the closely associated Bowmansville soil in having better drainage. Internal drainage is slow, and surface runoff is very slow.

Profile description:

- 0 to 10 inches, brown to dark-brown very friable silt loam.
- 10 to 17 inches, dark-brown friable silt loam; contains slight black discolorations.
- 17 to 22 inches, yellowish or dark yellowish-brown, mottled with light brownish-gray, friable silty clay loam.
- 22 inches +, mottled yellowish-brown and light brownish-gray slightly plastic silty clay loam containing abundant small, rounded, dark, mineral concretions.

The soil is usually farther removed from the streambanks, is less subject to stream overflow, and occupies wider and better propor-

tioned areas than the associated Bermudian silt loam. In places the boundary line between the two soils is rather arbitrarily placed because of their similar surface characteristics. Small depressed areas of the more poorly drained Bowmansville soil are included in places. The soil varies considerably in depth to mottling and texture of the subsoil. The depth to mottling commonly ranges from 4 to 12 inches from the surface. Depending mainly on position and internal drainage, the subsoil may be heavier in texture and more highly mottled or better oxidized and less mottled. Although the soil is less subject to stream flooding than Bermudian silt loam, it receives a large quantity of the runoff brought down by many intermittent streams from the higher uplands.

Rowland silt loam is strongly acid in reaction, high in organic matter, and apparently high in content of plant nutrients. It is loose and permeable, but the fluctuating relatively high water table restricts downward plant root growth and the free movement of air. The water-supplying capacity is high.

*Use suitability.*—Nearly all of this soil has been cleared. At least 75 percent of the cleared area is now used for permanent pasture (pl. 14, *B*), and the rest for crops.

This soil has limited use suitability because of imperfect drainage and susceptibility to overflow. It is well suited to corn and some hay crops but is poorly suited to small grains and most clovers. Permanent pasture is considered to be its best use. During dry seasons the grazing is good in comparison to that on the more droughty upland soils. Drainage is usually by dug ditches that connect to the small intermittent streams. Good pasture management should include adequate applications of lime and probably phosphate fertilizer, adequate drainage, and proper weed and grazing control. For a more detailed discussion on use and management, see management group 10.

**Seneca loam** (2 to 7 percent slopes) (Sa).—This is a light-colored moderately well drained deep soil of the recent colluvial lands. It consists of materials washed and sloughed from light-colored upland soils underlain by acidic rocks such as quartzite, granite, schist, gneiss, and slate. It occupies rather small elongated areas at the base of slopes and along small drains (pl. 3, *B*) and is associated chiefly with the Louisburg, Brandywine, and Nason soils. As it consists of recently accumulated materials, the soil has not developed horizons that differ appreciably in color and texture. Surface runoff and internal drainage are medium.

Profile description:

0 to 8 inches, light yellowish-brown when dry and dark yellowish-brown when wet very friable loam.

8 inches +, yellowish-brown friable silty clay loam; slightly mottled with light brownish gray below 30 inches.

In places small areas having imperfect drainage are included on the map and shown by symbol. Where it consists of materials washed from the Chester, Brandywine, and other soils underlain by granite, the soil appears to be more fertile and productive. As it is composed of colluvial materials, its character and fertility are largely derived from the upland soils from which it washed.

The soil is normally strongly acid and moderately well supplied with plant nutrients and organic matter. Because of its low position,

it has favorable moisture relationships and possesses physical properties that favor tillage, percolation of water, penetration of plant roots, and movement of air. The water-supplying capacity is good and stones are uncommon.

*Use suitability.*—Approximately 25 percent of the soil is in forest, 50 percent in pasture, and the rest in crops. Only a few areas are idle. Corn, hay, and truck crops are the principal crops (pl. 10, A).

The soil is well suited to the common crops. Its proper use and management are limited mainly by its occurrence in areas too small and too irregular to be used and managed as individual units. More of it should be used for special crops and truck crops where small acreage is desirable. However, in its present condition it has a narrower adaptation than the Starr and Meadowville soils, as it is naturally less fertile. It is also less productive than these soils, but it can be built up to a high level of productivity if adequately limed and fertilized. For a discussion on use and management, see management group 1.

**Starr silt loam** (2 to 7 percent slopes) (Sb).—This is a brown or reddish-brown, well-drained deep soil of the recent colluvial lands. It formed from materials washed from upland soils underlain by granite, schist, gneiss, and quartzite. Although surface runoff is slow, internal drainage is medium and sufficiently free to permit the normal growth of crops. The colluvial materials are recent and have been deposited largely since the adjoining uplands were first cleared and cultivated.

The soil occurs at the base of slopes, in depressions, and in draws along small drains. Areas are small to moderately large and are most extensive in the northern part of the county in association with the Chester, Brandywine, and other soils underlain by granite and associated rocks.

The soil is characterized by high fertility and predominantly favorable physical characteristics. Because it is so young, it has not developed distinct profile layers that differ appreciably in color and texture.

Profile description:

0 to 23 inches, brown, dark-brown, or reddish-brown very friable granular silt loam.

23 inches +, brown, dark-brown, or reddish-brown friable silty clay loam.

Starr silt loam varies considerably in thickness, texture and color. The surface texture is locally a loam in the granite and quartzite belts. Where this soil is associated with Brandywine gritty loam soils, the surface soil contains considerable small quartz particles washed from these Brandywine soils. Starr silt loam is redder and heavier textured than normal where developed from materials washed from upland soils with red subsoils, such as the Tatum, Elioak, and Culpeper. In contrast the soil is browner and lighter textured when associated with the Chester and Brandywine soils. Slight mottlings of brownish gray locally appear in the lower subsoil, but these are not typical.

The soil is normally slightly to medium acid and exceptionally well supplied with plant nutrients and organic matter. It is probably more naturally fertile than any other soil in the county. Because of

its low position, the soil is kept fertile by constantly receiving highly fertile materials from adjacent slopes. However, the fertility of the materials varies somewhat with the character and fertility of the upland soils from which the materials are washed. Generally, the soil is more fertile and productive where associated with the Chester, Myersville, and Brandywine soils in the northern part of the county. Although it is not commonly susceptible to erosion, it may be injured by deposition of heavy-textured materials washed in from severely eroded and impoverished upland soils.

Water is readily absorbed, and the water-supplying capacity is good. The soil is permeable and readily permits penetration of plant roots, air, and moisture. It has good tilth and can be cultivated under a wide range of moisture conditions. Stones are uncommon.

*Use suitability.*—Practically all of this soil has been cleared; probably 65 percent is in crops, 30 percent is in pasture, and 5 percent is idle or reverting to forest. Areas large enough to receive individual attention are used intensively for corn and other special crops. The smaller more poorly proportioned areas are generally used and managed like the associated upland soils. Farmers often remark, however, that these small areas produce much higher yields than the upland soils in the same field.

The soil is very well suited to the production of the common crops, including truck crops. Average yields are probably higher than any other soil in the county. The soil has a fairly wide range of crop adaptation, is not rigid in its rotation requirements, and requires little or no fertilizer and lime for the common crops. Because of the relatively high nitrogen content of the soil, small grains may tend to lodge. The lodging can be overcome to some extent by adequate applications of phosphate and potash fertilizers. For a further discussion on use and management, see management group 1.

**State loam** (2 to 7 percent slopes) (Sc).—This yellowish-brown, well-drained soil occurs as small elongated areas on high first bottoms or low terraces along the Rappahannock River and other major streams of the county. The terraces are in the initial stages of river-terrace development. They represent stream flood plains that are beginning to be isolated from the furthest reach of floodwaters as the stream gradually cuts a deeper channel. The parent material consists of stream alluvium washed from uplands underlain by a wide variety of rocks common to the county.

The soil is similar to the Congaree soils in many characteristics but differs in having a lighter textured and lighter colored surface soil and a heavier textured subsoil. It also differs in occurring at slightly higher elevations where it is less subject to flooding and deposition of new alluvial material. Runoff and internal drainage are medium. The soil is not very susceptible to erosion and is only slightly sheet eroded.

**Profile description:**

0 to 9 inches, light yellowish-brown very friable loam.

9 to 25 inches, yellowish-brown or brown friable silty clay loam.

25 inches +, light yellowish-brown, slightly mingled with brownish-yellow, very fine sandy loam containing a few small pebbles and gravel.

The surface texture is locally a fine sandy loam or silt loam, and small areas with a little gravel on the surface are included in places. Some small tracts of this soil are included with the Congaree soils.

The soil is medium to strongly acid and moderately well supplied with plant nutrients and organic matter. It is readily permeable to air, moisture, and roots. The moisture-holding properties are only moderately good, but the position of the soil is such that a good supply of moisture for growing plants is available. Although less fertile than the Congaree soils, it is less subject to flooding and more highly desired for growing crops. Good tilth is maintained with ease, and tillage can be carried on over a fairly wide range of soil moisture conditions.

*Use suitability.*—Nearly all of this soil has been cleared and is now used for cultivated crops. It is well suited to many kinds of crops and can be used intensively for intertilled crops if properly managed. No erosion control is necessary, and only light applications of lime and fertilizer are required. Use of the soil is handicapped mainly by its occurring in areas too small to be used and managed individually. For further discussion on use and management, see management group 2.

**Stony colluvium** (0 to 7 percent slopes) (Sd).—This land type consists of colluvium and alluvium that contains so many stones, cobbles, and boulders that cultivation is impracticable (pl. 15, A). The material has washed and rolled from steep rocky slopes to drainage-ways, where it has been further moved for short distances by stream action. The land type typically occurs in long narrow areas at the floors of the gaps in the Blue Ridge and Bull Run Mountains and also for short distances along the streams flowing from these mountains. It is extremely variable in drainage, composition, and origin. The material may come from greenstone, quartzite, or granite; the origin depends on the type of bedrock common to the area in which it occurs.

The stones are numerous both on the surface and throughout the profile. They vary from 2 to 20 inches or more in diameter, but most of them are 2 to 10. They are mainly subangular but are somewhat rounded. The more stony areas are on the floor of gaps and hollows in the Blue Ridge Mountains. Most of this land type is poorly drained, and some is subject to overflow during heavy rains.

*Use suitability.*—Probably not more than 25 percent of this land type is cleared. All of the cleared land is in permanent pasture. The quality of pasture varies considerably according to drainage, fertility, management, and size and quantity of the rocks.

Because it is extremely stony, this land type is not suited to crops and is poor for pasture. It is probably best suited to forest. Fair pastures can be obtained, but the control of weeds is very difficult, as mowing is practically impossible. Better and more nearly weed-free pastures are obtained if adequate lime and fertilizer are applied. For a further discussion on use and management, see management group 16.

**Stony rolling and hilly land, acidic rock** (7 to 25 percent slopes) (Se).—This land type is locally known as sandy stony land because of the numerous solid outcroppings, ledges, and loose stones of quartz-

ite, granite, or other acidic rocks that occur in the areas of sandy soil (pl. 16). The outcrops and stones occupy 20 to 40 percent of the surface. The soil material between the outcrops and stones ranges from a few inches to more than 2 feet in depth. More than three-fourths of the total area has slopes greater than 14 percent.

This land type is most widespread in the "Free State" and Bull Run Mountain regions, where it is underlain by arkosic quartzite or conglomerate. Here, it contains soils of the Louisburg series.

Probably about 40 percent of this land type is underlain by granite and contains soils of the Brandywine series. These areas are largely in the Blue Ridge and isolated outlying mountains.

In the extreme southern part of the county small areas underlain by sericite schist are included. They contain abundant loose quartz rocks, and quartz outcrops on the surface.

*Use suitability.*—Because of the high stone content, this land type is unsuited to crops. It is fairly well suited to permanent pasture if properly managed. The areas of the land type containing granite rocks and Brandywine soils are mainly in forest. Probably 30 to 40 percent of their total acreage is cleared and used for pasture, but none of it is cultivated. These areas are better adapted to and more productive of pasture grass than the areas containing quartzite rocks and Louisburg soils. The areas containing Louisburg soils are less naturally fertile and more droughty. Most of them are in forest. Although these areas are generally used for pasture when cleared, they produce poor grazing.

Good pasture management should include adequate liming, fertilization, and control of grazing. Because of the steepness of slope and high rock content of this land type, control of weeds and brush by clipping is extremely difficult and probably can be done only on the less steep and less stony areas. The forested areas should not be cleared and pastured unless the pastures can be properly managed. For a discussion of use and management, see management group 13.

**Stony steep land, acidic rock** (25+ percent slopes) (Sg).—This land type differs from Stony rolling and hilly land, acidic rock, in occupying steeper slopes. It occurs largely in the parts of the Bull Run Mountains and "Free State" regions underlain by quartzite, in the granitic parts of the Blue Ridge Mountains, and in the isolated outlying granite mountains and hills of the Blue Ridge (pl. 3, A). Scattered areas occur in the uplands on slopes produced by deep stream dissection.

Because of the steeper relief, this land type is shallower, more droughty, and more subject to runoff and erosion than Stony rolling and hilly land, acidic rock.

*Use suitability.*—Probably not more than 25 percent of this land type is clear. The cleared areas largely contain granite rocks and Brandywine soils and are in permanent pasture.

Forestry is the best use for this land type. Stoniness, steep relief, and very poor water-supplying capacity precludes its use for crops or pasture. The areas underlain by granite might make fair pasture in early spring under good management. For a discussion of use and management, see management group 14.

**Stony (very stony) steep land, acidic rock** (14 to 40 percent slopes) (Sk).—This land type is locally known as rock land. It differs from Stony rolling and hilly land, acidic rock, principally in occupying steeper slopes and in having considerably more outcrops and loose surface rock (pl. 3 A). The outcrops and stones occupy more than 40 percent of the surface. Most of this land type is on the steep rocky slopes of the Bull Run Mountains and the "Free State" region and contains Louisburg soils and quartzite rocks. The remaining areas are in the Blue Ridge, Rattlesnake, Buck, Hardscrapple, Naked, Lost, Red Oak, Big Cobbler, Little Cobbler, and Oven Top Mountains. These areas contain granite rocks and Brandywine soils. More than 90 percent of the total area has slopes stronger than 25 percent.

*Use suitability.*—Practically all of this land type is in forest, although a few areas in the granite region are either in pasture or are idle.

Because of the very high stone content and steep relief, this land type is not suited to cultivated crops or pasture. It is best suited to forestry. For a discussion of use and management, see management group 16.

**Stony rolling and hilly land, basic rock** (7 to 25 percent slopes) (Sf).—This land type is locally called rock land or stony land. It contains numerous outcroppings and loose rock of greenstone, diabase, and other basic rocks. The outcrops and stones occupy about 20 to 40 percent of the surface.

Approximately 60 percent of this land type has slopes of 14 to 25 percent and contains soils of the Catoclin series. These areas are underlain by greenstone and occur largely in the Blue Ridge, Rappahannock, Pignut, and Fishback Mountains and prominent hills throughout the greenstone section. With the exception of the Blue Ridge, these mountains and hills are underlain by the agglomerate variety of greenstone, which is extremely resistant to weathering.

About 40 percent of this land type has rolling slopes of 7 to 14 percent, is underlain by greenstone, and contains Fauquier, Catoclin, and Myersville-Orange soils. A few small scattered areas have undulating slopes of 2 to 7 percent and contain Fauquier, Myersville-Orange, and Eubanks soils that have developed over greenstone and the Iredell and Montalto soils that have developed over Triassic diabase. In all places the surface texture of the soil occurring between the rocks is a silt loam.

*Use suitability.*—An estimated 35 to 50 percent of this land type is cleared and in permanent pasture. None of it is cultivated. It cannot be used for cultivated crops because of its rockiness. However, it is fairly well suited to permanent pasture if properly managed. Good pasture management should include adequate liming, fertilization, and control of grazing. The rock surface and unfavorable relief prevents the use of mowing machines, and the control of weeds is therefore more difficult. The forested areas should not be cleared and pastured, unless the pastures are properly managed. For a discussion of use and management, see management group 13.

**Stony steep land, basic rock** (25+ percent slopes) (Sh).—This land type is similar to the Stony rolling and hilly land, basic rock, but occupies steeper slopes and contains only soils of the Catoclin

series. Because of the steeper slopes, this soil is also shallower, and has more rapid runoff, greater erosion hazard and lower water-supplying capacity. It occurs largely on Blue Ridge, Rappahannock, and Fishback Mountains and on the western slopes of the Bull Run Mountains.

*Use suitability.*—About 40 percent is cleared and used for permanent pasture. Because of steepness and stoniness, this land type is not suited to crops and is poorly suited to pasture. Forestry is probably its best use, and the forested areas should not be cleared and pastured unless a great need for pasture exists. Management practices should be at a high level on the areas now in pasture and should include use of adequate lime and fertilizer and grazing control. For a discussion of use and management, see management group 14.

**Stony (very stony) steep land, basic rock** (7 to 40 percent slopes) (S1).—This land type, locally known as rock land, differs essentially from Stony rolling and hilly land,<sup>1</sup> basic rock, in having considerably more outcrops and loose surface rock and in having steeper slopes. The outcrops and stones occupy more than 40 percent of the land surface.

More than 95 percent of this land type occupies slopes of 14 to 40 percent and contains greenstone rock and Catocin soils. The remaining inextensive areas have relief of 7 to 14 percent and contain Triassic diabase rock and Iredell or Montalto soils or contain greenstone rock and Fauquier or Myersville-Orange soils.

*Use suitability.*—Practically all of this land type is in hardwood forest. Bedrock outcrops and loose stones are so numerous that the land is unsuited to crops or pasture. It is best adapted to forestry. For a discussion on use and management, see management group 16.

**Tatum silt loam, undulating phase** (2 to 7 percent slopes) (Tb).—This soil is characterized by its light-colored surface soil and reddish micaceous subsoil. It is a well-drained moderately deep upland soil that developed over sericite and biotite schists and gneiss. It occurs in association with the Nason, Manteo, Lignum, and other Tatum soils in the extreme southern part of the county. It is typically in rather small areas that usually occupy narrow ridgetops or divides at slightly higher elevations than the associated Nason soils. The Tatum soils are similar to the Elioak but are less inherently fertile and productive. Runoff and internal drainage are medium. Accelerated sheet erosion ranges from practically none to moderate, and locally a few shallow gullies occur.

**Profile description:**

- 0 to 8 inches, reddish-yellow when dry and brown when wet very friable silt loam; contains a few small scattered fragments of quartz.
- 8 to 13 inches, yellowish-red friable silty clay loam that breaks into small blocky pieces.
- 13 to 36 inches, red micaceous clay; breaks into small blocky pieces that are firm to friable when moist and fairly hard when dry; contains scattered small platy fragments of highly weathered sericite schist in lower part; the mica imparts a smooth, greasy feel to this layer.
- 36 inches +, highly weathered sericite schist containing red friable silt loam soil material between the rock cleavage planes; material grades into less weathered schist with increasing depth.

Small angular quartz fragments are scattered over the surface in many places. Areas where these rocks are very abundant are indi-

cated on the map by symbol. A few areas have a loam or fine sandy loam surface texture. These areas are underlain by mica gneiss containing intrusions of greenstone. Small outcrops of quartz locally occur.

The soil is not as extensive as Nason silt loam, undulating phase, but it is more productive. Although not nearly so productive as the Fauquier or Chester soils, it is a relatively good soil in comparison to the associated Nason, Goldvein, and Lignum soils and is more extensively used for agriculture. It has a number of desirable characteristics. The soil is friable and has good water-supplying capacity, tilth, and drainage, favorable relief, and moderate depth. Permeability to air, moisture, and plant roots is good. The soil is very responsive to lime and fertilizer and apparently retains improvements well. On the unfavorable side, however, the soil is very strongly to extremely acid in reaction and extremely low in plant nutrients and organic matter. Although the plant-nutrient content is thought to be slightly higher than for the Nason soils, it is lower than for the Fauquier and Chester soils. Abundant applications of lime and complete fertilizer are needed to bring the soil up to maximum production.

*Use suitability.*—An estimated 50 percent of this soil is cleared. Most of the cleared land is in cultivation, but a few areas are in poorly managed pasture or are idle. All the common crops are grown, but yields are very low. Subsistence farming predominates, and management practices are generally poor. Very little lime or fertilizer is used, and systematic rotations are generally not followed. Most of the cultivated land is in small areas complexly associated with Nason or other Tatum soils that have different use adaptations and management requirements. The soil therefore cannot be conveniently managed as a separate unit.

This soil is fairly well suited to the common crops if properly managed. The present management, with a few exceptions, is not adequate. Application of lime and complete fertilizers, the frequent incorporation of organic matter, and use of crop rotations that include legumes and grasses will tend to increase productivity. The proper management of this soil is distinctly difficult because of the economic problems involved. The soil, even in the virgin condition, was very poor in fertility and lime. It has received such poor management that it has become even less fertile and productive. The uncleared areas are probably best left in forest. For a discussion of use and management, see management group 4.

**Tatum silt loam, rolling phase** (7 to 14 percent slopes) (Ta).—This phase differs from Tatum silt loam, undulating phase, chiefly in having stronger slopes and in being slightly shallower.

*Use suitability.*—About 35 percent of this soil has never been cleared and is in cutover hardwood forest. A few areas once cleared but subsequently abandoned are in pine forest. Most of the cleared land is used for cultivated crops, but some is idle or in unimproved pasture. Management and crops are the same as on the undulating phase, but yields are slightly lower.

Runoff and susceptibility to erosion are greater on this phase than on the undulating phase, mainly because of its stronger relief. Mod-

erate sheet erosion and a few shallow gullies are already evident in most areas. Because of these unfavorable features, this soil is more difficult to manage properly than the undulating phase. It can be used for cultivated crops but should be in close-growing crops as long as possible, and moderately long rotations should be followed. Amendment requirements are similar to those of the undulating phase.

Included with the soil are approximately 90 acres on hilly relief of 14 to 25 percent. These areas, for the most part, have never been cleared. They are suitable for pasture but are probably best left in forest unless a great need for pasture exists. For a discussion of use and management, see management group 5.

**Tatum silty clay loam, eroded rolling phase** (7 to 14 percent slopes) (Tc).—This soil differs from Tatum silt loam, undulating phase, chiefly in being considerably more eroded and in having stronger slopes. A few slopes are greater than 14 but less than 25 percent. All of the soil is severely sheet eroded and has lost at least 75 percent of the original surface soil. In most places the remaining surface soil has been mixed with the upper part of the subsoil by tillage, and the resulting surface layer to plow depth is a reddish-brown moderately friable silty clay loam. In other places, however, the red micaceous clay subsoil is exposed. Gullies, both deep and shallow, occur locally.

*Use suitability.*—All of this soil has been cleared and cultivated, but probably 75 percent is now idle, in unimproved brushy pasture, or in pine forest. Only a very small part is used for crops, and yields are very low.

This soil is very poorly suited to cropping, largely because of its poor tilth, high susceptibility to excessive runoff and further erosion, and extremely low fertility and lime content. The best use is thought to be pasture or forest. Shortleaf and scrub pines establish themselves rapidly and make fairly good growth on this soil. However, as a great deal of the soil occurs where tillable land is scarce, some of it will probably be cropped. It is quite probable, however, that areas of this soil not too severely gullied may be suited to permanent pasture if properly managed. To obtain good stands of grass, heavy additions of lime, fertilizer, and probably organic matter are necessary. For a discussion of use and management, see management group 12.

**Thurmont stony loam, undulating phase** (2 to 10 percent slopes) (Td).—This is a light-colored, well-drained deep stony soil of the old colluvial lands. It has developed from old colluvial rock and soil materials washed or rolled from mountain slopes underlain by quartzite. The soil occurs in the Bull Run Mountain-Baldwin Ridge area, where it is at the base of steep mountain slopes or spread out for a short distance over the lower upland level. Areas are relatively small and closely associated with the Braddock soils and the stony lands from acidic rock. They are mainly at the southern end of the Bull Run Mountains, where they more or less surround Baldwin Ridge. Some areas are between New Baltimore and Thorofare Gap. Most of the slopes are less than 7 percent. Runoff and internal drainage are medium. Accelerated sheet erosion ranges from slight to moderate, and gullies are absent.

**Profile description:**

- 0 to 8 inches, light yellowish-brown to yellowish-brown very friable stony loam; abundant quartzite cobbles and pebbles on the surface and in the soil; stones may make up 10 to 20 percent of this horizon.
- 8 to 25 inches, strong-brown to yellowish-brown friable clay loam or sandy clay loam; breaks into small blocky pieces; contains a few quartzite cobbles and pebbles.
- 25 to 45 inches, strong-brown or brown (slightly mottled with red, gray, and brown) friable sandy clay loam, breaks into small blocky pieces; contains a few small quartzite pebbles.
- 45 inches +, largely composed of rounded and subangular quartzite cobbles and boulders; strong-brown, mottled with gray and brown, friable sandy clay loam soil material in the spaces between them.

The soil varies considerably in content and size of stones. A few scattered areas are more stony than normal and are indicated on the map by symbol. Some extremely stony areas are included with the stony lands derived from acidic rock. A few areas are a stony fine sandy loam in surface texture.

The soil is extremely acid in reaction and very low in organic matter and plant nutrients. The soil absorbs water readily, but the moisture-supplying capacity is only fair. It is very permeable to air, roots, and moisture. Few to numerous rounded and subangular stones, 1 to 10 inches across, occur on the surface and throughout the soil. They are sufficiently numerous to interfere with cultivation.

*Use suitability.*—An estimated 50 to 60 percent of this soil has been cleared and cultivated. Most of this is now abandoned and is in various stages of reforestation. Probably not more than 25 percent of the soil is now cultivated.

The soil is suited to crops, but low fertility and stoniness limit its usefulness. On most farms the soil areas are small and not readily accessible to farm machinery. The soil is deficient in essential plant nutrients and water-holding capacity; consequently, yields of most crops would be expected to be low. It is near the lower limit of land adapted to crops, and might well be used largely for pasture or forest.

When used for crops, the soil needs for satisfactory plant growth: (1) Heavy applications of lime and complete fertilizer, (2) frequent incorporation of organic matter, and (3) rotation of crops. The more stony areas are now in forest. They are very poorly suited to cultivated crops, and should not be cleared for pasture unless a great need for pasture exists. The soil is not ordinarily susceptible to accelerated erosion, and erosion control is consequently not a great problem. For a discussion of use and management, see management group 4.

**Tusquitee loam, rolling phase** (7 to 14 percent slopes) (Te).—This is a brown, well-drained, moderately deep soil of the old colluvial lands. The colluvial rock and soil materials from which the soil has formed have rolled or washed from steep rocky mountain slopes underlain by granitic rocks. The soil occupies small elongated areas in the larger hollows and at the base of gaps in parts of the Blue Ridge and isolated outlying mountains. It is associated with the Chester, Brandywine, and Starr soils in the northwestern part of the county. It differs from the closely associated Starr soil principally in having developed distinct profile layers that differ in texture and structure. The most extensive areas are in hollows of Red Oak and Little Cobbler Mountains. A few slopes are less than 7 percent.

Runoff and internal drainage are medium. Most of the soil is moderately eroded. In most places 25 to 50 percent of the original surface soil has been removed by sheet erosion.

Profile description:

- 0 to 8 inches, brown to dark-brown friable coarse granular loam; in wooded areas the upper 2 or 3 inches is a very dark-brown loose loam relatively high in organic matter.
- 8 to 20 inches, brown to strong-brown friable clay loam; breaks into small blocky pieces; contains numerous subangular granite rocks of various sizes.
- 20 to 40 inches +, brown to reddish-brown compact, friable, gritty clay loam; the gritty fraction consists of small rounded granite and quartz fragments and comprises up to 50 to 60 percent of this layer; contains a few scattered rather large subangular fragments of granite; the colluvial deposit ranges from about 2 to 20 feet or more in depth over the old land surface.

The soil is locally stony. Such areas are shown on the map by symbol and would have been mapped as Tusquitee stony loam if they had been extensive enough to justify separation. Surface characteristics of this included soil are similar to those of Chester loam, rolling phase, and some small areas are included on the map with that soil. Other small very stony areas in the Blue Ridge Mountains are included with the stony and very stony land types from acidic rock.

This colluvial soil is medium to strongly acid in reaction and is naturally well supplied with organic matter and plant nutrients. It also receives highly fertile materials carried in runoff and seepage water from the associated slopes. The soil is very permeable to air, moisture, and roots. Its water-supplying capacity is only fair, but its low position on the landscape favors the accumulation of adequate moisture for plant growth. A few stones, 2 to 10 inches across, are on the surface and in the soil but they do not interfere with cultivation. The soil has good tilth and can be cultivated safely under a wide range of moisture conditions. All types of farm machinery can be used, although the soil areas are small and irregularly shaped.

*Use suitability.*—Probably 75 percent of this soil has been cleared. The cleared areas are now used mostly for cultivated crops. The more stony areas are mainly in forest, but a few are in permanent pasture. The soil occurs in long narrow bodies that are too small and irregular to be used and managed individually. It is moderately well suited to crops and pasture. Although naturally one of the more fertile soils of the county, it responds well to good management and retains improvement well. It is somewhat susceptible to erosion when cultivated, but under good management, erosion control is not a serious problem. Good management practices should include a suitable rotation and applications of lime and fertilizer in amounts that will bring continued high yields. Clover and alfalfa are well adapted but require heavier liming and fertilization than other hay crops. For a discussion of use and management, see management group 3.

**Wadesboro silt loam, undulating phase (2 to 7 percent slopes) (Wc).**—This soil is characterized by its light-colored surface soil and reddish subsoil. It is a well-drained deep upland soil that developed over Triassic red shale materials in the southern part of the county. It occurs in moderately large areas and is associated with the Penn,

Bucks, Calverton, Croton, and other Wadesboro soils. The soil occupies comparatively high elevations among the associated soils and has weathered to great depths over consolidated shale bedrock. The largest concentration is near Greenville and in the northeastern part of the Triassic belt. This soil closely resembles the Culpeper and Braddock soils in general appearance. Conditions of accelerated erosion are variable. Although a few areas have shallow gullies or are severely sheet eroded, more than 95 percent of the soil is only slightly to moderately sheet eroded.

Profile description:

- 0 to 6 inches, light yellowish-brown when dry and brown when wet very friable silt loam; contains numerous small semirounded quartz pebbles; in uneroded wooded areas, a 2- or 3-inch layer of pale-brown floury silt loam is on the surface.
- 6 to 12 inches, yellowish-brown friable silt loam; breaks into small blocky pieces; contains a few scattered small quartz pebbles.
- 12 to 17 inches, yellowish-red friable silty clay loam; breaks into small blocky pieces.
- 17 to 44 inches, red to dark-red firm clay; breaks into small blocky pieces.
- 44 inches +, red, streaked with yellow, friable silty clay loam; contains numerous small fragments of red Triassic shale; grades into solid shale bedrock with increasing depth.

The soil horizons vary somewhat in color, texture, and thickness. Small eroded tracts with reddish-brown silty clay loam surface soils are included. Some areas with paler subsoils resemble the Mayodan soils as mapped in other counties to the south. Other small areas have reddish-brown subsoils similar to those of the Bucks soil. In places the parent shale contains horizons of sandstone, and here the surface soil texture may be loam or fine sandy loam. Rounded pink and white quartz gravel and pebbles are locally abundant over the surface and in the surface soil. These gravelly areas are indicated on the map by stone symbols. Small areas of Bucks and Calverton soils are included in some places where they adjoin this soil.

This soil is very strongly to extremely acid and low in plant nutrients and organic matter. The low lime supply and poor fertility are traceable to the low content of lime and plant nutrients in the parent shale and to the severe leaching in this soil. The soil is permeable to air, plant roots, and water. Moisture is readily absorbed and well retained. The water-holding and water-supplying capacity is good. Internal drainage and runoff are medium. The soil is moderately susceptible to erosion. Tilth is ordinarily good and easily maintained under a fairly wide range of moisture and erosion conditions.

*Use suitability.*—Approximately 40 to 50 percent of this soil is cleared and used mostly for crops. At one time or another, most of the soil has been cleared and cultivated. Much of it, especially in the eastern part of the Triassic belt near Greenville, has been abandoned and has reverted to brushland or pine forest. The soil, on the average, is more poorly managed than the associated Penn, Bucks, Calverton, and Croton soils. Subsistence farming predominates, and yields are generally low.

The soil is moderately well suited to the common crops of the county. Although naturally low in lime and plant nutrients, it has good physical characteristics, and good productivity can be built up and main-

tained by proper management. This soil responds exceptionally well to good management and retains improvement well. Good management requires rather heavy regular additions of lime, complete fertilizer, and organic matter. Alfalfa and clover can be grown successfully but have heavier lime and fertilizer requirements than the more common crops. For a discussion of use and management, see management group 4.

**Wadesboro silt loam, rolling phase** (7 to 14 percent slopes) (Wb).—This phase is essentially similar to Wadesboro silt loam, undulating phase, but differs mainly in having stronger slopes and slightly shallower depth to parent rock. Accelerated sheet erosion ranges from slight to severe, and locally a few shallow gullies occur.

*Use suitability.*—About 50 percent of this soil has been cleared and is used mostly for cultivated crops.

The soil is fairly well suited to the common crops. In general its use suitability and management requirements are similar to those of the undulating phase. However, because of stronger slopes, runoff is more rapid, moisture-supplying capacity is less, and conservation problems are greater. For a discussion of use and management, see management group 5.

**Wadesboro fine sandy loam, rolling phase** (7 to 14 percent slopes) (Wa).—This soil differs from Wadesboro silt loam, undulating phase, in texture of the surface soil and slope. Another important difference is its development over Triassic sandstone rather than shale. The soil is closely associated with the Penn, Bucks, Calverton, and other Wadesboro soils. The slope ranges from 2 to 14 percent, but more than three-fourths of the soil has slopes greater than 7 percent. Accelerated sheet erosion is moderate, and a few shallow gullies locally occur.

A few small areas included with the soil have a yellowish-brown subsoil and are underlain by light-gray Triassic sandstone. These areas would have been mapped as Granville fine sandy loam if their extent and agricultural significance had justified such a separation.

*Use suitability.*—Most of this soil has been cleared and cultivated at one time or another. Much of the cleared land is now idle or in pine forest. Probably not more than 35 percent of the soil is now in cultivation. This phase is less desired for agriculture and less productive than Wadesboro silt loam, undulating phase.

Chiefly because of the lighter texture and greater susceptibility to leaching and erosion, this soil does not retain improvement so well as Wadesboro silt loam, undulating phase. Such erosion control measures as contour tillage and stripcropping will permit more intensive use of the soil without injury. Amendment needs are probably slightly higher than on the silt loam soil, but other management problems are similar. For a discussion on use and management, see management group 5.

**Watt silt loam, hilly phase** (14 to 25 percent slopes) (Wd).—This is a shallow excessively drained upland soil derived from black graphitic schist and slate. It is characterized by its grayish color and is locally called black slate land. The soil typically occurs in small elongated areas in close association with the Hazel, Manor,

and Elioak soils. The surface soil that is almost black when wet and the high slate content make the soil easily recognizable. Its shallowness results partly from the resistance of the parent rock to weathering. The soil occurs for the most part near Turnbull and White Sulphur Springs. A few slopes are less than 14 percent. The soil is not gullied and only moderately sheet eroded. Surface runoff is rapid; and owing to the permeability of the soil and substratum, internal drainage is rapid to very rapid.

**Profile description:**

- 0 to 10 inches, grayish-brown when dry and very dark grayish-brown when wet, very friable floury silt loam; contains abundant black slate chips of various sizes.
- 10 to 22 inches, very dark grayish-brown friable heavy silt loam; breaks into easily crushed small blocky pieces and contains abundant black slate fragments of various sizes.
- 22 inches +, predominantly black weathered graphitic slate containing some very dark grayish-brown friable silt loam soil material between the rock cleavage planes; grades into more solid bedrock with increasing depth.

Characteristics of this soil show little variation, except that the color is less gray and more brown in some areas. The parent rock occurs as narrow beds in mica schist and gneiss and outcrops only locally. In a few places, small areas of the soil are included with the Hazel, Manor, or Elioak soils.

The profile is very strongly to extremely acid in reaction and low in plant nutrients and organic matter. The low plant nutrient and lime supply is due primarily to the scarcity of these materials in the parent rock. Because of hilly slopes, the soil has poor accessibility to farm machinery and is susceptible to accelerated erosion when cultivated. It is permeable to plant roots, water, and air but retains and supplies soil moisture poorly. Tilt conditions are only fair because of the shallow profile and the high slate content of the plow layer. The soil is less productive and does not respond so well to good management as the associated Hazel soils.

*Use suitability.*—Probably 70 percent of the soil is in forest and has never been cleared. The remaining areas are about equally divided between pasture and crops.

Largely because of its shallowness, poor water-holding and water-supplying capacity, natural poverty of plant nutrients and lime, and susceptibility to erosion, this soil is considered unsuitable for crops. It is fairly well suited to permanent pasture if the proper amendments are used and grazing is carefully controlled. For a more detailed discussion on use and management, see management group 13.

**Wehadkee silt loam** (0 to 2 percent slopes) (We).—This soil consists of general stream alluvium washed from uplands underlain by granite, greenstone, schist, gneiss, slate, or quartzite. It occurs extensively along the Rappahannock River and along most of the larger streams of the county with the exception of those within the Triassic belt. Along the larger streams, it occurs typically in long narrow areas at the outer edges of the flood plains, or some distance removed from the stream channel. It is associated with Congaree and Chewacla soils on first bottoms but is more poorly drained. The surface is almost level and nowhere exceeds a 2-percent slope. Runoff is very slow, and internal drainage is slow to very slow.

**Profile description:**

- 0 to 9 inches, dark yellowish-brown, mottled with gray, very friable silt loam.  
 9 inches +, highly mottled gray, grayish-brown, and dark yellowish-brown heavy fine sandy loam; layer becomes more compact, heavier, and grayer with increasing depth.

The most dominant characteristic of the soil is the presence of mottling at or very near to the surface. Crayfish holes and mounds are abundant, especially in the wetter and more depressed areas. Where Wehadkee silt loam is washed predominantly from Manor, Hazel, Elioak, and other micaceous soils, small mica flakes occur throughout the profile.

The soil is characteristically medium to strongly acid in reaction and apparently moderately high in organic-matter and plant-nutrient content. Nevertheless, poor aeration and the associated high average water table have restricted the availability of plant nutrients to most farm crops. The soil is permeable to water and has a high water-supplying capacity, but the high water table restricts development of plant roots and practically prevents penetration and movement of air during most of the year.

*Use suitability.*—Probably more than 50 percent of this soil is in forest or grown over with bushes, reeds, or sedges. The cleared area is used entirely for permanent pasture.

This soil is not suitable for growing crops, but it is fairly well suited to pasture. Undesirable vegetation, such as sedges and reeds, persist unless the soil is artificially drained. In its natural condition, the soil supports a poorer quality of pasture than the associated Chewacla silt loam because of its poorer drainage, poorer aeration, and lower capacity to supply plant nutrients to desirable pasture grasses. Open ditch drainage is most commonly used. When the soil is drained, reclaimed, and adequately limed and fertilized, pastures are improved greatly in quantity and quality of forage. For a discussion of use and management, see management group 10.

**Worsham silt loam** (0 to 2 percent slopes) (Wf).—This is a poorly drained, deep, light-colored soil of the recent colluvial lands. The colluvial material from which the soil is derived has washed and sloughed from upland slopes underlain by granite, quartzite, schist, gneiss, or other acidic rocks except those of the Triassic region. The soil occupies small elongated areas at the base of slopes, along small drains, in slight depressions, and in flat seepy areas fed by springs at the heads of drains (pl. 2, A). The drainageways through areas of this soil are small and usually not subject to overflow. Internal drainage and runoff are very slow.

**Profile description:**

- 0 to 10 inches, gray or grayish-brown, slightly mottled with yellow, friable silt loam.  
 10 to 20 inches, light brownish-gray, mottled with yellow, friable silty clay loam.  
 20 to 34 inches, highly mottled light-gray and yellowish-brown compact plastic clay.  
 34 inches +, highly mottled gray and yellowish-brown compact firm clay loam containing numerous small fragments of quartz.

The mottlings characteristically are at or near the surface, but the degree of mottling, plasticity of the subsoil, and depth to the waterlogged part of the profile vary considerably. Small areas with

recently deposited shallow coverings of brown soil material washed from upland slopes occur locally. Some areas are apparently partly derived from residuum weathered in place rather than entirely derived from colluvial materials.

The soil is generally strongly to extremely acid in reaction and low in organic-matter and plant nutrient-content, but it varies according to the character of the materials from which it is washed. The water table is high, and as a result the soil has poor aeration and low permeability to water and roots. In turn, poor aeration greatly retards the growth of most plants. Tilt is moderately favorable, but during wet periods the soil is injured by cultivation and is poorly accessible to farm machinery.

*Use suitability.*—Approximately 50 percent of this soil is cleared and about equally divided between crops and pasture. Much of the cultivated soil is in small, narrow areas surrounding small drains. These areas are too small and irregular to be handled individually and are used and managed like the associated soils. The larger, better proportioned, cleared areas are used mainly for pasture, but the pasture vegetation consists largely of water-tolerant species.

In its present condition, this soil is probably best suited to permanent pasture, although some hay is grown with varying degrees of success. Artificial drainage is locally attempted by open ditches, bedding, or combinations of both. Drainage would serve to lower the water table, remove excess surface and subsurface water, promote better aeration, and increase the availability of plant nutrients. When drained, the soil should show a response to lime and fertilizer and produce pasture of relatively good quality. For a discussion of use and management, see management group 10.

**Zion silt loam, undulating phase** (2 to 7 percent slopes) (Za).—This is a light-colored imperfectly drained upland soil derived from Triassic diabase. It occurs in the south-central part of the county in small areas throughout the Triassic diabase belts. It is associated with the moderately shallow phases of Montalto (pl. 10, B), and with Iredell, Catlett, Kelly, and Elbert soils. It is characterized mainly by its light color and the abundance of dark mineral concretions in the profile. Generally, relief is undulating, but a few areas are more rolling. Runoff and internal drainage are slow. Accelerated erosion ranges from slight to moderate, but more than three-fourths of the soil is only slightly sheet eroded. A few areas contain shallow gullies, but these are rare and restricted to the rolling slopes.

**Profile description:**

- 0 to 7 inches, light to dark yellowish-brown very friable floury silt loam containing a few small dark mineral concretions.
- 7 to 14 inches, light to dark yellowish-brown, slightly mottled with brownish yellow, friable heavy silt loam containing numerous small dark mineral concretions.
- 14 to 26 inches, predominantly dark yellowish-brown, slightly mottled with brownish yellow, firm to friable silty clay loam; contains abundant small dark mineral concretions and a few small fragments of weathered diabase; in some places a 4- to 6-inch layer of brownish-yellow impervious plastic clay is encountered in the lower part.
- 26 inches +, dark yellowish-brown or brown, slightly mottled with black and brownish yellow, friable silty clay loam soil material mixed with rounded fragments of weathered diabase; the rock fragments make up 80 percent of this layer and increase in quantity and size with depth; bedrock occurs at 4 feet or more.

The soil varies considerably as mapped. Where it developed over coarse-grained diabase, it may be a loam in surface texture or contain a thin plastic subsoil layer that is similar to that of the Iredell soils. This variation also contains fewer mineral concretions, occupies higher and more undulating relief, and appears to be slightly better drained than the typical soil.

Locally, the soil contains various quantities of baked shale in the lower parts of the profile. This variation occurs where the bodies of coarse-grained Triassic diabase adjoin and are interbedded with baked Triassic shale. This variation is associated principally with the Iredell and Kelly soils; whereas the normal soil is associated chiefly with the Montalto soils and Elbert silt loam, concretionary phase. Because surface characteristics are similar to those of the Iredell soils, some of this variation is included with Iredell silt loam, undulating phase, especially in the wooded areas.

Zion silt loam, undulating phase, is very strongly acid and apparently low in plant nutrients and organic matter. The water table is within 2 to 3 feet of the surface during the wetter periods of the year; consequently, the root zone is limited in depth, and the soil is rather poorly aerated during a part of the growing season. The soil is slowly permeable to water and has a fair water-supplying capacity. Although the soil responds fairly well to good management practices, the effects are not lasting. The soil is not very susceptible to accelerated erosion. Tilt is good, and stones and outcrops of rock are generally absent.

*Use suitability.*—More than 75 percent of the soil has been cleared; a very small part of the cleared area is in pasture or idle, and the rest is in crops. The common crops are corn, wheat, timothy, and lespedeza grown in a 3- or 4-year rotation.

The soil is fairly well adapted to the common crops including clover, but it is not well suited to alfalfa. Artificial drainage would broaden the use suitability. The soil needs rather heavy application of lime, fertilizer, and organic matter for optimum production. It is used and managed like the closely associated Montalto soils, but crop yields are less and management problems are greater. For a more detailed discussion on use and management, see management group 7.

## INTERPRETIVE SOIL GROUPINGS AND MAPS

Three interpretive soil groupings are given in this section of the report.

The first grouping is based on use and management. The management groups are indicated on the detailed soil map by distinguishing colors. The distribution of the soils that are similar in use suitability and management requirements is thus shown. Suitable agricultural use and management practices are discussed for the soils of each group in the section, Use and Management of Important Groups of Soils. Management groups 1 through 9 consist of soils physically suited to the growing of cultivated crops; groups 10 through 15 consist of soils unsuited to the growing of crops and best suited to pasture; and group 16 consists of soils unsuited to either crops or pasture and best suited to forest.

The second grouping of soils, according to their degree of suitability for the present agriculture, is discussed in the section, Classification of Soils According to Suitability for Use. This grouping is not shown on a map, but it closely correlates with the grouping shown by color on the detailed map.

The third major grouping of soils is based on geographic associations and patterns of distribution. It is discussed in the section Soil Associations. These soil associations, which have fairly well defined geographic boundaries, are shown on the soil association map (see fig. 3, p. 182).

Only a few of the several possible interpretive soil groupings have been prepared and discussed in this report. Other groupings may be prepared from the basic soil survey data if needed. Some possible groupings of soils are: (1) According to expected yields under specific management, (2) according to predicted success of a certain crop, (3) according to requirements for a certain fertilizer element, such as phosphorus, (4) according to measures needed for erosion control, and (5) according to drainage need.

#### USE AND MANAGEMENT <sup>10</sup> OF IMPORTANT GROUPS OF SOILS

The better farmers of Fauquier 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 of the soils of the county have capabilities that have never been realized. These soils can be built up to a fair or even high level of productivity by good management practices. Many of these soils have been used in the past in a one-crop system of farming, and too little attention has been given to proper diversification of crops. Such practices have seriously impaired the productivity of some of the soils.

On the other hand, many of the farmers are now practicing proper soil use and good soil management. Their crop yields are much higher than the county average. In general these farmers are following practices that are basic to good farming, such 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 resources on the land. Generally such a rotation will include (a) a legume for nitrogen maintenance, (b) a tilled crop for weed control, (c) a deep-rooted crop that will reach nutrients in the subsoil and increase permeability, and (d) pasture, meadow, or green manure for organic-matter maintenance and tilth.
- (3) Returning barnyard or green manure to the soil in order to maintain a supply of nitrogen and fresh organic matter.
- (4) Applying liming materials, phosphate, nitrogen, or potash, or any combination of these materials, where needed. (See county agent about testing soil before lime or fertilizer is added.)

<sup>10</sup> 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 such practices as (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 land.

(5) Taking reasonable care in preparing the seedbed and following the practices of the better farmers or the recommendation of experiment stations regarding the time and rate of planting and other cultivation operations.

(6) Taking suitable measures to control weeds, insects, and diseases.

Although these basic practices will apply to all the soils of the county, the 125 mapping units do differ in varying degrees in their use suitability and management requirements. In order to simplify and condense the discussion of use and management, however, the soils that are similar in those characteristics particularly important in their management are discussed together.<sup>11</sup> The soils within each group may be similar or they may vary in productivity for certain crops and in response to improved management practices. Any differences in productivity and response, however, are not wide.

Two levels of management, A and B,<sup>12</sup> are discussed for each group—(A), under the heading, Present Use and Management, and (B), under the heading, Use Suitability and Management Requirements. Management requirements for permanent pasture are discussed for most soil groups. Generally, two or more groups may have similar management requirements for pasture. Each group, however, has management requirements for tilled crops that are different from those of other groups, because of the more exacting requirements resulting from tillage on most of the soils of the county.

Suitable use and management practices for the soils of Fauquier County, Va., are given in table 4.

Productivity ratings for each soil under the two levels of management are given in tables 5 to 19.<sup>13</sup> These ratings are based on field observations, on the experience of farmers throughout the county, and on information from the county agent and agricultural specialists at the Virginia Agricultural Experiment Station. They therefore represent the combined judgment of a number of informed people.

The productivity rating is a percentage of a standard yield. The standard yields are given at the top of the column for each crop. The standard yield of corn, for example, is 50 bushels per acre. A rating of 120 for corn indicates that 120 percent of 50, or 60 bushels per acre, can be expected, on the average of several years, from that soil under the particular system of management. The ratings are based on at least a 5-year period, and yields higher than those indicated for the high level of management are not uncommon and can be obtained in favorable seasons. The average expected yields may also greatly change in the future with the introduction of new crop varieties, new cultural practices, and new controls for plant diseases or insect pests. To raise the yields from those in column A to those in column B will generally require at least two rotation cycles under the high level of management.

<sup>11</sup> It is recognized that certain suggested management practices may not be feasible for all farmers in the county under present conditions. Each farm has combinations of soils peculiar to itself. Therefore combinations of management practices different from those indicated in this section but better suited to the particular conditions of the farm may be necessary.

<sup>12</sup> A = the prevailing level; B = the level practiced by a few of the better farmers and thought to be feasible under present economic conditions.

<sup>13</sup> Bottom land soils are rated as unprotected from flooding by dikes.

TABLE 4.—*Suitable uses and management practices for soils of Fauquier County, Va.*

Management group and soil	Uses	Rotations	Supplementary practices for water control	Remarks
Management group 1—Nearly level to undulating well to moderately well drained soils of bottom lands and recent colluvial slopes:				
Bermudian silt loam.....	Corn, soybeans, orchardgrass, timothy, lespedeza, Ladino clover, white clover, bluegrass, and a variety of vegetable crops; fairly well suited to red clover.	1. Continuous corn..... 2. Corn, legume and grass hay. 3. Corn, soybeans, legume and grass hay. 4. Corn, legume for green manure.	None.....	{ Subject to periodic flooding or excessively wet conditions.
Congaree fine sandy loam.....				
Congaree silt loam.....				
Meadowville silt loam.....				
Seneca loam.....				
Starr silt loam.....				
Management group 2—Undulating well-drained soils of uplands and terraces:				
Chester-Brandywine loams, undulating phases.	Corn, small grains, red clover, alfalfa, Ladino clover, lespedeza, orchardgrass, timothy, bluegrass, white clover, and a variety of vegetable crops.	1. Corn, wheat, orchardgrass and red clover for 1 or 2 years. 2. Corn, wheat, red clover for 1 or 2 years. 3. Corn, wheat, alfalfa for 2 years or more. 4. Corn, alfalfa for 3 to 5 years. 5. Pasture.....	Contour tillage.....	{ Good tillth easily maintained; good to fair natural fertility; erosion not a serious problem.
Chester loam, undulating phase.....				
Chester silt loam, undulating phase.....				
Fauquier-Elloak silt loams, undulating phases.				
Fauquier silt loam, undulating phase.....				
Hiwassee loam, undulating phase.....				
Montalto silt loam, undulating moderately shallow phase.				
State loam.....				
Management group 3—Rolling well to somewhat excessively drained soils of uplands and old colluvial slopes, of relatively high fertility:				
Chester-Brandywine loams, rolling phases.	do.....	1. Corn, wheat, red clover and orchardgrass for 2 to 3 years. 2. Soybeans, wheat, red clover and orchardgrass for 2 to 3 years. 3. Corn, wheat, alfalfa for 4 or 5 years. 4. Corn, rotation pasture for 3 to 5 years. 5. Pasture.....	Contour tillage; contour strip-cropping on some of the longer and steeper slopes.	{ Same as for management group 2 but greater susceptibility to erosion.
Chester-Brandywine silt loams, rolling phases.				
Chester loam-Eubanks silt loam, rolling phases.				
Chester loam, rolling phase.....				
Eubanks loam, rolling phase.....				
Eubanks silt loam, rolling phase.....				
Fauquier-Elloak silt loams, rolling phases.				
Fauquier silt loam, rolling phase.....				
Lloyd silt loam, rolling phase.....				
Montalto silt loam, rolling moderately shallow phase.				
Tusquitee loam, rolling phase.....				

<p>Management group 4—Undulating well to moderately well drained soil of uplands and terraces, of low to fair fertility:</p> <p>Albemarle loam, undulating phase.....  Bucks silt loam, undulating phase.....  Culpeper fine sandy loam, undulating phase.....  Eloak silt loam, undulating phase.....  Goldvein gritty silt loam, undulating phase.....  Hiwassee loam, undulating light-colored variant.....  Masada loam, undulating phase.....  Mecklenburg loam, undulating phase.....  Myersville-Orange silt loams, undulating phases.....  Nason silt loam, undulating phase.....  Tatum silt loam, undulating phase.....  Thurmont stony loam, undulating phase.....  Wadesboro silt loam, undulating phase.....</p>	<p>Corn, small grains, soybeans, lespedeza, timothy, orchardgrass, bluegrass, white clover, Ladino clover, red clover, and a variety of vegetable crops; alfalfa well suited with heavy liming and fertilization.</p>	<ol style="list-style-type: none"> <li>1. Corn, wheat, orchardgrass or timothy with red clover for 1 or 2 years.</li> <li>2. Corn, wheat, lespedeza alone or with grass for 1 or 2 years.</li> <li>3. Pasture.....</li> </ol>	<p>Contour tillage.....</p>	<p>Low fertility levels. High productivity levels maintained only with adequate liming, fertilization, and other good management practices. Lime and fertilizer requirements relatively high. Erosion is not a serious problem.</p>
<p>Management group 5—Rolling well to moderately well-drained soils of uplands, terraces, and old colluvial slopes, of low to fair fertility:</p> <p>Albemarle loam, rolling phase.....  Braddock stony loam, rolling phase.....  Culpeper fine sandy loam, rolling phase.....  Eloak silt loam, rolling phase.....  Goldvein gritty silt loam, rolling phase.....  Hiwassee loam, eroded rolling light-colored variant.....  Mecklenburg loam, rolling phase.....  Myersville-Orange silt loams, rolling phases.....  Nason silt loam, rolling phase.....  Tatum silt loam, rolling phase.....  Wadesboro fine sandy loam, rolling phase.....  Wadesboro silt loam, rolling phase.....</p>	<p>do.....</p>	<ol style="list-style-type: none"> <li>1. Corn, wheat, orchardgrass or timothy with red clover for 2 to 5 years.</li> <li>2. Corn, wheat, lespedeza alone or with grass for 2 to 5 years.</li> <li>3. Pasture.</li> </ol>	<p>Contour tillage; contour strip-cropping if rotation is 4 years or less, and also suggested for longer and steeper slopes.</p>	<p>Same as for group 4 but soils of this group are more difficult to conserve.</p>
<p>Management group 6—Predominantly rolling eroded well-drained soils of uplands, terraces, and colluvial slopes, of relatively high fertility:</p> <p>Davidson clay, eroded rolling phase.....  Dyke silt loam, eroded rolling phase.....  Eubanks loam, eroded rolling phase.....  Fauquier silty clay loam, eroded rolling phase.....  Fauquier silty clay loam, eroded undulating phase.....  Hiwassee silty clay loam, eroded rolling phase.....  Lloyd clay loam, eroded rolling phase.....</p>	<p>Small grains, corn, soybeans, lespedeza, red clover, Ladino clover, orchardgrass, timothy, bluegrass, white clover, and alfalfa.</p>	<ol style="list-style-type: none"> <li>1. Corn, wheat, orchardgrass or timothy with red clover for 2 to 5 years.</li> <li>2. Corn, wheat, alfalfa for 2 to 5 years.</li> <li>3. Pasture.</li> </ol>	<p>Contour tillage, contour strip-cropping on longer and steeper slopes; check dams in gullies; diversion ditches.</p>	<p>Very susceptible to further erosion; rather low range of moisture content for tillage; important to keep frequency of seedbed preparation at a minimum.</p>

TABLE 4.—*Suitable uses and management practices for soils of Fauquier County, Va.—Continued*

Management group and soil	Uses	Rotations	Supplementary practices for water control	Remarks
Management group 7—Nearly level to undulating imperfectly or poorly drained soils of uplands with semicemented or claypan subsoils:				
Belvoir loam, level phase.....	Corn, small grains, soybeans, lespedeza, Ladino clover, orchardgrass, timothy, bluegrass, and white clover; red clover moderately well suited, and alfalfa unsuited even if soils are drained.	<ol style="list-style-type: none"> <li>1. Corn, wheat, lespedeza for 1 or 2 years.</li> <li>2. Corn, wheat, lespedeza and timothy or orchardgrass for 1 or 2 years.</li> <li>3. If adequately drained: Corn, wheat, red clover and grass for 1 or 2 years.</li> <li>4. Permanent pasture: Bluegrass, white clover, and Ladino clover.</li> </ol>	Open ditches, bedding, and diversion ditches; tiling recommended principally for smaller areas.	Subject to excessively wet and dry conditions.
Belvoir loam, undulating phase.....				
Calverton silt loam, undulating phase.....				
Croton silt loam.....				
Iredell silt loam, undulating phase.....				
Kelly silt loam, level and undulating phases.....				
Lignum silt loam, undulating phase.....				
Zion silt loam, undulating phase.....				
Undulating to rolling well to excessively drained soils of uplands:				
Management group 8:				
Catlett silt loam, eroded undulating phase.....	Corn, small grains, soybeans, lespedeza, orchardgrass, timothy, bluegrass, and white clover; alfalfa fairly and red clover only moderately well suited.	<ol style="list-style-type: none"> <li>1. Corn, wheat or oats, red clover and timothy or orchardgrass for 1 to 2 years.</li> <li>2. Corn, wheat, lespedeza alone or with grass for 1 or 2 years.</li> </ol>	None, except possibly contour tillage on longer slopes.	Rather low water-holding capacity and low natural fertility.
Penn loam, undulating phase.....				
Penn silt loam, undulating phase.....				
Management group 9:				
Brandywine gritty loam, rolling phase.....	Corn, small grains, lespedeza, Ladino clover, red clover, white clover, orchardgrass, timothy, and bluegrass; alfalfa poorly suited.	<ol style="list-style-type: none"> <li>1. Corn, wheat, red clover and orchardgrass or timothy for 2 to 5 years.</li> <li>2. Corn, wheat, lespedeza alone or with grass for 2 to 5 years.</li> </ol>	Contour tillage; contour strip-cropping with shorter rotations or on longer and steeper slopes.	Low water-holding capacity; good tilth over wide range of moisture conditions.
Brandywine loam, rolling phase.....				
Brandywine silt loam, rolling phase.....				
Catoctin silt loam, rolling phase.....				
Hazel silt loam, rolling phase.....				
Louisburg sandy loam, rolling phase.....				
Manor silt loam, rolling phase.....				
Penn silt loam, rolling phase.....				
Management group 10—Level or nearly level imperfectly or poorly drained soils and land types of bottom lands and recent colluvial slopes:				
Bowmansville silt loam.....	Permanent pasture: Bluegrass, orchardgrass, white clover, Ladino clover, and lespedeza.	Permanent pasture.....		
Chewacha silt loam.....				
Mixed alluvial land.....				
Rohrersville silt loam.....	Corn, soybeans, orchardgrass, timothy, white clover, and Ladino clover.	With adequate drainage: Corn or soybeans, pasture for 2 or more years; or corn, lespedeza or Ladino clover for 2 or more years.	Open ditches, bedding, and possibly diversion ditches and tiling of some areas.	Subject to excessively wet conditions, flooding, or ponding.
Rowland silt loam.....				
Wehadkee silt loam.....				
Worsham silt loam.....				

Rolling and hilly well to excessively drained soils of eroded uplands and old colluvial slopes, of low to relatively high fertility:				
Management group 11:				
Chester-Brandywine loams, hilly phases.	Permanent pasture: Bluegrass, orchardgrass, white clover, Ladino clover, and lespedeza.	Permanent pasture.....	None if used for pasture.....	Medium to rapid runoff; after a few years in well-managed pasture, soils probably will be suited to crops for a short period; management would be similar to that of management group 3.
Clifton stony silt loam, rolling phase...				
Eubanks silt loam, eroded hilly phase...				
Eubanks stony silt loam, rolling phase				
Fauquier silty clay loam, eroded hilly phase.				
Fauquier silt loam, hilly phase.....				
Montalto silty clay loam, eroded rolling moderately shallow phase.				
Montalto stony silt loam, rolling moderately shallow phase.				
Management group 12:				
Braddock very stony loam, rolling phase.				
Culpeper clay loam, eroded rolling phase.				
Elloak silt loam, eroded hilly phase...				
Elloak silt loam, eroded rolling phase...	do.....	do.....	do.....	Predominantly rapid runoff.
Tatum silty clay loam, eroded rolling phase.				
Management group 13:	do.....	do.....	do.....	Predominantly rapid runoff.
Brandywine gritty loam, hilly phase...				
Brandywine loam, hilly phase.....				
Brandywine loam-Eubanks silt loam, hilly phases.				
Brandywine silt loam, hilly phase.....				
Catoctin silt loam, hilly phase.....				
Manor silt loam, eroded hilly phase.....				
Penn loam, eroded rolling phase.....				
Penn silt loam, eroded rolling phase...				
Stony rolling and hilly land, acidic rock.				
Stony rolling and hilly land, basic rock.	do.....	do.....	do.....	Rapid to very rapid surface runoff.
Watt silt loam, hilly phase.....				
Management group 14—Steep excessively drained shallow upland soils and stony steep land:				
Brandywine loam, steep phase.....				
Catoctin silt loam, eroded steep phase.....				
Hazel silt loam, hilly and steep phases.....				
Louisburg sandy loam, hilly and steep phases.				
Stony steep land, acidic rock.....				
Stony steep land, basic rock.....				

TABLE 4.—*Suitable uses and management practices for soils of Fauquier County, Va.—Continued*

Management group and soil	Uses	Rotations	Supplementary practices for water control	Remarks
Management group 15—Nearly level to undulating imperfectly or poorly drained soils of uplands with plastic and sticky subsoils: Elbert silt loam, concretionary phase..... Iredell silt loam, eroded undulating phase..... Iredell silt loam, level phase..... Management group 16—Stony (very stony) steep land, stony colluvium, rough gullied land, hilly and steep shallow shaly soils, stony imperfectly drained soils, and very poorly drained soils: Elbert silt loam..... Iredell stony silt loam, undulating phase..... Made land..... Manteo shaly silt loam, hilly and steep phases..... Penn shaly silt loam, eroded hilly phase..... Rough gullied land..... Stony colluvium..... Stony (very stony) steep land, acidic rock..... Stony (very stony) steep land, basic rock.....	Permanent pasture: Bluegrass orchardgrass, white clover, Ladino clover, and lespedeza.	Permanent pasture and rotation of corn, wheat, legume and grass meadow for 2 years or more at 7, to 10 year intervals.	..do.....	Imperfect to poor natural drainage; low fertility.
Elbert silt loam..... Iredell stony silt loam, undulating phase..... Made land..... Manteo shaly silt loam, hilly and steep phases..... Penn shaly silt loam, eroded hilly phase..... Rough gullied land..... Stony colluvium..... Stony (very stony) steep land, acidic rock..... Stony (very stony) steep land, basic rock.....	Forestry.....	None.....	Maintenance of permanent forest cover.	On most farms reforestation of acreage now cleared is advisable.

The productivity ratings cannot be directly interpreted into land values, because distance to markets, relative prices of farm products, the pattern of soils on the farm, and other factors (mostly economic) influence land values at specific places. The ratings are useful however in comparing the different soils of the county and in estimating responses from different systems of management. They can also be used to estimate the production to be expected under each of several different farm plans, and to estimate the productive capacity of the entire county or any part of the county.

**MANAGEMENT GROUP 1—NEARLY LEVEL TO UNDULATING WELL TO MODERATELY WELL DRAINED SOILS OF BOTTOM LANDS AND RECENT COLLUVIAL SLOPES**

The soils of Management group 1 are considered the most naturally fertile in the county. They are well suited to most of the common field crops and to pasture and forest. They are similar in most physical characteristics and require similar management.

These soils are better supplied with plant nutrients, lime, and organic matter than other soils of the county and are replenished periodically by fresh sediments. Comparatively high yields of adapted crops are commonly obtained in favorable seasons without the use of amendments. Moisture supplies are usually adequate for the normal growth of adapted plants, except possibly on Congaree fine sandy loam. The soils are deep, friable, and are readily permeable to air, moisture, and roots. Essentially they are free of stones or gravel and are easily worked over a wide range of moisture conditions. As they occupy almost level first bottoms or colluvial depressions, there is practically no problem of erosion or loss of water. However, they may be made less desirable by depositions of sandy or gravelly materials. These soils have good natural drainage, but floodwaters may cover those on the first bottoms for a time during winter and spring months. The favorable relief and friability permit the efficient use of heavy farm machinery.

Physically, these are the best soils in the county for intensive use. Cultivated crops are successfully grown year after year in most places without amendments. In general, no crop rotations or only short ones are necessary to maintain productivity. Although the soils of this group are all acid in reaction, they need very little lime for satisfactory production of the common field crops.

These soils, however, have several adverse characteristics. First, and most important, most of them are either subject to stream overflow, as the Congaree and Bermudian soils, or, particularly the Seneca soil, to excessive moisture conditions in wet seasons. Secondly, they normally occupy small elongated areas that may be so intimately associated with other soils of widely different capabilities that their use and management as individual units is not practicable. Thirdly, they are not well adapted to wheat and barley, as their comparatively high nitrogen content may cause lodging.

Productivity ratings under two levels of management for soils of Management group 1 are given in table 5.

TABLE 5.—*Estimated productivity ratings for soils of management group 1 under two levels of management, Fauquier County, Va.*

[Ratings in columns A are for prevailing management; those in columns B are for improved management. (See text discussion of management group 1.)]

Soil	Corn (100=50 bu. per acre)		Red clover hay (100=2 tons per acre)		Lespedeza hay (100=1½ tons per acre)		Orchardgrass hay (100=2 tons per acre)		Mixed hay (100=2 tons per acre)		Pasture (100=100 cow-acre-days) <sup>1</sup>	
	A	B	A	B	A	B	A	B	A	B	A	B
Bermudian silt loam.....	95	130	95	120	115	130	105	115	100	130	150	180
Congaree fine sandy loam.....	90	125	85	115	105	120	100	110	95	120	140	170
Congaree silt loam.....	95	130	95	120	115	130	105	115	100	130	150	180
Meadowville silt loam.....	120	145	85	115	100	115	105	115	90	120	150	180
Seneca loam.....	110	140	80	100	95	110	105	115	85	105	105	120
Starr silt loam.....	120	150	90	120	100	115	105	115	95	125	150	180

<sup>1</sup> Cow-acre-days, used to express the carrying capacity of pasture land, is the product of the number of animal units carried per acre multiplied by the number of days during the year the animals are grazed without injury to the pasture; for example, a soil that supports 1 animal unit per acre for 360 days rates 360; a soil that supports 1 animal unit on 2 acres for 180 days rates 90; and a soil that supports 1 animal unit on 4 acres for 100 days rates 25.

*Present use and management.*—Most of the soils of management group 1 have been cleared. The Congaree and Bermudian soils are now used for permanent pasture and for selected crops. The Meadowville, Starr, and Seneca soils normally do not receive individual attention but are used and managed like the associated upland soils.

Corn, the most extensive crop, and hay crops are grown almost continuously on many fields of the Congaree and Bermudian soils. On other fields of these soils, corn may be grown several years in succession and followed by meadow for 2 or 3 years. The hay meadows, consisting largely of timothy and clover or lespedeza, may be pastured before being plowed for corn. Permanent pastures are usually established on adjoining poorly drained bottom soils or on adjacent upland soils on slopes. Commercial fertilizers are applied in small or moderate amounts, and generally no lime or barnyard manure is used. Tillage operations are usually adequate.

Pastures commonly contain bluegrass and white clover, but many have various weeds common to the bottom lands. On the better pastures, weeds are controlled by clipping and to some extent by grazing. A few farmers fertilize pastures on these soils.

*Use suitability and management requirements.*—These soils are well suited to intensive crop production, but their use suitability for some crops is somewhat limited by susceptibility to flooding or to wet soil conditions. They are very well suited to corn and summer hay crops, but poorly suited to alfalfa, although this crop is grown successfully in places. Red clover, Ladino clover, and lespedeza are better suited. Small grains are subject to lodging and mature later than on upland soils.

Although adapted crops can be grown with success almost continuously, a short rotation is desirable. The rotation should include legumes or a legume-grass mixture. Probably the best rotation is corn-meadow—the meadow cut for hay or pastured and then plowed under in order to supply humus. Moderate applications of a complete fertilizer would benefit corn. When fertilizers are applied to corn or other crops in adequate amounts, the hay and cover crops will not likely require any. Lime may be needed to help insure success of legumes.<sup>14</sup> All crops respond to the use of barnyard manure and plant residues.

These soils have physical characteristics and fertility very well suited to pastures, and many of them are used for this purpose, especially in places subject to frequent flooding. Weedy vegetation competes vigorously with desirable pasture plants, but it can be controlled by proper fertilization, careful grazing, and mowing. The favorable relief greatly facilitates mowing for weed control.

#### MANAGEMENT GROUP 2—UNDULATING WELL-DRAINED SOILS OF UPLANDS AND TERRACES

Management group 2 includes some of the most desirable soils of the county for general agricultural use. The soils are good to excellent for either crops or pasture and are productive of the crops commonly grown. They are similar in most physical characteristics and require similar management.

<sup>14</sup> See the county agricultural agent regarding the testing of soils for lime and available plant nutrients and for specific fertilizer recommendations.

TABLE 6.—*Estimated productivity ratings for soils of management group 2 under two levels of management, Fauquier County, Va.*

[Ratings in columns A are for prevailing management; those in columns B are for improved management. (See text discussion of management group 2.)]

Soil	Corn (100=50 bu. per acre)		Wheat (100=25 bu. per acre)		Barley (100=40 bu. per acre)		Alfalfa hay (100=4 tons per acre)		Red clover hay (100=2 tons per acre)		Lespedeza hay (100=1½ tons per acre)		Orchardgrass hay (100=2 tons per acre)		Mixed hay (100=2 tons per acre)		Apples (100=200 bu. per acre)	Pasture (100=100 cow- acre-days) <sup>1</sup>	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	B <sup>2</sup>	A	B
Chester-Brandywine loams, undulating phases.....	110	140	90	120	85	115	80	100	85	115	85	115	90	120	90	125	100	100	130
Chester loam, undulating phase.....	125	155	100	130	95	140	95	115	95	125	95	125	95	125	100	135	120	125	160
Chester silt loam, undulating phase.....	130	160	100	130	100	145	100	125	100	130	100	130	100	130	105	140	115	130	165
Fauquier-Eltoak silt loams, undulating phases.....	100	135	90	120	90	120	85	105	80	110	75	105	80	105	85	115	90	95	120
Fauquier silt loam, undulating phase.....	115	145	95	125	85	130	90	110	90	120	90	110	95	125	95	130	95	120	160
Hwassee loam, undulating phase.....	120	150	95	125	90	135	95	115	95	125	100	125	95	125	100	135	100	125	160
Montalto silt loam, undulating moderately shallow phase.....	75	100	75	95	75	95	60	80	70	95	65	90	65	85	75	95	( <sup>3</sup> )	85	100
State loam.....	120	150	100	125	105	125	90	110	100	125	100	120	110	120	105	135	( <sup>3</sup> )	135	165

<sup>1</sup> Cow-acre-days, used to express the carrying capacity of pasture land, is the product of the number of animal units carried per acre multiplied by the number of days during the year the animals are grazed without injury to the pasture; for example, a soil that supports 1 animal unit per acre for 360 days rates 360; a soil that supports 1 animal unit

on 2 acres for 180 days rates 90; and a soil that supports 1 animal unit on 4 acres for 100 days rates 25.

<sup>2</sup> Productivity ratings not estimated for prevailing management.

<sup>3</sup> Crop not adapted.

All the soils of management group 2 were derived from parent materials relatively high in plant nutrients. As compared with other upland and terrace soils, they are relatively high in plant nutrients, lime, and organic matter. The organic matter is apparently fairly durable and is usually adequately replenished by regular incorporation of plant residues. Water-supplying capacity is good to fair, and crops seldom lack needed moisture except during extended droughts. The soils are readily permeable to moisture, air, and roots. They are moderately easy to work and conserve. Relief is predominantly undulating and is favorable for the operation of all types of farm machinery. Very few if any troublesome stones are present. Runoff and internal drainage are medium. Accelerated erosion is slight to moderate; the original surface soil is sufficiently thick to constitute practically all the plow layer.

Productivity ratings for the soils of group 2 are given in table 6.

*Present use and management.*—Most of the soils of this group were cleared of their oak-hickory forest for cropping. Corn, wheat, orchardgrass, and red clover are the principal crops. Smaller acreages of alfalfa, timothy, lespedeza, and barley are grown. Soils of this group commonly occur in convenient management pattern with soils on steeper slopes. They are used as cropland, whereas the soils on adjacent steeper slopes, where cleared, may serve for permanent pasture.

Crop rotations and management practices are essentially similar on soils of this group but are least well adapted to the Hiwassee and Fauquier-Elloak soils. Rotations are 3 or 4 years in length and include corn, small grains, and meadow that is largely orchardgrass or timothy and red clover. Small to moderate amounts of commercial fertilizer are applied with corn, and larger amounts are sown with small grains. Lime is usually applied on meadows before being turned under for corn. Heavier applications of lime and of phosphate and potash fertilizers are used to establish alfalfa. No special engineering practices for conserving soil material are used on the more sloping areas, but some plowing and cultivating on the contour is done.

*Use suitability and management requirements.*—Soils of this group are well suited to a wide variety of crops, including corn, wheat, barley, oats, and practically all pasture grasses. If properly fertilized and limed, they are also well suited to alfalfa and red clover.

These soils are important agriculturally, and their maintenance and increased productivity are essential to the general economic welfare of the county. Their conservation and productivity are maintained readily under recognized good management systems and practices. Observation and experience indicate that their productivity can be conserved in a short rotation of 3 or 4 years that includes a legume crop. The rotation of corn, small grains, and clover and grass for hay is well suited, provided other management requirements are met.

The soils are everywhere acid, and applications of  $\frac{1}{2}$  to 1 ton of ground limestone or the equivalent an acre during the rotation are necessary to maintain favorable soil reaction. Heavier applications of lime may be necessary if alfalfa or sweetclover is grown. Phosphorus, nitrogen, and, to less extent, potash are generally deficient.

Productivity may be maintained by the liberal use of commercial fertilizer and the replenishment of nitrogen through the growing of legumes in the hay crop. Plowing under all available barnyard manure, plant residues, or green manure increases fertility and improves physical properties of the soils. Additional applications of phosphate and potash may be needed for the successful growth of alfalfa.

Good tilth is easily maintained on these soils, and tillage is carried on safely over a wide range of moisture conditions. Controlling erosion and conserving soil moisture are not serious problems under good management. Engineering devices for erosion control are generally not needed, but contour tillage may be desirable.

These soils are well suited to pasture. To obtain high-yielding pastures of good quality, however, at least moderate applications of lime and phosphate are necessary. Controlled grazing is effective in suppressing weeds, but mowing will very likely be necessary. Under good management, the soils are productive of all the common pasture plants, such as bluegrass, orchardgrass, white clover, and lespedeza.

**MANAGEMENT GROUP 3—ROLLING WELL TO SOMEWHAT EXCESSIVELY DRAINED SOILS OF UPLANDS AND OLD COLLUVIAL SLOPES, OF RELATIVELY HIGH FERTILITY**

This group includes soils that are good for cropland and good to very good for pasture. All soils of this group, although derived from a wide variety of parent materials, have profiles that are rather similar in texture and arrangement of soil horizons. All are deep or moderately deep to parent material except the rolling moderately shallow phase of Montalto silt loam and the Brandywine soils included with the Chester-Brandywine soil complexes.

Soils of this group vary from medium to high in natural fertility. All are friable and readily permeable to roots, air, and moisture. Their ability to absorb and supply water is good to fair, but runoff is medium to high. They range from shallow to deep, and their differences in productiveness in some seasons is determined to some degree by their differences in depth.

Slopes are 7 to 14 percent. The soils are only slightly to moderately sheet eroded. Their original surface soils however constitute practically all of the plow layer. They are easy to work but moderately difficult to conserve.

These soils have essentially the same management problems, are capable of being built up to a good state of productivity, and are relatively productive under good management. Erosion, although a problem under common management, would be much less serious under good management. The soils of this group have different management requirements from those of group 2 mainly because of their stronger slopes. As a result they require more exacting conservation measures.

Productivity ratings for the soils of management group 3 are given in table 7.

*Present use and management.*—Probably more than 85 percent of these soils are cleared for agriculture. Relatively good management prevails on most of them, but that on the Montalto silt loam, rolling moderately shallow phase, Fauquier-Elioak silt loams, rolling phases, and Lloyd silt loam, rolling phase, is less desirable. Corn, wheat,

TABLE 7.—Estimated productivity ratings for soils of management group 3 under two levels of management, Fauquier County, Va.

[Ratings in columns A are for prevailing management; those in columns B are for improved management. (See text discussion of management group 3.)]

Soil	Corn (100=50 bu. per acre)		Wheat (100=25 bu. per acre)		Barley (100=40 bu. per acre)		Alfalfa hay (100=4 tons per acre)		Red clover hay (100=2 tons per acre)		Lespedeza hay (100=1½ tons per acre)		Orchardgrass hay (100=2 tons per acre)		Mixed hay (100=2 tons per acre)		Apples (100=200 bu. per acre)	Pasture (100=100 cow- acre-days) <sup>1</sup>	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	B <sup>2</sup>	A	B
Chester-Brandywine loams, rolling phases.....	105	135	85	115	80	110	75	90	80	110	80	110	85	115	85	120	95	90	120
Chester-Brandywine silt loams, rolling phases.....	115	150	95	125	90	120	85	105	85	115	80	110	85	115	90	120	100	100	130
Chester loam-Eubanks silt loam, rolling phases.....	110	140	90	120	90	120	85	110	85	115	85	110	80	110	90	120	100	105	130
Chester loam, rolling phase.....	115	145	90	120	90	120	90	110	90	120	90	120	90	120	95	130	110	110	140
Eubanks loam, rolling phase.....	115	145	95	125	95	125	90	115	90	120	85	115	85	115	90	130	110	110	140
Eubanks silt loam, rolling phase.....	110	140	90	120	90	120	90	115	90	120	75	100	80	110	95	125	70	110	140
Fauquier-Eltoak silt loams, rolling phases.....	85	110	85	115	85	115	80	100	75	105	70	100	75	100	80	110	80	90	115
Fauquier silt loam, rolling phase.....	90	130	85	115	85	115	85	110	90	120	85	110	80	110	95	125	80	110	140
Lloyd silt loam, rolling phase.....	90	120	85	115	85	115	85	110	70	105	80	110	80	110	75	110	75	105	135
Montalto silt loam, rolling moderately shallow phase.....	65	90	65	85	70	85	45	65	60	85	55	80	60	80	65	85	( <sup>3</sup> )	75	90
Tusquitee loam, rolling phase.....	90	120	85	110	80	105	80	100	85	115	85	110	85	110	90	120	115	105	130

<sup>1</sup> Cow-acre-days, used to express the carrying capacity of pasture land, is the product of the number of animal units carried per acre multiplied by the number of days during the year the animals are grazed without injury to the pasture; for example, a soil that supports 1 animal unit for 360 days rates 360; a soil that supports 1 animal unit on 2

acres for 180 days rates 90; and a soil that supports 1 animal unit on 4 acres for 100 days rates 25.

<sup>2</sup> Productivity ratings not estimated for prevailing management.

<sup>3</sup> Crop not adapted.

orchardgrass, red clover, and lespedeza are the principal crops; but alfalfa, barley, and timothy are produced on smaller acreages.

Crops are usually rotated systematically. Some farmers use a 3-year rotation of corn, small grains, and meadow. The majority, however, follow 4- to 7-year rotations that include 2 to 5 years of orchardgrass-red clover meadow, which is commonly used for pasture after the fourth year. The longer rotations are used mostly on the larger farms of the northern part of the county where the production of beef cattle predominates.

Fairly large amounts of commercial fertilizers are supplied to small grains; smaller amounts are used with corn. Some farmers apply commercial fertilizer or superphosphate on 3- or 6-year-old meadows or rotation pastures. Lime is generally used for legume-grass hay or alfalfa, but some is applied to meadows before plowing for corn. Green manures or winter cover crops are not ordinarily grown, as sufficient crop residue is returned to the soil during the common rotation.

*Use suitability and management requirements.*—These soils are suitable for all the common crops; and if properly fertilized and limed, they will produce alfalfa and red clover successfully. They are, however, more exacting in their management requirements than those of group 2. Longer rotations and slightly heavier fertilization, as well as better water and erosion control measures, are needed. If other management practices are good, the soils can be maintained in a 4- or 5-year rotation. For example, a rotation of corn, small grain, and red clover and grass for 2 or 3 years is well suited. Almost any of the row crops commonly grown can be substituted for corn in this rotation. In a longer rotation, alfalfa could replace the red clover.

Although these soils are naturally moderately fertile, they are deficient in lime, phosphorus, nitrogen, and possibly potash for continued high yields of most crops. These deficiencies vary largely because of differences in the past use and management of these soils<sup>15</sup> rather than because of wide differences in inherent fertility.

All of these soils are acid in reaction unless limed. Applications of 1 to 1½ tons of ground limestone, or its equivalent, an acre during the rotations are necessary for a favorable soil reaction. Heavier applications of lime may be necessary if alfalfa or sweetclover is included.

The 4- or 5-year rotations require about 500 to 600 pounds of 4-16-8, or of equivalent fertilizer, an acre for corn and 400 to 600 pounds an acre for small grain. However, if a longer rotation (6 or 7 years) is used that includes 4 or 5 years of hay and temporary pasture, there should be an additional application of about 400 pounds of 20-percent superphosphate an acre on the meadowland after the second year of grass. All available manure should be spread on the small grain in February or early March. These recommendations are for the general field crops grown in rotation, principally corn, small grain, and clover and grass. If alfalfa is grown, it should receive about 1,000 to 1,200 pounds per acre of a 2-12-12, 0-14-14, or an equivalent fertilizer at seeding and should be topdressed each spring with 300 to 500 pounds per acre of 0-14-14, or the equivalent.

<sup>15</sup> See footnote 14, p. 137.

Under such management, the organic-matter content of these soils is kept fairly stable and is adequately replenished by regular incorporation of crop residue and the applications of manure on small grain. However, special attention should be given to increasing and maintaining the organic-matter content in eroded areas. Mulching with straw and manure is especially beneficial on these areas.

The soils of this group can be worked over a moderately wide range of moisture conditions without destruction of good tilth, although tillage conditions are not quite so good as for soils of group 2. Moisture relationships are most favorable in the Lloyd and Fauquier and poorest in the Montalto and Chester-Brandywine soils. Where crops require cultivation, judicious tillage practices are necessary to conserve water and soil. Contour tillage should be practiced wherever feasible. Terraces or other engineering devices for runoff and erosion control should not be necessary—except possibly on the Fauquier, Lloyd, and Montalto soils—unless a shorter rotation than suggested is used. The Fauquier, Lloyd, and Montalto soils are naturally more subject to accelerated erosion; but since they are deep and permeable and generally have regular slopes, they should be well suited to terraces if outlets are available.

All of the soils of management group 3 are equally well suited to pasture. The supplying of needed amendments to suitable pasture plants is the principal management requirement. On pastures that receive adequate amendments and are properly grazed, weed control is not a serious problem. An occasional mowing, however, may be necessary.

**MANAGEMENT GROUP 4—UNDULATING WELL TO MODERATELY WELL DRAINED SOILS OF UPLANDS AND TERRACES, OF LOW TO FAIR FERTILITY**

The soils of management group 4 are fair to good for crops and for pasture. Their productivity, however, is low for most crops under common management.

These soils were derived from dissimilar parent materials. All have similar profiles and are predominantly strongly acid and low in lime, plant nutrients, and organic matter. They are deep to moderately deep. All have friable subsoils except the Mecklenburg and Myersville-Orange soils, which have rather plastic subsoil layers that restrict somewhat water, root, and air movement. Otherwise the soils are readily permeable. Their water-holding and water-supplying capacities range from good to fair.

Soils of management group 4 are moderately easy to work and to conserve. Slopes range from 2 to 7 percent. Surface relief is favorable for the operation of all types of farm machinery. Runoff and internal drainage on these soils are medium. The soils have been only slightly or moderately sheet eroded; most of the original surface soil is included in the plow layer.

Estimated productivity ratings for soils of management group 4 are given in table 8.

*Present use and management.*—Most of these soils are cleared and in agricultural use, but the proportion of cleared land is much lower than for soils of management group 2. The Bucks soil has by far the highest percentage of cleared land in cultivation. Probably more than 65 percent of the Nason, Tatum, Goldvein, and Masada soils

TABLE 8.—Estimated productivity ratings for soils of management group 4 under two levels of management, Fauquier County, Va.

(Ratings in columns A are for prevailing management; those in columns B are for improved management. (See text discussion of management group 4.))

Soil	Corn (100=50 bu. per acre)		Wheat (100=25 bu. per acre)		Barley (100=40 bu. per acre)		Alfalfa hay (100=4 tons per acre)		Red clover hay (100=2 tons per acre)		Lespedeza hay (100=1¼ tons per acre)		Orchardgrass hay (100=2 tons per acre)		Mixed hay (100=2 tons per acre)		Apples (100=200 bu. per acre)		Pasture (100=100 cow- acre-days) <sup>1</sup>	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Albemarle loam, undulating phase	50	75	45	70	40	60	( <sup>2</sup> )	60	50	65	55	80	60	85	55	70	( <sup>2</sup> )	( <sup>2</sup> )	50	85
Bucks silt loam, undulating phase	95	130	90	110	90	110	80	105	70	100	75	105	75	100	75	105	( <sup>2</sup> )	( <sup>2</sup> )	85	120
Culpeper fine sandy loam, undulating phase	80	115	80	105	75	100	80	100	65	85	80	110	70	100	70	90	( <sup>2</sup> )	85	80	115
Eloak silt loam, undulating phase	95	130	90	115	90	115	80	100	70	100	70	100	75	100	75	105	( <sup>2</sup> )	80	85	115
Goldvein gritty silt loam, undulating phase	50	90	55	90	50	80	( <sup>2</sup> )	( <sup>2</sup> )	50	75	60	85	55	85	55	80	( <sup>2</sup> )	( <sup>2</sup> )	50	95
Hwassee loam, undulating light-colored variant	95	135	85	115	80	110	80	100	70	100	85	115	75	105	75	110	( <sup>2</sup> )	110	85	120
Masada loam, undulating phase	80	110	75	100	70	95	( <sup>2</sup> )	( <sup>2</sup> )	60	85	70	95	65	90	65	90	( <sup>2</sup> )	( <sup>2</sup> )	80	115
Mecklenburg loam, undulating phase	75	100	70	90	70	90	( <sup>2</sup> )	( <sup>2</sup> )	70	95	70	95	70	90	75	100	( <sup>2</sup> )	( <sup>2</sup> )	85	110
Myersville-Orange silt loams undulating phases	60	85	65	90	65	90	( <sup>2</sup> )	( <sup>2</sup> )	45	60	55	75	65	90	50	65	( <sup>2</sup> )	( <sup>2</sup> )	80	100
Nason silt loam, undulating phase	50	100	75	105	70	100		85	60	90	70	100	65	95	65	95	( <sup>2</sup> )	( <sup>2</sup> )	50	105
Tatum silt loam, undulating phase	70	120	85	115	85	115	( <sup>2</sup> )	100	70	100	80	110	70	100	75	100	( <sup>2</sup> )	( <sup>2</sup> )	60	115
Thurmont stony loam, undulating phase	45	65	45	65	45	65	( <sup>2</sup> )	60	45	60	50	75	55	80	50	75	( <sup>2</sup> )	55	70	95
Wadesboro silt loam, undulating phase	90	120	85	110	85	110	80	105	70	100	80	110	75	100	75	105	( <sup>2</sup> )	( <sup>2</sup> )	85	120

<sup>1</sup> Cow-acre-days, used to express the carrying capacity of pasture land, is the product of the number of animal units carried per acre multiplied by the number of days during the year the animals are grazed without injury to the pasture; for example, a soil that supports 1 animal unit per acre for 360 days rates 360; a soil that supports 1 animal unit

on 2 acres for 180 days rates 90; and a soil that supports 1 animal unit on 4 acres for 100 days rates 25.

<sup>2</sup> Productivity ratings not estimated for prevailing management.

<sup>3</sup> Crop not adapted.

are in forest. Many areas are lying idle. The forests are chiefly of the mixed hardwood-pine type in which oak and hickory predominate.

Corn, wheat, lespedeza, and timothy are the principal crops produced. The most successful farmers use a 3- or 4-year rotation of corn, small grain, and meadow that is largely lespedeza. Some red clover but very little alfalfa is grown. Some fertilizer may be applied with corn, and larger amounts for small grains. Some lime is used, but all soils of this group, except some of the Bucks still need lime.

Present management varies widely on these soils. That on the Nason, Tatum, Goldvein, and Masada soils is commonly of a rather low-level subsistence type. No systematic rotation is followed, and the crops and management practices are dictated largely by the needs of each farmer. Management is probably better on the Bucks than any of the other soils. This soil is in the dairy region, and most of it is kept productive by good use and management practices. Management on the other soils of this group is intermediate between these two extremes.

*Use suitability and management requirements.*—Because of their deficiencies in lime, plant nutrients, and organic matter, these soils require more exacting management than those of management group 2. They have, however, physical properties that enable them to be moderately productive of the common crops if these deficiencies are corrected by good soil management. The Nason, Tatum, Goldvein, and Thurmont soils are, in general, more deficient in lime and plant nutrients than others of this group.

If other management practices are good, the soils can be maintained in a 3- or 4-year rotation. For example, a rotation of corn, small grain, and legume-grass meadow for 1 or 2 years is well suited. Lespedeza may be used as a legume in the hay crop, but red clover is more desirable and beneficial. Lime requirements are about 50 to 75 percent higher than for soils of group 2. Applications of 1 to 1½ tons of ground limestone, or the equivalent, an acre during the rotation are necessary to maintain favorable soil reaction. If alfalfa is grown, heavier applications may be necessary.

These soils are rather highly leached and deficient in nitrogen, phosphorus, and possibly potash. All crops respond well to fertilizers containing these elements. Productivity may be maintained by the use of moderate to heavy applications of complete commercial fertilizer and the replenishment of nitrogen by legumes grown in the hay crop. Because the Nason, Tatum, Goldvein, and Thurmont soils are so low in plant nutrients, they require heavier fertilization than the other soils.

Barnyard manure, plant residues, or green manures are highly beneficial in correcting organic-matter deficiency on these soils. These materials not only add fertility to the soil but increase water-absorbing and water-holding capacities and improve tilth and other physical properties.

Good tilth is easily maintained on these soils over a wide range of moisture conditions. Stones are not a problem except on the Thurmont soil. Since the soils of this group are only slightly susceptible to erosion, soil material is easily conserved under good management. However, contour tillage may be desirable in some places.

The soils of this management group are physically fair to good for pasture, but they need adequate lime and fertilizer for the satisfactory growth of desirable pasture plants. Other requirements include proper control of grazing and regulated mowing to control weeds. Unless the lime and fertilizer requirements are met, pastures on these soils are of rather poor quality.

**MANAGEMENT GROUP 5—ROLLING WELL TO MODERATELY WELL DRAINED SOILS OF UPLANDS, TERRACES, AND OLD COLLUVIAL SLOPES, OF LOW TO FAIR FERTILITY**

Management group 5 includes soils fair for crops and fair to good for pasture. Of the well-drained soils considered suitable for crop production, these are among the poorest in inherent fertility and natural soil reaction. Productivity is low under common management.

The soils of this group, except the Myersville-Orange and the Mecklenburg, are derived from acidic parent materials; and all are highly leached—especially in their surface soils—of plant nutrients, lime, and organic matter. Their water-absorbing and water-holding capacities are good, but their water-supplying capacity is only fair to good. All have favorable physical characteristics except the Mecklenburg and Orange soils, which have moderately plastic to plastic and sticky dense subsoils. Otherwise, all are friable and permeable to moisture, air, and roots. They are deep and moderately easy to work. Tillage is good to excellent except on the stony Braddock soil, which has stones that interfere with tillage.

These soils occupy rolling relief of 7 to 14 percent. Runoff is medium to high and internal drainage is medium. Sheet erosion ranges from slight to moderate. Although small more severely eroded areas occur, the original surface soil is in most areas sufficiently thick to make up most or all of the plow layer. Erosion control is a problem under common management. These soils, in general, represent the rolling phases of the soils of group 4 and require more exacting management, largely because of their greater runoff and susceptibility to erosion and their lower water-supplying capacities.

Estimated productivity ratings for soils of management group 5 are given in table 9.

*Present use and management.*—The percentage of cleared area varies widely among these soils. In general the Goldvein, Nason, Tatum, and Wadesboro soils have the lowest percentage of cleared land, and the Culpeper, Myersville-Orange, and Elioak soils the highest. How much of each soil is cleared apparently depends more on the suitabilities of the associated soils than on suitability of the soil itself for use. The cleared land is used for both crops and pasture but principally for crops. Corn, small grains, lespedeza, and timothy are among the crops grown with moderate success. Red clover and some alfalfa are produced under higher levels of management.

The level of management is variable. It is highest on the Elioak and Culpeper soils; the Nason, Tatum, and Goldvein soils receive much poorer management. Rotations, where used, are short. The common rotation is corn, wheat, and 1 year of hay. Lespedeza is the principal legume used in hay mixtures. Some fertilizer, although generally inadequate, is used on corn and wheat.

*Use suitability and management requirements.*—The deficiencies in these soils in organic matter, lime, and plant-nutrient content can be

TABLE 9.—Estimated productivity ratings for soils of management group 5 under two levels of management, Fauquier County, Va.

[Ratings in columns A are for prevailing management; those in columns B are for improved management. (See text discussion of management group 5.)]

Soil	Corn (100=50 bu. per acre)		Wheat (100=25 bu. per acre)		Barley (100=40 bu. per acre)		Alfalfa hay (100=4 tons per acre)		Red clover hay (100=2 tons per acre)		Lespedeza hay (100=1½ tons per acre)		Orchardgrass hay (100=2 tons per acre)		Mixed hay (100=2 tons per acre)		Apples (100=200 bu. per acre)		Pasture (100=100 cow- acre-days) <sup>1</sup>	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Albemarle loam, rolling phase	40	65	40	60	35	55	(?)	50	45	60	50	75	50	75	50	75	(?)	(?)	45	80
Braddock stony loam, rolling phase	60	90	65	90	65	90	65	85	65	85	70	90	65	85	70	90	(?)	60	75	105
Culpeper fine sandy loam, rolling phase	65	95	70	95	70	95	65	85	60	75	70	100	65	90	65	85	(?)	70	75	110
Eloak silt loam, rolling phase	75	100	80	105	75	100	75	95	65	90	65	95	70	95	70	95	(?)	70	75	105
Goldvein gritty silt loam, rolling phase	40	75	50	85	40	75	(?)	(?)	45	70	50	75	50	80	50	75	(?)	(?)	45	85
Hilwassee loam, eroded rolling light-colored variant	70	100	75	105	75	105	70	90	60	90	80	110	70	100	65	95	(?)	70	80	110
Mecklenburg loam, rolling phase	65	90	65	85	65	85	(?)	(?)	60	85	65	90	60	80	65	90	(?)	(?)	80	105
Myersville-Orange silt loams, rolling phases	50	80	70	95	70	95	(?)	60	50	65	50	70	60	85	55	70	(?)	(?)	85	105
Nason silt loam, rolling phase	40	75	70	100	60	90	(?)	(?)	45	75	60	90	55	85	50	80	(?)	(?)	45	90
Tatum silt loam, rolling phase	45	85	75	105	65	95	(?)	75	60	90	70	100	60	90	65	95	(?)	(?)	50	100
Wadesboro fine sandy loam, rolling phase	70	95	75	100	75	100	65	90	60	90	70	100	75	100	65	95	(?)	(?)	75	110
Wadesboro silt loam, rolling phase	75	105	80	105	80	105	70	90	65	90	70	100	80	100	70	95	(?)	(?)	75	110

<sup>1</sup> Cow-acre-days, used to express the carrying capacity of pasture land, is the product of the number of animal units carried per acre multiplied by the number of days during the year the animals are grazed without injury to the pasture; for example, a soil that supports 1 animal unit per acre for 360 days rates 360; a soil that supports 1 animal unit

on 2 acres for 180 days rates 90; and a soil that supports 1 animal unit on 4 acres for 100 days rates 25.

<sup>2</sup> Productivity rating not estimated.

<sup>3</sup> Crop not adapted.

corrected to a large extent by good soil management. Largely because these soils require relatively heavy applications of amendments before reaching maximum productivity, they have never become highly productive and most of them are inadequately managed. This is especially true of the Nason, Tatum, and Goldvein soils. Adequate use of amendments is the most important requirement for increasing and maintaining productivity.

Rotations of 4 to 7 years consisting of corn, small grains, and legume-grass hay are well suited. Lime, phosphate, and potash will be needed for practically all crops.<sup>16</sup> These soils may require a rather heavy initial application of both lime and fertilizer in places where the soil is seriously impoverished. However, regular applications of 1 to 2 tons, or the equivalent, of ground limestone and medium to heavy applications of complete commercial fertilizer should maintain stable productivity of the common crops, provided other management requirements are met. The fertilizer applications may be divided as follows: About 40 percent on corn and about 60 percent on small grain. If rotations include 3 to 5 years of meadow or rotation pasture, additional applications of phosphorus and potassium fertilizers on the hayland after the second year of hay will be beneficial. All available manure should be spread on the small grain early in spring, and all crop residue should be returned to the soil to increase organic-matter content.

Special attention should also be given to increasing and maintaining organic-matter content on eroded areas by mulching with straw or barnyard manure. Sidedressing of knee-high corn and topdressing of wheat in early spring with 15 to 80 pounds of nitrogen per acre, a practice followed by a few farmers, brings profitable increases in yields of these crops. Alfalfa, although not well adapted to these soils under common management, can be grown successfully if the land is adequately limed and fertilized. These soils are not seriously eroded, but contour tillage should be used at all times, and strip-cropping is needed for the shorter crop rotations. These practices will aid in conserving water and minimizing erosion.

Increasing the productivity of these soils, particularly the Nason, Tatum, and Goldvein, and maintaining it at a high level is probably the most difficult and complex problem of soil management in the county. The present management is, in almost all cases, entirely inadequate. A different system needs to be adapted. Whether or not the above suggestions for management are economically feasible on these soils is questionable, however.

**MANAGEMENT GROUP 6—PREDOMINANTLY ROLLING ERODED WELL-DRAINED SOILS OF UPLANDS, TERRACES, AND COLLUVIAL SLOPES, OF RELATIVELY HIGH FERTILITY**

Soils of management group 6 are good to fair for crops and good to very good for pasture. They are moderately productive under common management.

All the soils of this group were derived from parent materials fairly high in bases. Compared with soils of management group 4 and 5, they are high in phosphorus, potash, and calcium. They are, however, deficient in organic matter and nitrogen because of losses

<sup>16</sup> See footnote 14, p. 137.

through erosion. All are eroded. Their present plow layer consists mainly of original subsoil material.

Slopes range from 7 to 14 percent for all the soils except Fauquier silty clay loam, eroded undulating phase, which has slopes of 2 to 7 percent. The soils of this group have medium to rapid runoff, but their relatively thick, dense but friable subsoils have a rather high capacity to retain subsoil moisture. All of these soils are easily permeable to air and roots; and although their surface soils do not absorb moisture readily, other layers permit rather free percolation. Internal drainage is medium.

Because of erosion, these soils have poor tilth, especially when worked under extremes of moisture content. They tend to clod, bake, and puddle. Stones, however, are not numerous enough to interfere with tillage. These soils are difficult to conserve, and under inadequate management are highly susceptible to further erosion.

Estimated productivity ratings for the soils of management group 6 are given in table 10.

*Present use and management.*—All these soils have been cleared of their oak-hickory forest and cultivated intensively, usually under an inadequate system of management. Although there are significant acreages of idle land and pasture on soils of this group, most of the soils are still used for cultivated crops. Management is variable. Common rotations are for 4 years and include corn, wheat, and red clover and orchardgrass or timothy. Lespedeza and alfalfa are grown to some extent. Some lime and fertilizer are used; the fertilizer is applied largely to corn and wheat. Pastures either of orchardgrass or of bluegrass and white clover are of fair to good quality and productivity. Little fertilizer, however, is applied to pastures except on some rotation pastures of orchardgrass.

*Use suitability and management requirements.*—Because of their low organic-matter content, high runoff and susceptibility to erosion, and fair to good water-supplying capacities, these soils have very exacting management requirements when used for cultivated crops. Good management therefore consists largely of practices designed to correct these adverse characteristics.

These soils are adapted to a wide variety of crops, including corn, small grains, orchardgrass, timothy, red clover, alfalfa, lespedeza, and Ladino clover. They are not well suited to winter small grains, however, because of susceptibility to heaving and winterkilling. If cultivated crops are included in the rotation, great care must be exercised in controlling erosion and in increasing organic-matter content and water-absorbing and water-supplying capacities. Whether the soils should be used largely for close-growing crops such as small grains, grasses, and legumes or for a rotation that includes a cultivated crop every 4 or 7 years will be determined largely by the operating problems of the individual farms. A rotation of corn, wheat, legume-grass hay and rotation pasture for 2 to 5 years is well suited. In such a rotation, the soils are productive if other management requirements are met.

Amendment needs are rather high. In general, about 1 to 1½ tons per acre of ground limestone, or the equivalent, applied every 4 years will maintain favorable soil reaction. Medium to heavy applications of complete commercial fertilizer are needed. About 40 percent of

TABLE 10.—*Estimated productivity ratings for soils of management group 6 under two levels of management, Fauquier County, Va.*

[Ratings in columns A are for prevailing management; those in columns B are for improved management. (See text discussion of management group 6.)]

Soil	Corn (100=50 bu. per acre)		Wheat (100=25 bu. per acre)		Barley (100=40 bu. per acre)		Alfalfa hay (100=4 tons per acre)		Red clover hay (100=2 tons per acre)		Lespedeza hay (100=1½ tons per acre)		Orchardgrass hay (100=2 tons per acre)		Mixed hay (100=2 tons per acre)		Apples (100=200 bu. per acre)		Pasture (100=100 cow- acre-days) <sup>1</sup>	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Davidson clay, eroded rolling phase.....	105	135	85	110	85	110	90	115	85	115	75	90	80	100	90	120	(?)	(?)	85	105
Dyke silt loam, eroded rolling phase.....	105	135	90	115	90	115	90	115	85	115	70	90	80	100	85	115	(?)	70	85	105
Eubanks loam, eroded rolling phase.....	85	120	85	115	85	115	80	105	80	110	75	105	80	110	85	115	(?)	70	95	125
Fauquier silty clay loam: Eroded rolling phase.....	80	105	75	100	75	100	75	95	70	100	60	80	75	100	80	105	(?)	50	75	100
Eroded undulating phase.....	90	125	85	110	85	110	85	110	80	110	70	90	80	105	85	110	(?)	70	85	100
Hiwassee silty clay loam, eroded rolling phase.....	85	115	85	110	85	110	90	115	80	110	75	90	80	100	85	110	(?)	(?)	85	105
Lloyd clay loam, eroded rolling phase.....	80	110	75	105	80	105	75	100	75	100	65	85	80	105	80	105	(?)	55	90	110

<sup>1</sup> Cow-acre-days, used to express the carrying capacity of pasture land, is the product of the number of animal units carried per acre multiplied by the number of days during the year the animals are grazed without injury to the pasture; for example, a soil that supports 1 animal unit per acre for 360 days rates 360; a soil that supports 1 animal unit

on 2 acres for 180 days rates 90; and a soil that supports 1 animal unit on 4 acres for 100 days rates 25.

<sup>2</sup> Soil not used for apple production.

<sup>3</sup> Productivity rating not estimated.

the fertilizer should go on the corn and about 60 percent on the wheat. If rotations are longer than 4 years, applications of phosphorus and potassium fertilizer on the hayland after the second year of hay will give beneficial results. Because of a scarcity of organic matter and nitrogen, topdressing of wheat with all available barnyard manure or 15 to 80 pounds an acre of nitrogen will greatly increase yields. The organic-matter supply can be increased through regular application of barnyard manure, incorporation of all crop residues, and the turning under of green manures. These soils need additional organic matter, particularly for bettering tilth, decreasing runoff and erosion, and increasing the water-absorbing and water-supplying capacities.

Previous erosion has made these soils more susceptible to further injury from erosion. Proper choice and rotation of crops and judicious tillage and use of amendments will help control erosion, but other practices are also needed. Contour tillage and, in many cases, contour stripcropping are essential as supplementary erosion control measures. These soils, largely because of their good inherent fertility and fair to good water-supplying capacities, can be made fairly high in productivity with proper management.

Pasture management problems are similar to those of management group 11, but yields are probably higher on soils of this group because of their greater water-supplying capacities.

**MANAGEMENT GROUP 7—NEARLY LEVEL TO UNDULATING IMPERFECTLY OR POORLY DRAINED SOILS OF UPLANDS WITH SEMICEMENTED OR CLAYPAN SUBSOILS**

The soils of management group 7 are fair to poor for crops and pasture. They are not well drained and are poor in inherent fertility. Their content of organic matter, plant nutrients, and lime is low.

Slopes are nearly level to mildly undulating, and gradients do not exceed 5 percent. Runoff is slow to very slow; internal drainage is impeded by the dense, semicemented, or claypan subsoils. The surface soils are subject to extremes of moisture content. In winter and early in spring when the water table is at or near the surface, the entire profile is excessively wet; during summer and early fall when the water table is lower, the surface is excessively dry.

The surface soils, when dry, are permeable to air, moisture, and roots; but the dense, often plastic and sticky, subsoils are very slowly permeable to air and moisture and practically prevent the downward growth of roots at all times. Since the roots are thus confined to the surface soil layers, they are unable to take advantage of the high water-absorbing and water-holding capacity of the subsoils. Consequently, the water-supplying capacity of these soils is only fair.

These soils are fairly easy to work and very easy to conserve. They have good tilth except when wet. The relief is suitable for the operation of heavy farm machinery, but the soils are often too wet in spring to accommodate heavy equipment. They are not susceptible to erosion and are uneroded or only slightly sheet eroded.

Productivity ratings for the soils of management group 7 under two levels of management are given in table 11.

*Present use and management.*—More than 75 percent of the Iredell and Lignum soils are in cutover forest. Areas of the Belvoir soils are largely cleared and are farmed with the associated Chester and Brandywine soils. Probably more than 65 percent of the Calverton,

TABLE 11.—*Estimated productivity ratings for soils of management group 7 under two levels of management, Fauquier County, Va.*

[Ratings in columns A are for prevailing management; those in columns B are for improved management. (See text discussion of management group 7.)]

Soil	Corn (100=50 bu. per acre)		Wheat (100=25 bu. per acre)		Barley (100=40 bu. per acre)		Red clover hay (100=2 tons per acre)		Lespedeza hay (100=1½ tons per acre)		Orchardgrass hay (100=2 tons per acre)		Mixed hay (100=2 tons per acre)		Pasture (100= 100 cow-acre- days) <sup>1</sup>	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Belvoir loam, level phase.....	50	70	50	70	50	70	45	60	70	95	60	90	50	65	70	85
Belvoir loam, undulating phase.....	55	80	55	75	55	75	45	55	70	100	70	100	50	60	75	90
Calverton silt loam, undulating phase.....	50	75	50	70	50	70	50	65	70	90	60	85	50	70	75	90
Croton silt loam.....	50	65	55	70	55	70	50	65	60	80	55	75	55	70	80	90
Iredell silt loam, undulating phase.....	40	65	45	70	45	70	50	65	60	75	55	75	55	70	80	95
Kelly silt loam, level and undulating phases.....	50	65	55	70	55	70	50	65	60	80	55	75	55	70	80	90
Lignum silt loam, undulating phase.....	45	70	50	75	40	60	50	65	70	90	60	80	50	70	70	85
Zion silt loam, undulating phase.....	55	75	65	85	65	85	55	75	65	85	60	80	60	80	80	95

<sup>1</sup> Cow-acre-days, used to express the carrying capacity of pasture land, is the product of the number of animal units carried per acre multiplied by the number of days during the year the animals are grazed without injury to the pasture; for example, a soil that

supports 1 animal unit per acre for 360 days rates 360; a soil that supports 1 animal unit on 2 acres for 180 days rates 90; and a soil that supports 1 animal unit on 4 acres for 100 days rates 25.

Croton, Kelly, and Zion soils are cleared and in agricultural use, principally for crops.

Soils of this management group are used largely for corn, wheat, lespedeza, timothy, and pasture crops. Farming on these soils ranges from a subsistence type to that of a high level. Where cultivated, the poorly drained Croton and Kelly soils are usually artificially drained by bedding and ditching. Such drainage is moderately effective in removing excess surface water and lowering the water table. The soils are thus made more suitable for crops and more productive.

*Use suitability and management requirements.*—These soils have exacting management requirements but can be effectively maintained, conserved, and brought to higher productivity levels with improved management systems.

Artificial drainage is probably the most important requirement. Drainage by tiling is of doubtful economic feasibility because of the low productivity and unfavorable qualities of the soils. However, tiling of small areas of these soils in fields containing a predominance of well-drained soils may be practicable. It may then be possible to use heavy farm machinery on the tiled areas during wet periods, and the field can thus be cultivated and otherwise farmed as a unit. Local farmers have used the low-cost drainage practice of bedding and ditching with good success; in fact, hardly any areas of the Croton and Kelly soils are successfully cultivated otherwise. Besides helping remove excess surface water, drainage by bedding serves to hold the water table lower during wet periods. This drainage promotes better aeration and deeper rooting, increases the availability of plant nutrients and water to plants, and widens the range of moisture conditions under which the soil can be tilled. When drained, these soils are also more responsive to lime, fertilizers, and other amendments and to good management practices in general.

So far as consistent with operating limitations of the individual farms, the choice and rotation of crops should be planned to increase and maintain an adequate supply of plant nutrients and a more favorable physical condition of the soil. Corn, small grain, lespedeza, timothy, orchardgrass, and possibly alsike and Ladino clovers are suitable crops on drained areas. Red clover and alfalfa are not well adapted. A 3- or 4-year rotation of corn, wheat, and legume-grass hay for 1 or 2 years is well suited, provided other management requirements are met. Neither engineering practices for soil conservation nor longer rotations are needed, since these soils are not susceptible to accelerated erosion.

The soils of this group are deficient in lime, organic matter, nitrogen, phosphorus, and potassium. Adequate amounts of these materials are needed for satisfactory crop production. Lime and fertilizer requirements are high and are similar to those recommended for the soils of group 4. It is important that the organic-matter content of these soils be increased so as to establish a more favorable physical condition and to increase fertility. This can be done adequately by incorporating all crop residue in the soil, by applying all available barnyard manure, or by turning under green manure.

These soils, even when drained, are often too wet in the spring for early plowing. There are also instances when they are suitable for

cultivation for only a short period. Therefore quick farm power, either by tractors or teams, is needed to take advantage of the short time available for tillage. Fall plowing is seldom practiced, but it would probably improve the physical condition of the plow layer by permitting alternate freezing and thawing of the soil during winter. The drainage of these soils by bedding detracts from the efficient use of all farm machinery and is especially unfavorable to the use of hay loaders.

Soils of this group are near the lower range of suitability for crops, and might well be used for pasture. Bluegrass, orchardgrass, white clover, and lespedeza are best suited for pasture on drained areas of these soils. Pasture management, as it applies to liming, fertilization, and weed control, is similar to that given for the soils of management group 13.

#### MANAGEMENT GROUP 8—UNDULATING WELL TO EXCESSIVELY DRAINED SOILS OF UPLANDS

Management group 8 includes soils fair to poor for crops and fair for pasture. They have profile characteristics similar to those of management group 9 but occupy less steep relief and have different management problems.

These soils are derived from acidic shales or sandstones and are low in plant nutrients, lime, and organic matter. They are very permeable to roots, moisture, and air and they have poor water-supplying capacity. They respond very well to liming, fertilization, and other good management practices, but do not retain improvement very long. Tilt over a wide range of moisture conditions is good on the Penn soils but is less favorable on the Catlett soil because of the rather high content of hard shale material. As all the soils have a somewhat rapid underdrainage, they dry out quickly and can be tilled safely soon after heavy rains. The Catlett soil appears to be naturally less fertile, more acid, and more subject to accelerated erosion than the Penn soils.

Slopes range from 2 to 7 percent; consequently, runoff is medium to slow. Internal drainage is medium to rapid, owing to the shallowness of the soil profiles and the permeable nature of the soils and substrata. These soils are slightly to moderately sheet eroded and locally contain a few shallow gullies. The soils, to plow depth, are composed largely of the original surface soil. Productivity ratings of the soils of management group 8 under two levels of management are given in table 12.

*Present use and management.*—Most of these soils are cleared and used for crops. In general the areas in forests have never been cleared. Very little of the cleared land is idle or in permanent pasture. Corn, wheat, lespedeza, timothy, orchardgrass, and red clover are the principal crops grown. Some soybeans, alfalfa, and oats are produced, but their acreage is not large. The management is variable; some is of the subsistence type, but most is good or of a higher level. The better management seems to be where the dairy type of farming is practiced. Rotations lasting 3 or 4 years that include corn, wheat, and legume-grass meadow are in general use among the dairy farmers. Corn and wheat are usually the only crops fertilized, and lime is commonly applied once during the rotation.

TABLE 12.—*Estimated productivity ratings for soils of management group 8 under two levels of management, Fauquier County, Va.*

[Ratings in columns A are for prevailing management; those in columns B are for improved management. (See text discussion of management group 8.)]

Soil	Corn (100=50 bu. per acre)		Wheat (100=25 bu. per acre)		Barley (100=40 bu. per acre)		Alfalfa hay (100=4 tons per acre)		Red clover hay (100=2 tons per acre)		Lespedeza hay (100=1½ tons per acre)		Orchardgrass hay (100=2 tons per acre)		Mixed hay (100=2 tons per acre)		Pasture (100=100 cow-acre- days) <sup>1</sup>	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Catlett silt loam, eroded undulating phase.....	60	80	65	85	60	80	(?)	(?)	55	80	60	75	55	70	60	80	65	85
Penn loam, undulating phase.....	70	115	75	100	70	95	50	70	60	85	70	90	65	85	65	90	70	100
Penn silt loam, undulating phase.....	70	110	80	100	75	95	(?)	75	60	85	65	90	65	80	65	90	70	100

<sup>1</sup> Cow-acre-days, used to express the carrying capacity of pasture land, is the product of the number of animal units carried per acre multiplied by the number of days during the year the animals are grazed without injury to the pasture; for example, a soil that supports 1 animal unit per acre for 360 days rates 360; a soil that supports 1 animal

unit on 2 acres for 180 days rates 90; and a soil that supports 1 animal unit on 4 acres for 100 days rates 25.

<sup>2</sup> Alfalfa is not adapted to this soil.

<sup>3</sup> Productivity rating not estimated.

*Use suitability and management requirements.*—Corn, small grains, lespedeza, red clover, orchardgrass, timothy, and Ladino clover are well adapted to these soils. Alfalfa is less well suited because of the rather short life of its stands. The soils are moderately easy to work and conserve. The greatest management problem is increasing their fertility and moisture-retaining capacity. Erosion control is a minor problem on these soils.

Soils of this group can be maintained in productivity and conserved by a 3- or 4-year rotation of corn, small grains, and legume-grass hay, adequate liming and fertilization, and the return of organic matter to the soil. Phosphorus, potash, nitrogen, and lime will be needed for most of the common crops. Amendment requirements are similar to those for the soils of management group 4. Since these soils are deficient in organic matter, it is important that all available barnyard manure be applied, all plant residues be returned to the soil, and possibly that green manures be plowed under. Such practices add fertility, increase the water-absorbing and retaining capacities of the soil, and improve its tilth and other physical properties. These soils are droughty, and the success or failure of corn or other crops that need much moisture is largely dependent on the amount of rainfall during the middle of the growing season.

Pasture management on these soils is similar to that recommended for the soils of management group 9.

#### MANAGEMENT GROUP 9—ROLLING WELL TO EXCESSIVELY DRAINED SOILS OF UPLANDS

The soils of management group 9 are fair for crops and fair to good for pasture. They are shallow except for Manor silt loam, rolling phase, which is moderately deep. They lack the clayey subsoils characteristic of most other upland soils. There is some variation among them in inherent fertility, but the range is not wide. Natural fertility is highest in the Brandywine and Catocin soils and lowest in the Louisburg, Penn, Manor, and Hazel. The soils of this group are moderately to extremely acid. They are rather low in lime and organic matter and fairly low in productivity under common management. All are readily permeable to moisture and roots and are well aerated. Their response to liming and fertilization is high, but their durability in crop production is low. Because of rolling slopes, these soils have rather high runoff; consequently, only a moderate amount of rainfall is absorbed by the soils. They have been slightly to moderately sheet eroded. Internal drainage is medium to very rapid, and the water-holding and water-supplying capacities are very poor to fair.

Productivity ratings for the soils of management group 9 under two levels of management are given in table 13.

*Present use and management.*—Most of these soils have been cleared and are used for crops or pasture. The percentage of cleared land on the Louisburg soil is less than the average for the group.

On cultivated areas corn, wheat, orchardgrass, red clover, lespedeza, and timothy are the principal crops. Rotations lasting 3 to 4 or more years are generally used. Many of these soils, although not well suited as cropland, are largely used for crops because they are better suited than many of their associated soils. This is particularly true of the Louisburg soil, which is being farmed with inadequate manage-

TABLE 13.—*Estimated productivity ratings for soils of management group 9 under two levels of management, Fauquier County, Va.*

[Ratings in columns A are for prevailing management; those in columns B are for improved management. (See text discussion of management group 9.)]

Soil	Corn (100=50 bu. per acre)		Wheat (100=25 bu. per acre)		Barley (100=40 bu. per acre)		Alfalfa hay (100=4 tons per acre)		Red clover hay (100=2 tons per acre)		Lespedeza hay (100=1½ tons per acre)		Orchardgrass hay (100=2 tons per acre)		Mixed hay (100=2 tons per acre)		Apples (100=200 bu. per acre)		Pasture (100=100 cow- acre-days) <sup>1</sup>	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Brandywine gritty loam, rolling phase.....	60	80	60	85	55	80	(*)	55	45	65	55	75	60	60	55	75	(*)	(*)	60	90
Brandywine loam, rolling phase.....	70	95	70	95	60	85	45	65	50	70	50	70	75	105	55	75	(*)	50	70	100
Brandywine silt loam, roll- ing phase.....	70	95	75	100	70	95	50	70	55	75	55	80	75	105	60	80	(*)	55	80	105
Catoctin silt loam, rolling phase.....	65	80	70	90	65	85	(*)	(*)	55	75	65	80	60	75	60	80	(*)	50	75	100
Hazel silt loam, rolling phase.....	65	85	70	90	65	85	(*)	(*)	50	70	60	80	65	80	60	80	(*)	45	70	90
Louisburg sandy loam, roll- ing phase.....	40	75	35	50	30	45	(*)	(*)	35	55	40	65	45	70	40	60	(*)	(*)	40	70
Manor silt loam, rolling phase.....	60	90	70	90	65	85	(*)	(*)	50	70	60	75	65	80	55	75	(*)	45	65	85
Penn silt loam, rolling phase..	55	75	70	90	70	85	(*)	70	55	75	60	75	60	75	60	80	(*)	(*)	60	90

<sup>1</sup> Cow-acre-days, used to express the carrying capacity of pasture land, is the product of the number of animal units carried per acre multiplied by the number of days during the year the animals are grazed without injury to the pasture; for example, a soil that supports 1 animal unit per acre for 360 days rates 360; a soil that supports 1 animal unit

on 2 acres for 180 days rates 90; and a soil that supports 1 animal unit on 4 acres for 100 days rates 25.

<sup>2</sup> Productivity rating not estimated.

<sup>3</sup> Crop not adapted.

ment, insufficient amendments, and no rotations or only short ones.

*Use suitability and management requirements.*—Corn, small grains, red clover, orchardgrass, timothy, and lespedeza are some of the crops that are successfully grown on these soils. Alfalfa is not well adapted because of the short life of its stands.

Although these soils are subject to medium to rapid runoff and to loss of soil material by erosion, their greatest management problem is primarily that of increasing their fertility and capacity to absorb and retain moisture. They can be conserved and maintained under a 5- to 7-year rotation that includes legumes in the hay crop and that receives adequate applications of amendments. When a 3- to 4-year rotation is used, contour cultivation and probably stripcropping are essential in maintaining productivity and conserving soil material and water. It is desirable to farm the Penn soil in a rotation including at least 1 year of pasture, as the maintenance of favorable soil structure for this soil appears to be dependent on the effects of trampling by livestock.

Except for Manor silt loam, rolling phase, which is moderately deep, these soils are shallow. Their organic-matter content therefore is low, and their lime requirement is not so great as might be anticipated. The effects of liming, however, are not lasting. Because of leaching, 1 to 1½ tons of ground limestone an acre, or its equivalent, is required for each crop rotation. These soils need nitrogen, phosphate, and probably potash for common crops. General fertilizer requirements are similar to those given for management group 2, but possible productivity is lower than for soils of that group. All crop residue and available barnyard manure should be applied to these soils to increase organic-matter content and water-supplying capacity. Soils of this group possess good qualities of tilth and can be tilled over a wide range of moisture conditions.

In some areas these soils may be better used for pasture than for crops. This is especially true where these soils are associated with large bodies of soils poorly suited to crops. Good pastures can be obtained and maintained, but the soils will need substantial applications of lime and phosphate. Recommended applications of these materials, as well as other needed management, are similar to those given for management group 13.

**MANAGEMENT GROUP 10—LEVEL OR NEARLY LEVEL IMPERFECTLY OR POORLY DRAINED SOILS AND LAND TYPES OF BOTTOM LANDS AND RECENT COLLUVIAL SLOPES**

Management group 10 consists of soils poorly to very poorly suited to crops but poor to excellent for pasture. They are on nearly level to slightly depressed areas where runoff is slow to very slow. The Bowmansville, Chewacla, Rowland, and Wehadkee soils, and Mixed alluvial land occur on stream bottoms subject to flooding; the Rohrersville and Worsham are poorly drained soils of the recent colluvial slopes. The soils of this group are easy to conserve, but their productivity is low for most cultivated crops under common management.

Soils of management group 10 range from medium to very strongly acid. They are moderately high in organic matter and plant nutrients, but their imperfect to poor drainage limits or restricts their usefulness for crops. The water table fluctuates; it is at or near the surface

during winter and early in spring but is considerably lower during summer and fall. The upper part of the soils is relatively permeable to roots, moisture, and air during the drier seasons, but the subsoil is slowly permeable to air and roots at most times under natural conditions, especially when the water table is high.

Productivity ratings for the soils of management group 10 under two levels of management are given in table 14.

*Present use and management.*—Most of these soils are cleared and in agricultural use. The Chewacla, Rowland, Wehadkee, and Bowmansville soils, and Mixed alluvial land are largely used for permanent pasture. The Rohrersville and Worsham soils have small scattered areas that are commonly used and managed like the closely associated soils. Where associated with better drained soils, the Rohrersville and Worsham soils are generally used for cultivated crops. Little attempt has been made to improve their drainage, because of the small size of each unit, the low productivity, and the costs involved.

Pasture on soils of this group consists largely of bluegrass and some white clover mixed with native plants, sedges, and weeds. Some areas are drained by ditches; but on the whole little attempt is made to improve drainage of pasture. The imperfectly drained Chewacla and Rowland soils probably produce more pasture throughout the growing season than any other soils of the county.

*Use suitability and management requirements.*—Under natural drainage conditions and the present agriculture, these soils are considered poorly suited to cultivated crops and best suited to pasture. They furnish a good amount of pasture throughout the spring and fall, but are particularly valuable during the drier summer months when pasture productivity is low on the more droughty well-drained upland soils. Pastures on the Chewacla and Rowland soils are of fair to good quality. Those on the other soils, which are more poorly drained, are of inferior quality. The first measures taken in pasture improvement should therefore be those designed to improve drainage. Drainage can be improved considerably in most places through the use of open ditches, bedding, and diversions. In addition, tiling would be effective and feasible in some of the smaller wetter areas.

After drainage, liming is needed. Applications of 1 to 2 tons an acre of ground limestone or its equivalent every 3 or 4 years are recommended. Seedings of bluegrass, white clover, Ladino clover, and orchardgrass do well on drained areas of these soils. Although no data are available, it is thought that applications of commercial fertilizer every 3 or 4 years will give beneficial and profitable results. Lime and fertilizer requirements for the Chewacla and Rowland soils may be lower than for the other soils of this group. Undergrazing seems to have a more undesirable effect than overgrazing on soils of this group. Frequent clipping as an aid in suppressing weeds is also very important.

Although considered poorly suited to cultivated crops, these soils, if adequately drained, may be fairly well suited to hay crops and crops that can be planted late in spring or early in summer and harvested in fall.

TABLE 14.—*Estimated productivity ratings for soils of management group 10 under two levels of management, Fauquier County, Va.*

[Ratings in columns A are for prevailing management; those in columns B are for improved management. (See text discussion of management group 10.)]

Soil	Corn (100=50 bu. per acre)		Lespedeza hay (100=1½ tons per acre)		Orchardgrass hay (100=2 tons per acre)		Mixed hay (100=2 tons per acre)		Pasture (100=100 cow-acre-days) <sup>1</sup>	
	A	B	A	B	A	B	A	B	A	B
Bowmansville silt loam.....	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	70	100
Chewacla silt loam.....	50	65	85	100	75	85	90	105	120	150
Mixed alluvial land.....	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	60	80
Rohrersville silt loam.....	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	120	150
Rowland silt loam.....	50	65	85	100	75	85	90	105	120	150
Wehadkee silt loam.....	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	70	100
Worsham silt loam.....	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	70	100

<sup>1</sup> Cow-acre-days, used to express the carrying capacity of pasture land, is the product of the number of animal units carried per acre multiplied by the number of days during the year the animals are grazed without injury to the pasture; for example, a soil that supports 1 animal unit per acre for 360 days rates 360;

a soil that supports 1 animal unit on 2 acres for 180 days rates 90; and a soil that supports 1 animal unit on 4 acres for 100 days rates 25.

<sup>2</sup> Crop not adapted.

## MANAGEMENT GROUP 11—ROLLING AND HILLY WELL TO EXCESSIVELY DRAINED SOILS OF ERODED UPLANDS, OF FAIR TO RELATIVELY HIGH FERTILITY

Management group 11 consists of poor crop soils and poor to very good pasture soils. In general, these soils have rather high productivity. They are predominantly moderately to strongly acid in reaction and rank high in inherent fertility in comparison to the soils of management group 5. Although they are eroded and occupy relief where runoff is medium to rapid, most of them have fair water-supplying capacities because of their relatively thick and clayey subsoils. They are rather difficult to work and conserve. Stones are not sufficiently numerous to interfere with cultivation except on the Clifton, Montalto, and Eubanks stony silt loam soils. Slopes range from 7 to 25 percent in gradient; consequently, susceptibility to erosion is medium to high. Internal drainage is medium to rapid, and the physical characteristics of the soils are suitable for good air and moisture movement and penetration of roots. Accelerated sheet erosion is predominantly moderate, but the Fauquier and Montalto silty clay loam soils are more severely sheet eroded and contain shallow gullies in places.

Productivity ratings of the soils of management group 11 under two levels of management are given in table 15.

*Present use and management.*—Nearly all of these soils are cleared and used for crops or pasture. However, probably not more than 40 percent of the Clifton and Eubanks stony silt loam soils has been cleared, and the cleared areas are used primarily for pasture. Although the eroded phases of the Fauquier and Montalto soils were at one time cultivated, they are now mostly in pasture because of low crop yields resulting from erosion. Management varies considerably on the soils of this group used for crops. A 3- or 4-year rotation consisting of corn, wheat, and grass-legume hay is generally used. Fertilization and liming are not adequate, and little is done to check erosion. Pastures on these soils receive moderately good management. They consist largely of bluegrass and white clover, and some are limed and fertilized.

*Use suitability and management requirements.*—Because of high runoff, susceptibility to further erosion, and in some cases, excessive stoniness, these soils are poorly suited to crops and are best suited to pasture.

Most pastures are already established, and management requirements consist chiefly of periodic applications of adequate lime and fertilizer and the control of weeds. Phosphate and lime applied in the United States Department of Agriculture conservation program have given a desirable increase in pasture production on many of these soils. Where the soils have been impoverished by misuse and poor management, applications of  $\frac{1}{2}$  to 1 ton of ground limestone every 3 or 4 years should correct soil acidity. In general, phosphorus is the chief fertilizer requirement.

If pastures are not yet established, the soils present a more difficult management problem. Establishing pastures is rather difficult, largely because these soils have poor tilth, a tendency to clod and bake, slow absorption of moisture, and deficiency in organic matter. In addition to lime and phosphate, nitrogen and potassium fertilizers may be needed to establish vegetation. If the soils are adequately

TABLE 15.—Estimated productivity ratings for soils of management group 11 under two levels of management, Fauquier County, Va.

[Ratings in columns A are for prevailing management; those in columns B are for improved management. (See text discussion of management group 11.)]

Soil	Corn (100=50 bu. per acre)		Wheat (100=25 bu. per acre)		Barley (100=40 bu. per acre)		Alfalfa hay (100=4 tons per acre)		Red clover hay (100=2 tons per acre)		Lespedeza hay (100=1½ tons per acre)		Orchardgrass hay (100=2 tons per acre)		Mixed hay (100=2 tons per acre)		Apples (100=200 bu. per acre)		Pasture (100=100 cow acre-days) <sup>1</sup>	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Chester-Brandywine loams, hilly phases.....	50	65	60	80	50	70	50	70	45	60	50	65	50	65	50	65	(?)	60	75	100
Clifton stony silt loam, roll- ing phase.....	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	55	75
Eubanks silt loam, eroded hilly phase.....	50	65	50	70	50	70	75	90	75	90	75	90	70	85	80	90	(?)	60	85	110
Eubanks stony silt loam, rolling phase.....	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	95	125
Fauquier silty clay loam, eroded hilly phase.....	(?)	(?)	30	50	25	45	65	85	70	85	70	90	70	85	75	90	(?)	50	60	85
Fauquier silt loam, hilly phase.....	45	65	50	70	40	60	75	95	80	100	70	100	85	105	85	105	(?)	60	75	100
Montalto silty clay loam, eroded rolling moderately shallow phase.....	40	65	40	60	45	60	(?)	50	35	60	30	55	35	55	40	60	(?)	(?)	50	70
Montalto, stony silt loam, rolling moderately shallow phase.....	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	50	70

<sup>1</sup> Cow-acre-days used to express the carrying capacity of pasture land, is the product of the number of animal units carried per acre multiplied by the number of days during the year the animals are grazed without injury to the pasture; for example, a soil that supports 1 animal unit per acre for 360 days rates 360; a soil that supports 1 animal unit

on 2 acres for 180 days rates 90; and a soil that supports 1 animal unit on 4 acres for 100 days rates 25.

<sup>2</sup> Productivity ratings not estimated

<sup>3</sup> Crop not adapted.

limed and fertilized, reseeded of old pastures should not be necessary, especially under a program of controlled grazing and weed eradication. Controlled grazing and frequent clipping to aid weed control are important in maintaining pastures of high quality. Feeding on the land is also beneficial in increasing organic-matter content and water-absorbing and water-containing capacities. Bluegrass and white clover are well adapted to soils of this group and probably produce higher yields than on other upland soils of the county on similar relief.

**MANAGEMENT GROUP 12—ROLLING AND HILLY WELL-DRAINED SOILS OF ERODED UPLANDS AND OLD COLLUVIAL SLOPES, OF LOW TO FAIR FERTILITY**

The soils of management group 12 are poor to very poor for crops and fair to good for pasture. They are low to fair in natural fertility. The content of organic matter, lime, and plant nutrients is low.

These soils are difficult to work and conserve. Slopes range from 7 to 25 percent. The soils are eroded, and most of the present surface soil to plow depth consists of subsoil material. Because of the slope, eroded condition, and medium to rapid runoff, these soils have only fair moisture-supplying capacities. All, however, are friable and readily permeable to air and plant roots. Although the amount of rainfall absorbed is not great, the relatively thick subsoils allow free percolation of water. The Braddock soil differs from other soils of this group mainly in being very stony and only slightly sheet eroded, but it has similar use and management requirements.

Productivity ratings for the soils of management group 12 under two levels of management are given in table 16.

*Present use and management.*—With the exception of the Braddock soil, all of these soils were at one time or another cleared and used as cropland. The acreage now cleared is about equal to that which has reverted to pine forest. Probably about half of the Braddock soil is cleared and used predominantly for permanent pasture. Most of the cleared areas of the other soils of this group are also used mainly for pasture.

On cultivated areas corn, wheat, lespedeza, and timothy are the principal crops. Management varies considerably from a subsistence to a much higher level. Management appears to be best on the Elioak soil and poorest on the Tatum. Rotations lasting 3 or 4 years and consisting of corn, wheat, and hay, are in use under the better management. Some fertilizer is used, generally on corn and wheat, and some lime is applied. Engineering measures for erosion control are seldom followed.

These soils, largely because of low content of lime and plant nutrients, produce relatively undesirable pasture grasses unless adequately limed and fertilized. A moderate proportion of the vegetation in pastures is bluegrass, but broomsedge, poverty oatgrass, and briers are predominant among the common wild grasses and weeds.

*Use suitability and management requirements.*—Largely because of their eroded condition and further susceptibility to erosion, these soils are poorly suited to cultivated crops and are best suited to permanent pasture.

Required pasture management consists largely of supplying needed amendments, chiefly fertilizer and lime, to suitable pasture plants.

TABLE 16.—*Estimated productivity ratings for soils of management group 12 under two levels of management, Fauquier County, Va.*

[Ratings in columns A are for prevailing management; those in columns B are for improved management. (See text discussion of management group 12.)]

Soil	Corn (100=50 bu. per acre)		Wheat (100=25 bu. per acre)		Barley (100=40 bu. per acre)		Alfalfa hay (100=4 tons per acre)		Red clover hay (100=2 tons per acre)		Lespedeza hay (100=1½ tons per acre)		Orchardgrass hay (100=2 tons per acre)		Mixed hay (100=2 tons per acre)		Apples (100=200 bu. per acre)		Pasture (100=100 cow- acre-days) <sup>1</sup>		
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	
Braddock very stony loam, rolling phase.....	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	35	50
Culpeper clay loam, eroded rolling phase.....	50	80	55	80	55	80	50	70	45	60	55	80	50	75	80	70	(?)	50	50	85	
Elloak silt loam, eroded hilly phase.....	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	50	80
Elloak silt loam, eroded roll- ing phase.....	60	80	65	85	60	80	60	75	60	75	50	75	55	75	55	80	(?)	55	60	90	
Tatum silty clay loam, eroded rolling phase.....	25	65	55	85	45	75	(?)	45	40	70	50	70	40	60	45	70	(?)	(?)	30	75	

<sup>1</sup> Cow-acre-days, used to express the carrying capacity of pasture land, is the product of the number of animal units carried per acre multiplied by the number of days during the year the animals are grazed without injury to the pasture; for example, a soil that supports 1 animal unit per acre for 360 days rates 360; a soil that supports 1 animal unit

on 2 acres for 180 days rates 90; and a soil that supports 1 animal unit on 4 acres for 100 days rates 25.

<sup>2</sup> Crop not adapted.

<sup>3</sup> Productivity rating not estimated.

The general lime requirement on pastures already established is 1 to 1½ tons of ground limestone, or its equivalent, an acre, applied every 3 or 4 years. If pastures are of low quality or if the soil is eroded or otherwise impoverished, reseeding of desirable plants and an initial medium application of commercial fertilizer are needed. Complete commercial fertilizer and the addition of lime and barnyard or green manure are desirable in establishing new seedings. Bluegrass, white clover, orchardgrass, and Ladino clover are the most desirable pasture plants.

It is important that the organic-matter content of these soils be increased in order to raise the water-absorptive and water-retaining capacities. Feeding on the land; scattering of droppings; and additions of barnyard manure, straw, and fodder are beneficial. Other requirements include proper control of grazing and frequent mowing as a weed-control measure.

Probably these soils will be suitable for short periods of cropping after they have been in pasture a few years. If they are used for crops following a period in pasture, management requirements similar to those given for management group 5 are appropriate, but greater care is needed to control erosion.

#### MANAGEMENT GROUP 13—ROLLING AND HILLY EXCESSIVELY DRAINED SOILS AND LAND TYPES OF ERODED UPLANDS

The soils and land types of management group 13 are poorly suited to crops and fairly well to very poorly suited to pasture. They are moderately low in productivity. They vary somewhat in plant nutrients, lime, and organic matter. They are predominantly shallow soils. Their poor water-supplying capacities limit their usefulness and productivity. Slopes range from 7 to 25 percent but are mostly greater than 14. Because of slope and predominantly rapid runoff, they are difficult to conserve. They are moderately difficult to work.

Productivity ratings for the soils of management group 13 under two levels of management are given in table 17.

*Present use and management.*—About 60 to 65 percent of these soils and land types are cleared of their original oak-hickory forest. Most of the cleared land is used for permanent pasture. The small cultivated acreage largely produces corn, wheat, and hay in moderately long rotations. Although the management varies, it is mostly moderately good. Pastures, especially those on the Brandywine and Catocin soils and the stony land types, consist largely of bluegrass and white clover, are mainly of good quality, and receive good to fair management.

*Use suitability and management requirements.*—These soils and land types are poorly suited to cultivated crops, largely because of deficiencies in water-holding and water-supplying capacities, susceptibility to runoff and erosion, and poor accessibility to farm machinery because of slope. They are best used as pasture, but, because of these adverse features, they are droughty during dry summer weather. Favorable pasture production is therefore dependent, in a large measure, on sufficient rainfall. Moreover, certain of these soils and land types have a moderately high quantity of loose stone and rock outcrops that may limit the mowing needed to suppress weeds.

TABLE 17.—*Estimated productivity ratings of soils and land types of management group 13 under two levels of management, Fauquier County, Va.*

[Ratings in columns A are for prevailing management; those in columns B are for improved management. (See text discussion of management group 13.)]

Soil	Corn (100=50 bu. per acre)		Wheat (100=25 bu. per acre)		Barley (100=40 bu. per acre)		Alfalfa hay (100=4 tons per acre)		Red clover hay (100=2 tons per acre)		Lespedeza hay (100=1½ tons per acre)		Orchardgrass hay (100=2 tons per acre)		Mixed hay (100=2 tons per acre)		Apples (100=200 bu. per acre)		Pasture (100=100 cow- acre-days) <sup>1</sup>		
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	
Brandywine gritty loam, hilly phase.....	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	35	65
Brandywine loam, hilly phase.....	40	60	50	70	45	65	25	45	30	50	30	55	40	60	35	55	(?)	40	55	80	
Brandywine loam-Eubanks silt loam, hilly phases.....	50	70	60	80	55	75	50	70	45	60	50	65	50	65	50	65	(?)	65	75	100	
Brandywine silt loam, hilly phase.....	45	65	55	75	50	70	30	50	35	55	35	60	45	65	40	60	(?)	40	60	85	
Catoctin silt loam, hilly phase.....	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	50	70
Manor silt loam, eroded hilly phase.....	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	40	60
Penn loam, eroded rolling phase.....	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	45	65
Penn silt loam, eroded roll- ing phase.....	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	35	50
Stony rolling and hilly land, acidic rock.....	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	40	60
Stony rolling and hilly land, basic rock.....	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	50	70
Watt silt loam, hilly phase.....	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	50	70

<sup>1</sup> Cow-acre-days, used to express the carrying capacity of pasture land, is the product of the number of animal units carried per acre multiplied by the number of days during the year the animals are grazed without injury to the pasture; for example, a soil that supports 1 animal unit per acre for 360 days rates 360; a soil that supports 1 animal unit

on 2 acres for 180 days rates 90; and a soil that supports 1 animal unit on 4 acres for 100 days rates 25.

<sup>2</sup> Crop not adapted.

<sup>3</sup> Productivity rating not estimated.

These soils and land types are capable of producing pastures of good yield and quality in favorable seasons, provided other requirements are met. On established pastures, management requirements consist chiefly of the periodic application of lime, phosphate, and probably potash, as well as controlled grazing and weed suppression by frequent mowing. Feeding on the land is also beneficial in increasing the organic-matter content and water-holding capacities of these soils.

Applications of 1 ton of ground limestone an acre every 3 or 4 years should fulfill the requirement for lime. In general, phosphate is the main fertilizer requirement. Usually, potash and nitrogen deficiencies are not apparent; but if pastures are newly established or a quick growth of pasture grasses is desired, applications of fertilizers containing these elements may be needed. Reseeding of old pastures is generally not necessary; if they are adequately limed and fertilized and otherwise properly managed, their quality should improve with age. Pastures are largely of bluegrass and white clover, although more drought-resistant plants are beginning to be used.

After a few years in well managed pasture, some of these soils can be used for cultivated crops 1 or 2 years before being returned to pasture. If so used, the soils would have management requirements similar to those of management group 9.

**MANAGEMENT GROUP 14—STEEP EXCESSIVELY DRAINED SHALLOW UPLAND SOILS AND STONY STEEP LAND**

The soils and land types of management group 14 are very poor for crops and poor to fair for pasture. Although they differ somewhat in inherent fertility, all of them are shallow to bedrock, have rapid to very rapid runoff and high erosion susceptibility, are very poor in water-supplying capacity, and are poorly accessible to farm machinery. Internal drainage is rapid to very rapid. The relief ranges from 14 to 35 percent or more, but most slopes are greater than 25. Sheet erosion is predominantly moderate.

Since these soils are not suited to cropping, productivity ratings are given only for pasture. These ratings are shown in table 18.

*Present use and management.*—About 50 to 60 percent of these soils and land types is in the oak-hickory type of forest. The eroded steep phase of Catoctin silt loam has been cleared but is of comparatively minor acreage. Some cleared land on the soils of this group is idle, but most of it is used for permanent pasture. Pasture management varies. However, most of the management on the Brandywine and Catoctin soils and portions of the stony land types containing these soils is good in comparison to the average management on the other soils of this management group. The quality of the pastures varies according to management. Most of the well-managed pastures are of bluegrass and white clover. Selective cutting of forest is not generally practiced, and few attempts are made to use cull trees and waste materials effectively.

*Use suitability and management requirements.*—Because of characteristics unfavorable to cultivated crops, these soils and land types are best used for pasture.

TABLE 18.—*Productivity ratings for soils of management group 14 under two levels of management, Fauquier County, Va.*

[Ratings in column A are for prevailing management; those in column B are for improved management. (See text discussion of management group 14.)]

Soil	Pasture (100=100 cow-acre-days) <sup>1</sup>	
	A	B
Brandywine loam, steep phase.....	40	60
Catoctin silt loam, eroded steep phase.....	40	60
Hazel silt loam, hilly and steep phases.....	45	65
Louisburg sandy loam, hilly and steep phases.....	20	35
Stony steep land, acidic rock.....	( <sup>2</sup> )	( <sup>2</sup> )
Stony steep land, basic rock.....	( <sup>2</sup> )	( <sup>2</sup> )

<sup>1</sup> Cow-acre-days, used to express the carrying capacity of pasture land, is the product of the number of animal units carried per acre multiplied by the number of days during the year the animals are grazed without injury to the pasture; for example, a soil that supports 1 animal unit per acre for 360 days rates 360; a soil that supports 1 animal unit on 2 acres for 180 days rates 90; and a soil that supports 1 animal unit on 4 acres for 100 days rates 25.

<sup>2</sup> Pasture not suited to soil.

Problems of pasture management are essentially similar to those of management group 13, but these soils and land types are less productive because of greater droughtiness and stoniness. The steep slopes and stoniness of some areas practically prevent the use of mowing machinery for weed control and interfere with application of amendments. Forest management requirements are the same as those given for soils and land types of management group 16.

**MANAGEMENT GROUP 15—NEARLY LEVEL TO UNDULATING IMPERFECTLY OR POORLY DRAINED SOILS OF UPLANDS WITH PLASTIC AND STICKY SUBSOILS**

Soils of this group are very poorly suited to crops and poorly to very poorly suited to pasture. They are strongly to very strongly acid in reaction and low in plant nutrients and organic matter. They are characterized by dense, plastic, and sticky subsoils that are almost impermeable to moisture, plant roots, and air. Runoff is very slow to medium. Internal drainage is slow because of the claypan subsoil, the high water table, or a combination of these. Accessibility to farm machinery is poor during the wet seasons of the year; as a result the planting and harvesting of some crops is sometimes seriously delayed. Erosion is slight except on Iredell silt loam, eroded undulating phase, which is moderately sheet and gully eroded.

Productivity ratings for soils of management group 15 under two levels of management are given in table 19.

*Present use and management.*—Probably more than 85 percent of these soils are in cutover forest or are in various stages of reversion to pine forest. The cleared land in agricultural use is about equally divided between crops and pasture. The pastures are generally poorly managed and consist largely of old meadows. They contain large proportions of undesirable weeds, such as broomsedge, poverty

TABLE 19.—*Estimated productivity ratings for soils of management group 15 under two levels of management, Fauquier County, Va.*

[Ratings in columns A are for prevailing management; those in columns B are for improved management. (See text discussion of management group 15.)]

Soil	Corn (100=50 bu. per acre)		Wheat (100=25 bu. per acre)		Barley (100=40 bu. per acre)		Red clover hay (100=2 tons per acre)		Lespedeza hay (100=1¼ tons per acre)		Orchardgrass hay (100=2 tons per acre)		Mixed hay (100=2 tons per acre)		Pasture (100=100 cow-acre-days) <sup>1</sup>	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Elbert silt loam, concretionary phase.	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	40	50
Iredell silt loam, eroded undulating phase.....	30	55	35	60	35	60	40	55	50	65	45	65	45	60	70	85
Iredell silt loam, level phase.....	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	(?)	35	45

<sup>1</sup> Cow-acre-days, used to express the carrying capacity of pasture land, is the product of the number of animal units carried per acre multiplied by the number of days during the year the animals are grazed without injury to the pasture; for example, a soil that supports 1 animal unit per acre for 360 days rates 360; a soil that supports 1 animal unit

on 2 acres for 180 days rates 90; and a soil that supports 1 animal unit on 4 acres for 100 days rates 25.

<sup>2</sup> Crop not adapted.

grass, and briers. Corn, small grains, and lespedeza are the principal crops. Little lime and commercial fertilizers are used on crops. Most of the fertilizer is applied to corn. Pastures usually are not fertilized or limed.

*Use suitability and management requirements.*—Of all the soils in the county that are considered physically suited to pasture, these are probably the poorest. Where feasible, they might well be used for forest.

Management required for pasture consists largely of proper choice of adapted pasture plants, adequate liming and fertilization, and control of grazing and weeds. If present pastures are of very low quality, reseedling of desirable pasture plants may be necessary. Fertilizer and liming requirements are similar to those recommended for the soils of management group 13. Artificial drainage would be beneficial, especially on the Elbert soil, but it is of doubtful economic feasibility. Bluegrass, lespedeza, and possibly Ladino clover are the most suitable pasture plants. Overgrazing should be avoided, and considerable attention should be given to the increasing of organic-matter content, especially on the eroded areas.

**MANAGEMENT GROUP 16—STONY (VERY STONY) STEEP LAND, STONY COLLUVIUM, ROUGH GULLIED LAND, HILLY AND STEEP SHALLOW SHALY SOILS, STONY IMPERFECTLY DRAINED SOILS, AND VERY POORLY DRAINED SOILS**

The soils and land types of management group 16 have some undesirable characteristic or combination of characteristics—such as stoniness, steep slope, low fertility, shallowness, poor drainage, or serious erosion injury—that largely prevents their use either for crops or for pasture. The group includes some of the steepest and stoniest uplands of the county and also some of the most nearly level. These soils and land types are low in organic matter and plant nutrients, and most of them are strongly acid. Their productivity and workability are very poor, and the units on the steeper slopes have very poor conservability.

Since these soils and land types are generally suited only to forestry, no productivity ratings are given. The soils of this group are listed in table 4.

*Present use and management.*—Practically all of the Elbert, Iredell, and Manteo soils and the Stony colluvium and Stony (very stony) steep land types are in mixed hardwood-pine forest. The Penn soil and Rough gullied land were once almost entirely cleared but are now largely in pine forest or in various stages of reforestation. Some areas of the Manteo and Penn soils are used for pasture along with associated soils. The pastures are commonly composed largely of native plants, principally broomsedge, intermixed with weeds, briers, and brush. Woodlands are not well managed. Selective cutting is not generally practiced, and few attempts are made to use cull trees and waste materials effectively.

*Use suitability and management requirements.*—About 90 percent of the total area of these soils is in forest, and, in general, a program of reforestation should be carried out on the remaining acreage.

These soils are not physically suited to crops or pasture. Where the production of crops is attempted, however, every effort should be made to lime and fertilize adequately, to select proper rotations,

and to use adequate measures for erosion and water control. For the maintenance of pasture, additions of lime and fertilizers, particularly phosphate, and other good management practices are required. Legumes should make up a good part of the pasture sod. It is difficult, however, to apply materials and also to control weeds in many places, chiefly because of the steep slopes, stoniness, or poor accessibility.

Most of the management practices used in the production of forest may be grouped as follows: (1) The control of fires, trampling, and damage from other causes; (2) systematic cutting of desirable trees and culling of inferior trees; (3) harvesting the mature trees in such a manner that desirable species may succeed them; and (4) maintenance of a full stand of desirable species.

An additional discussion on forest management is included in the section, *The Forests of Fauquier County*.

#### CLASSIFICATION OF SOILS ACCORDING TO SUITABILITY FOR USE

The purpose of soil classification is to place the soils in categories in order to remember more easily their characteristics and observe their relationships. Each soil is given a name that is intended to bring out as many of its characteristics as possible for those concerned with its classification, management, and productivity. It is important that this purpose be kept clearly in mind, because soils that are closely related in the natural soil classification may differ greatly in suitability for a specific practical objective. As an example, Montalto silt loam, rolling moderately shallow phase, is considered moderately well suited to the production of the common field crops; whereas Montalto stony silt loam, rolling moderately shallow phase, although similar in almost all characteristics except stone content, is very poorly suited to their production.

As mapped, any one soil is uniform in suitability for crops to the extent that its pertinent characteristics are recognized and their variation is limited. It is necessary, therefore, that the use suitability of each soil unit be so interpreted that the soil survey report may be of the greatest use in agricultural work. It is also convenient to have the soil units grouped together that have relatively similar suitabilities for a specific objective.

In this section, the soils of Fauquier County are rated according to their productivity of the various crops most commonly grown in the county and are grouped according to their relative suitability for agricultural use. As previously brought out, the soil units are classified and mapped on the basis of their physical characteristics that can be observed in the field. Some of these, such as color and consistency, are considered internal characteristics; others, such as slope, are considered external. Both internal and external characteristics form the basis for determining the capabilities of each soil unit.

The soil types, phases, variants, complexes, and miscellaneous land types are placed in seven groups according to their relative suitability for agricultural use. This grouping is on a county-wide, not a regional or nationwide, basis, and therefore the various classes may not be exactly comparable to corresponding classes and soil units in other areas. This grouping of the soils is not to be taken as a recommendation for use. Its purpose is to provide information as to the

relative adaptation of the various soil units in the present agriculture. Information on a number of additional factors beyond the scope of this report is necessary in order to make general recommendations for land use, and specific recommendations for any one farm would require knowledge and consideration of a number of factors applying to that specific farm. The term "land use" as used here refers to broad uses of land, such as for: (1) cultivated crops, (2) permanent pasture, and (3) forestry.

The seven groups are as follows: (1) Soils good to excellent for crops and good to excellent for pasture; (2) Soils fair to good for crops and fair to very good for pasture; (3) Soils poor to fair for crops and poor to good for pasture; (4) Soils poor for crops and fair to excellent for pasture; (5) Soils very poor to poor for crops and poor to fair for pasture; (6) Soils very poor for crops and very poor to poor for pasture; and (7) Soils very poor for crops or pasture and best suited to forest.

The first three groups contain soils suitable for the production of cultivated crops and together comprise about 57 percent of the county. The next three groups, containing soils unsuited to crops but adapted to pasture, cover about 32 percent of the county. The soils of the last group comprise about 11 percent of the county.

The soils included in each group are listed in table 20, and an evaluation of their productivity, workability, and conservability is given.

The soils of Fauquier County differ widely in physical characteristics and consequently in use capabilities and management needs. Such physical characteristics are texture, structure, consistence, organic matter, inherent fertility (including lime), moisture conditions, depth and arrangement of the soil layers, depth to bedrock, erosion, stoniness, and slope or lay of the land. These soil characteristics influence land use and management practices through their effect on productivity, workability, and conservability.

Productivity, as used here, refers to the capacity of the soil to produce crops under given farming practices. The soil may be productive of a crop but not well adapted to it because of poor workability or poor conservability or both.

Workability refers to the ease of tillage, harvesting, and other field operations. Important among the soil characteristics that affect workability are texture, structure, consistence, moisture conditions, organic matter, stoniness, and slope.

Conservability refers to the maintenance or improvement of the productivity and workability of the soil and includes control of erosion. The degree to which the soil responds to management practices indicates the extent of the conservation measures that must be practiced.

An ideal soil for the production of crops is one that is very productive, easily worked, and capable of being conserved with minimum of effort. Soils with such an ideal combination are rare. All the soil units of Fauquier County fall short of this ideal, but they differ widely in the degree of shortcoming. Moreover, the degree of shortcoming in any one of three conditions (productivity, workability, and conservability) may differ greatly in any one soil. For example, a soil may be highly productive and fairly easily conserved but very difficult to work. The relationships among productivity, workability, and conservability are very complex in their influence on the use suitability

TABLE 20.—*The soils of Fauquier County, Virginia, grouped according to suitability for use and evaluations of their productivity, workability, and conservability*

SOILS GOOD TO EXCELLENT FOR CROPS AND GOOD TO EXCELLENT FOR PASTURE

Soil	Productivity	Workability	Conservability
Bermudian silt loam.....	Good.....	Very good.....	Excellent.
Chester loam, undulating phase.....	Very good.....	do.....	Good.
Chester silt loam, undulating phase.....	do.....	do.....	Do.
Congaree fine sandy loam.....	Good.....	Excellent.....	Very good.
Congaree silt loam.....	do.....	Very good.....	Excellent.
Fauquier silt loam, undulating phase.....	do.....	Good.....	Good.
Hiwasee loam, undulating phase.....	Very good.....	do.....	Do.
Meadowville silt loam.....	do.....	do.....	Excellent.
Starr silt loam.....	do.....	do.....	Do.
State loam.....	do.....	Very good.....	Very good.

SOILS FAIR TO GOOD FOR CROPS AND FAIR TO VERY GOOD FOR PASTURE

Bucks silt loam, undulating phase.....	Good.....	Good.....	Good.
Chester loam, rolling phase.....	do.....	Fair.....	Fair.
Chester-Brandywine loams:			
Rolling phases.....	Fair to good.....	do.....	Do.
Undulating phases.....	Good.....	Good.....	Good.
Chester-Brandywine silt loams, rolling phases.....	Fair to good.....	Fair.....	Fair.
Chester loam-Eubanks silt loam, rolling phases.....	do.....	do.....	Do.
Culpeper fine sandy loam, undulating phase.....	Fair.....	Very good.....	Good.
Davidson clay, eroded rolling phase.....	Good.....	Poor.....	Fair.
Dyke silt loam, eroded rolling phase.....	do.....	do.....	Do.
Elioak silt loam, undulating phase.....	Fair.....	Good.....	Good.
Eubanks loam, rolling phase.....	Good.....	Fair.....	Fair.
Eubanks silt loam, rolling phase.....	do.....	do.....	Do.
Fauquier silt loam, rolling phase.....	Fair to good.....	do.....	Poor.
Fauquier silty clay loam, eroded undulating phase.....	do.....	do.....	Fair.

TABLE 20.—*The soils of Fauquier County, Virginia, grouped according to suitability for use and evaluations of their productivity, workability, and conservability—Continued*

## SOILS FAIR TO GOOD FOR CROPS AND FAIR TO VERY GOOD FOR PASTURE—Continued

Soil	Productivity	Workability	Conservability
Fauquier-Elioak silt loams:			
Undulating phases.....	Good.....	Good.....	Good.
Rolling phases.....	Fair.....	Fair.....	Fair.
Hiwassee loam, undulating light-colored variant.....	do.....	Very good.....	Good.
Hiwassee silty clay loam, eroded rolling phase.....	Good.....	Poor.....	Poor.
Lloyd silt loam, rolling phase.....	Fair to good.....	Fair.....	Fair.
Mecklenburg loam, undulating phase.....	Fair.....	do.....	Good.
Montalto silt loam:			
Undulating moderately shallow phase.....	do.....	do.....	Fair.
Rolling moderately shallow phase.....	do.....	do.....	Do.
Seneca loam.....	Good.....	Good.....	Excellent.
Tatum silt loam, undulating phase.....	Fair.....	do.....	Good.
Tusquitee loam, rolling phase.....	Poor to good.....	Fair.....	Fair.
Wadesboro silt loam, undulating phase.....	Fair.....	Good.....	Good.

## SOILS POOR TO FAIR FOR CROPS AND POOR TO GOOD FOR PASTURE

Albemarle loam:			
Undulating phase.....	Fair to poor.....	Very good.....	Poor.
Rolling phase.....	Poor.....	Fair.....	Do.
Belvoir loam:			
Undulating phase.....	do.....	Poor.....	Good.
Level phase.....	Very poor.....	do.....	Do.
Braddock stony loam, rolling phase.....	Fair to poor.....	do.....	Poor.
Brandywine loam, rolling phase.....	Fair.....	Fair.....	Do.
Brandywine gritty loam, rolling phase.....	Fair to poor.....	do.....	Do.
Brandywine silt loam, rolling phase.....	Fair.....	do.....	Do.
Calverton silt loam, undulating phase.....	Fair to poor.....	Poor.....	Good.
Catlett silt loam, eroded undulating phase.....	Poor.....	Fair.....	Fair.

Catoctin silt loam, rolling phase	Fair to poor	Poor	Poor.
Croton silt loam	Poor	do	Very good.
Culpeper fine sandy loam, rolling phase	Fair to poor	Fair	Fair.
Elioak silt loam, rolling phase	do	do	Do.
Eubanks loam, eroded rolling phase	Fair	Poor	Poor.
Fauquier silty clay loam, eroded rolling phase	do	do	Do.
Goldvein gritty silt loam:			
Undulating phase	Fair to poor	Good	Fair.
Rolling phase	do	Fair	Poor.
Hazel silt loam, rolling phase	do	do	Do.
Hiwassee loam, eroded rolling light-colored variant	Fair	Poor	Do.
Iredell silt loam, undulating phase	Poor	Very poor	Fair.
Kelly silt loam, level and undulating phases	do	do	Do.
Lignum silt loam, undulating phase	do	Poor	Good.
Lloyd clay loam, eroded rolling phase	Fair	do	Poor.
Louisburg sandy loam, rolling phase	Poor	Fair	Do.
Manor silt loam, rolling phase	Fair to poor	do	Do.
Masada loam, undulating phase	Fair	do	Good.
Mecklenburg loam, rolling phase	do	do	Poor.
Myersville-Orange silt loams:			
Rolling phases	Poor	Poor	Fair.
Undulating phases	do	do	Do.
Nason silt loam:			
Undulating phase	Fair to poor	Good	Good.
Rolling phase	Fair to very poor	Fair	Poor.
Penn loam, undulating phase	Fair	Good	Good.
Penn silt loam:			
Undulating phase	Fair to poor	do	Do.
Rolling phase	Poor	Poor	Poor.
Tatum silt loam, rolling phase	Fair to poor	Fair	Do.
Thurmont stony loam, undulating phase	do	Very poor	Good.
Wadesboro fine sandy loam, rolling phase	Fair	Fair	Poor.
Wadesboro silt loam, rolling phase	Fair to poor	do	Do.
Zion silt loam, undulating phase	do	Poor	Good.

TABLE 20.—The soils of Fauquier County, Virginia, grouped according to suitability for use and evaluations of their productivity, workability, and conservability—Continued

SOILS POOR FOR CROPS AND FAIR TO EXCELLENT FOR PASTURE

Soil	Productivity	Workability	Conservability
Chester-Brandywine loams, hilly phases.....	Fair to poor.....	Poor.....	Poor.
Chewacla silt loam.....	Good.....	Fair.....	Very good.
Culpeper clay loam, eroded rolling phase.....	Fair to poor.....	Poor.....	Poor.
Elioak silt loam, eroded rolling phase.....	Poor.....	do.....	Do.
Eubanks silt loam, eroded hilly phase.....	Fair to poor.....	Very poor.....	Very poor.
Fauquier silt loam, hilly phase.....	do.....	do.....	Do.
Fauquier silty clay loam, eroded hilly phase.....	Poor.....	do.....	Do.
Rohrersville silt loam.....	Fair to very poor.....	Poor.....	Good.
Rowland silt loam.....	Fair to good.....	Fair.....	Very good.

SOILS VERY POOR TO POOR FOR CROPS AND POOR TO FAIR FOR PASTURE

Bowmansville silt loam.....	Very poor.....	Very poor.....	Good.
Braddock very stony loam, rolling phase.....	Fair to poor.....	do.....	Fair.
Brandywine loam:			
Hilly phase.....	do.....	Poor.....	Poor.
Steep phase.....	Very poor.....	Very poor.....	Very poor.
Brandywine loam-Eubanks silt loam, hilly phases.....	Fair to poor.....	Poor.....	Poor.
Brandywine silt loam, hilly phase.....	do.....	do.....	Do.
Catoctin silt loam, hilly phase.....	Poor.....	do.....	Do.
Clifton stony silt loam, rolling phase.....	do.....	Very poor.....	Fair.
Elioak silt loam, eroded hilly phase.....	Very poor.....	do.....	Very poor.
Eubanks stony silt loam, rolling phase.....	Fair to poor.....	do.....	Fair.
Hazel silt loam, hilly and steep phases.....	Poor.....	Poor to very poor.....	Poor to very poor.
Iredell silt loam, eroded undulating phase.....	Very poor.....	Very poor.....	Poor.
Montalto silty clay loam, eroded rolling moderately shallow phase.....	Poor.....	do.....	Do.
Montalto stony silt loam, rolling moderately shallow phase.....	do.....	do.....	Fair.
Penn loam, eroded rolling phase.....	do.....	do.....	Very poor.

Stony rolling and hilly land:			
Acidic rock.....	Very poor.....	Very poor.....	Poor to fair.
Basic rock.....	do.....	do.....	Do.
Tatum silty clay loam, eroded rolling phase.....	Poor.....	Poor.....	Poor.
Watt silt loam, hilly phase.....	do.....	do.....	Very poor.
Wehadkee silt loam.....	Very poor.....	Very poor.....	Good.
Worsham silt loam.....	do.....	do.....	Do.

## SOILS VERY POOR FOR CROPS AND VERY POOR TO POOR FOR PASTURE

Brandywine gritty loam, hilly phase.....	Poor.....	Very poor.....	Very poor.
Catoctin silt loam, eroded steep phase.....	Very poor.....	do.....	Do.
Elbert silt loam, concretionary phase.....	do.....	do.....	Good.
Iredell silt loam, level phase.....	do.....	do.....	Do.
Louisburg sandy loam, hilly and steep phases.....	do.....	do.....	Poor.
Manor silt loam, eroded hilly phase.....	do.....	do.....	Very poor.
Mixed alluvial land.....	Poor to very poor.....	Poor.....	Fair.
Penn silt loam, eroded rolling phase.....	Poor.....	Very poor.....	Very poor.
Stony steep land:			
Acidic rock.....	Very poor.....	do.....	Do.
Basic rock.....	do.....	do.....	Do.

## SOILS VERY POOR FOR CROPS OR PASTURE AND BEST SUITED TO FOREST

Elbert silt loam.....	Very poor.....	Very poor.....	Good.
Iredell stony silt loam, undulating phase.....	do.....	do.....	Do.
Made land.....	( <sup>1</sup> ).....	( <sup>1</sup> ).....	( <sup>1</sup> ).
Manteo shaly silt loam, hilly and steep phases.....	Very poor.....	Very poor.....	Very poor.
Penn shaly silt loam, eroded hilly phase.....	do.....	do.....	Do.
Rough gullied land.....	do.....	do.....	Do.
Stony colluvium.....	do.....	do.....	Good.
Stony (very stony) steep land:			
Acidic rock.....	do.....	do.....	Poor.
Basic rock.....	do.....	do.....	Do.

<sup>1</sup> Not used for agriculture or forestry, so ratings were not assigned.

of any soil. The grouping indicated in table 20 is an estimate of the result of the combined effects of varying degrees of productivity, workability, and conservability on the suitability of the soil for the present agriculture.

The relative suitability of a soil for agriculture has been evaluated on the basis of the experiences and recommendations of farmers, soil survey workers, experiment station personnel, and others who work with the soil. A farmer knows that some soils on his farm are more desirable for certain uses than for others. By comparisons of such evaluations within and among farms, the soils may be ranked in the order of their suitability for different uses under the present agriculture. Where information based on experience is lacking, the soil may be ranked by comparisons with other soils of similar characteristics for which information is available.

Proper use of soils is a basic problem in the agriculture of the county. Although other factors are important, the physical character of a soil largely determines its use capabilities. Past use of the soil in this county was determined to a considerable extent by its physical character. For example, most of the soils that have been used for the cultivated crops are suitable for such use. Similarly, most of the soils that are not suited to crops have been used either for pasture or for timber. Nevertheless, improper soil use has been rather common. The attempt to cultivate the hilly and steep phases of Hazel silt loam, locally called slate land, in the central part of the county is an example. In the natural wooded state, these phases accumulated enough humus for favorable tilth and productivity, and the so-called virgin fertility tempted pioneer farmers to clear and cultivate a large part of them. However, they are shallow over bedrock, occupy rough terrain, and are very susceptible to erosion. Erosion became very active on these phases under cultivation, the virgin fertility was quickly depleted, and productivity deteriorated rapidly. Much of these hilly and steep phases is now either idle or in pastures of poor quality. This is a striking example of decreasing the value and productiveness of good forest or pasture land within a few years through improper use for cultivated crops.

Not all of the soils now producing crops in the county are naturally adapted to the purpose from the point of view of permanent land use. On the other hand, some of the soils now used as pasture, and even some in forest, are adapted to cultivated crops.

#### **SOILS GOOD TO EXCELLENT FOR CROPS AND GOOD TO EXCELLENT FOR PASTURE**

These soils differ in many characteristics, such as depth, character of parent material, color, texture, and degree of profile development. They are relatively similar, however, in productivity, workability, and conservability and are therefore similar in general suitability for agricultural use. They have comparatively high productivity, favorable working qualities, and relatively simple problems of conservation under the common system of farming. All are well suited to most of the crops of the county under the prevailing systems of management.

Compared with the other soils of the county, the soils of this group all are fairly well supplied with plant nutrients, but even the most fertile is responsive to needed amendments when used for some crops.

They contain more lime (available calcium) than most of the other soils. They are well supplied with organic matter. Their physical properties favor movement of air and moisture, and roots freely penetrate all parts of the subsoil.

All the soils are adequately drained for the production of the common crops, but none of them is excessively drained. In addition, they retain moisture well and thereby tend to insure an even and adequate supply for plant growth. On the whole, crops on these soils are less susceptible to injury from wet or dry conditions than those on the other soils of the county. Good tilth is easily maintained, and the range of moisture conditions for tillage is comparatively wide.

None of these soils have any prominent adverse condition. They are free or almost free from stones, their relief is favorable to soil conservation and tillage operations, and none is severely eroded or highly susceptible to erosion. The lay of the land is largely level to undulating.

The soils of this group occupy about 5.8 percent of the county.

#### **SOILS FAIR TO GOOD FOR CROPS AND FAIR TO VERY GOOD FOR PASTURE**

These soils are inferior to those of the preceding group in one or more of the following qualities: productivity, workability, and conservability. None, however, is so seriously deficient in any desirable characteristics as to be poorly suited physically to most of the important crops in the locality under the prevailing systems of management. In general, they are at least moderately productive of most of the crops commonly grown.

These soils differ from one another in a number of physical properties. Their physical properties, however, are moderately favorable for tillage, maintenance of good tilth, and movement and retention of moisture. The Seneca soil is, however, somewhat adversely affected by slow internal drainage in wet seasons. None of these soils occupies strong relief, is extremely stony or gravelly, or is greatly injured by erosion. These soils have moderately favorable workability and can be conserved by good management practices.

The soils of this group cover about 13.9 percent of the total area of the county.

#### **SOILS POOR TO FAIR FOR CROPS AND POOR TO GOOD FOR PASTURE**

These soils have characteristics that are sufficiently adverse to limit their physical suitability for the production of the common tilled crops under prevailing farming practices. None, however, has characteristics so limiting as to make it definitely unsuited physically to tilled crops. Their range in productivity, workability, and conservability is extremely wide, but all the soils are fairly low in their suitability for crops that require tillage. Under the present agriculture they are moderate to low in productivity of the common crops.

In this group, one or more of the following undesirable soil features are rather prominent: (1) Poverty of plant nutrients, (2) poverty of organic matter, (3) undesirable texture, structure, or consistence, (4) strong slope, (5) stoniness, (6) eroded condition, (7) susceptibility to erosion, (8) shallowness of soil over bedrock, and (9) unfavorable moisture conditions from various degrees of droughtiness to inadequate natural drainage. These detrimental features limit the use capabilities and complicate management requirements of these soils.

The soils of this group cover about 37.3 percent of the total land area of the county.

**SOILS POOR FOR CROPS AND FAIR TO EXCELLENT FOR PASTURE**

Because the soils of this group are difficult to work and conserve, subject to frequent stream flooding, droughty, or imperfectly drained, cultivation is generally not feasible. Each soil, however, is sufficiently fertile and has sufficiently good moisture relations when adequately drained to maintain a good cover of pasture plants. The Chewacla, Rowland, and Rohrsersville soils have an excess of moisture in wet seasons.

In general, the soils of this group are physically best suited to permanent pasture under prevailing farm practices. They are generally used for pasture, in areas where enough fair to good cropland is available. A considerable acreage, however, is currently used for crops, especially on farms where areas of soils better suited to cultivated crops are too small to meet the needs of the farm unit.

This group comprises about 10.5 percent of the total land area of the county.

**SOILS VERY POOR TO POOR FOR CROPS AND POOR TO FAIR FOR PASTURE**

The soils of this group are so difficult to conserve or work or so unproductive that cultivation is not feasible under the present agriculture. Low productivity of crops may be due to one or to various combinations of the following undesirable characteristics: (1) Shallowness to bedrock, (2) steep slope, (3) stoniness, (4) droughtiness, (5) slow internal drainage, (6) low content of plant nutrients, (7) adverse tilth, (8) poor accessibility to farm machinery, or (9) high susceptibility to excessive runoff and erosion. However, each soil has enough desirable characteristics to make it fair to poor for pasture. Although these soils are better suited physically to pasture than to crops, existing conditions may require the use of some areas for crops despite their poor suitability.

This group comprises about 13.8 percent of the county.

**SOILS VERY POOR FOR CROPS AND VERY POOR TO POOR FOR PASTURE**

Of the soils of the county considered adapted to permanent pasture, those of this group are the least suitable. Their undesirable features may include: (1) Excessive stoniness, (2) severe erosion, (3) high susceptibility to erosion and excessive runoff, (4) shallowness to bedrock, (5) low inherent fertility, (6) unfavorable soil consistence, (7) inadequate internal drainage, (8) steep slope, or (9) droughtiness. Tillage with ordinary farm implements is difficult. When used for pasture, some of the eroded steeper soils of this group require careful management for their conservation. Many of these soils are severely eroded, some are quite stony, and the Iredell and Elbert soils have excess moisture in wet periods of the year.

This group comprises about 7.3 percent of the county.

**SOILS VERY POOR FOR CROPS OR PASTURE AND BEST SUITED TO FOREST**

These soils are very poorly suited to agriculture. Each soil of this group is so difficult to work, so difficult to conserve, so low in productivity, or has such a combination of these unfavorable properties

that it generally is not feasible to apply the intensity of management necessary for cultivated crops or pasture. Each is characterized by one or more of the following undesirable features: (1) Steep relief, (2) high stone content, (3) poor tilth, (4) very low content of plant nutrients, (5) excessive runoff, (6) severe erosion and susceptibility to further erosion, (7) shallowness to bedrock, (8) unfavorable subsoil consistence and permeability, (9) unfavorable soil reaction, (10) restricted internal drainage, or (11) very poor water-supplying capacity.

These soils are apparently best suited to forest under present conditions, even though they are probably less productive of forests than soils of any of the preceding groups. They differ from one another, however, in many of the above-mentioned characteristics, and it is reasonable to assume that the kind and quality of the forest they support would differ. Existing conditions of the locality or of the farm unit may require the use of some of the soils of this group for pasture or for crops, despite their poor suitability.

This group comprises about 11.4 percent of the county.

#### SOIL ASSOCIATIONS <sup>17</sup>

Soils occur in characteristic positions in the landscape, as has been brought out in the descriptions of the various soil units. They also occur in rather characteristic geographic association. The Fauquier soils, for example, not only occur largely on rolling uplands underlain by greenstone but also are generally associated with the Catoctin soils. Likewise, the Congaree soils occur on the stream bottoms and are generally associated with the Chewacla and Wehadkee soils.

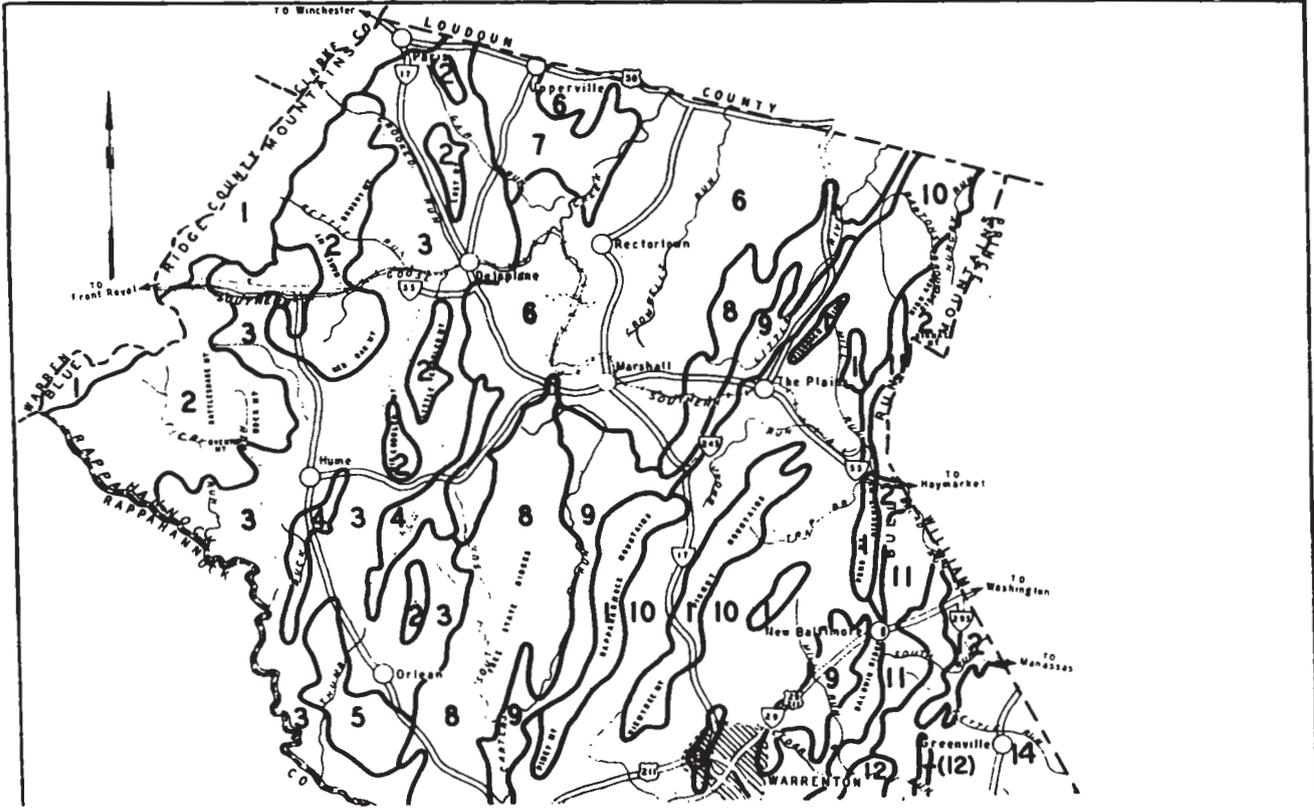
The soils of Fauquier County have been grouped in 16 soil associations, each of which has fairly definite geographic boundaries, and a generalized map (fig. 3) showing the areas dominated by each group of such associated soils has been made. This map was prepared from the detailed soil map.

A soil association may consist of only a few or of many soils. These soils may be similar, but for the most part they differ widely in physical characteristics. In each soil association, however, there is a certain uniformity of soil pattern. It is important also to bring out that, although soils may be closely associated, they are not therefore similar in their suitability for agricultural use.

For the most part, the soils within an association are derived from similar parent material. For example, the Fauquier-Catoctin soil association is underlain by greenstone, and the Chester-Brandywine soil association by granite. Each of the soils within these associations has a characteristic relief, and the relative proportions of soils in the association vary largely in accordance with variations in relief.

From the foregoing it is apparent that, in order to use the soil survey to best advantage in general land planning and related uses, it is not only important to know the physical characteristics, distribution, and extent of the separate soils, together with their suitability for various uses and their management requirements, but also to know their association with each other. Knowledge of soil asso-

<sup>17</sup> A soil association may be defined either as a group of soils occurring together in a characteristic pattern or as a landscape definable as to the kind, proportion, and distribution of its component soils.



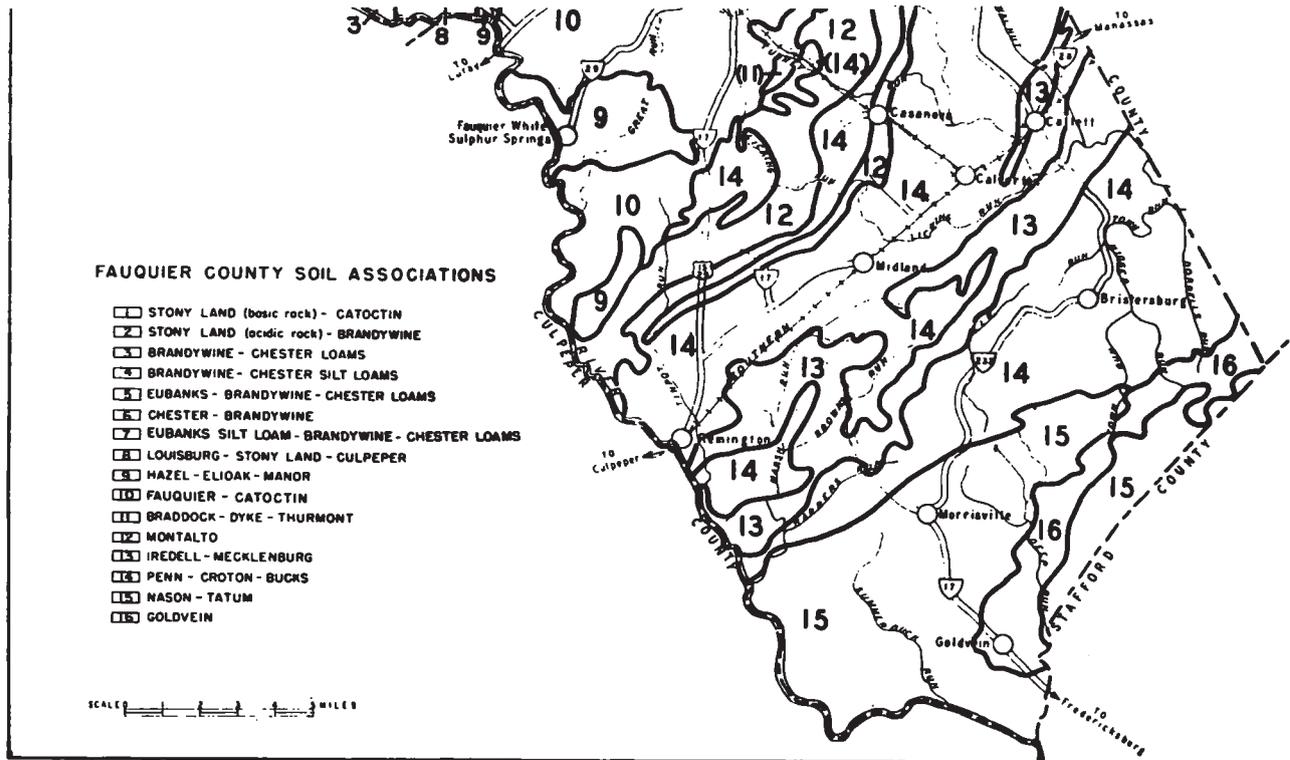


FIGURE 3.—Soil associations of Fauquier County, Virginia.

ciations is also useful in learning and understanding their distribution, interpreting and predicting their relationship to agriculture, and aiding in identifying the separate soils of the area.

A brief discussion of each soil association follows. More detailed information about the component soils can be obtained from the discussion of the soils in the section, The Soils of Fauquier County.

(1) STONY LAND (BASIC ROCK)-CATOCTIN SOIL ASSOCIATION

The Stony land (basic rock)-Catoctin is chiefly a stony steep soil association occurring in the Blue Ridge, Rappahannock, and Pignut Mountains, and other mountains or hills underlain by greenstone. It consists mainly of rolling to steep stony and very stony land types from basic rock, with smaller proportions of Catoctin soils. There is also a small acreage of Clifton soil on the Blue Ridge Mountain crest; a small proportion of Dyke soil in the gaps and hollows of the Blue Ridge; and local small areas of Fauquier soils, Mixed alluvial land, and Stony colluvium. The area occupied by this soil association is characterized by hilly to very steep stony mountain slopes and narrow, winding, stony mountain crests.

Except for small clearings on the Clifton, Dyke, or Catoctin soils or the less stony land types, the soil association is largely in forest. The cleared areas are used chiefly for pasture or orchards. Forest is the best use for the more stony and steep land types.

This association covers about 5.6 percent of the county.

(2) STONY LAND (ACIDIC ROCK)-BRANDYWINE SOIL ASSOCIATION

The stony land (acidic rock)-Brandywine is a moderately large rough mountainous soil association consisting chiefly of hilly to steep stony and very stony land types from acidic rock and smaller acreages of the Brandywine soils. It occurs in the Blue Ridge and associated foothills, where it is underlain by granite and in the Bull Run Mountains, where it is underlain by arkosic quartzite. There is a very small acreage of Tusquitee soils and Stony colluvium on colluvial areas in the Blue Ridge and foothills and a small acreage of Braddock and Thurmont soils on colluvial areas in the Bull Run Mountains. Most of this soil association is in hardwood forest, although considerable areas of Brandywine soils and the less stony land types in the Blue Ridge foothills are in permanent pasture or orchards. The steeper and more stony areas are best suited to forest.

This association covers about 7.7 percent of the total area of the county.

(3) BRANDYWINE-CHESTER LOAMS SOIL ASSOCIATION

The Brandywine-Chester loams soil association is mainly on hilly relief in the northwestern part of the county and contains soils and land types underlain by granite. It consists chiefly of shallow excessively drained Brandywine loam soils with smaller acreages of deeper well-drained Chester loam soils. There are also minor acreages of Eubanks and Belvoir soils, stony land types from acidic rock, and colluvial and alluvial soils.

The soils of the association are relatively fertile. Two-thirds or more of their acreage is cleared of hardwood forest. The Brandywine loam soils, although shallow and locally stony, produce good pasture

and are used largely for this purpose. The Chester loam soils are comparatively stone free and deeper to bedrock, and a great part of their acreage is used for crops. A moderately prosperous agriculture prevails, and management is at a fairly high level. Beef cattle production is the chief type of farming.

Farmers in this area have the problem of trying to use the soils according to their capabilities and still supply their needs for cultivated crops. The average farm has a small acreage of crop-adapted soils. This acreage, however, is generally inadequate to meet the farmer's needs for feed crops, and he is forced to use other less well adapted soils for crops.

The association occupies about 11.0 percent of the county.

#### (4) BRANDYWINE-CHESTER SILT LOAMS SOIL ASSOCIATION

The Brandywine-Chester silt loams soil association is underlain by dikes of greenstone schist that intrude into granite. The relief is prevailingly rolling to hilly, but many undulating slopes are included. Brandywine silt loam soils, which occupy about one-half of the area, are on most of the rolling to hilly areas; Chester silt loam soils are chiefly on the undulating and gently rolling areas. The association also includes scattered areas of Starr soils and some soils of the bottom lands.

Practically all this association is used for crops and pasture, but principally for crops. The soils are fertile, well used and managed, and productive. Beef cattle production predominates among the various types of farming.

This soil association occupies only 0.9 percent of the county.

#### (5) EUBANKS-BRANDYWINE-CHESTER LOAMS SOIL ASSOCIATION

The Eubanks-Brandywine-Chester loams is a small soil association. It includes soils underlain by granite in the southern part of the granite belt. Although the component soils are the same as those of Brandywine-Chester soil association, the relative proportions of the soils are widely different. Eubanks soils predominate, and the Brandywine and Chester soils, though important, are less extensive. Scattered areas of Belvoir soils and soils of the alluvial and recent colluvial lands occur throughout the association.

More than 80 percent of this association is cleared. The shallow Brandywine soils are used largely for permanent pasture, and the deeper well-drained Eubanks and Chester soils are used chiefly for cultivated crops. The soils of this association are relatively fertile and are productive if adequately managed. General and livestock farming are most common in this area.

This association comprises about 0.8 percent of the total area of the county.

#### (6) CHESTER-BRANDYWINE SOIL ASSOCIATION

The Chester-Brandywine is one of the more extensive soil associations and predominates in the northern part of the county. The component soils are underlain chiefly by granitic rocks. The well-drained moderately deep Chester soils occupy about 40 percent of the area, and the shallow excessively drained Brandywine soils about 35 percent. Scattered areas of Belvoir, Eubanks, and recent colluvial and first bottom soils comprise most of the remaining area.

In comparison to the Brandywine-Chester loams soil association, this association has considerably milder relief, predominantly rolling slopes, and a greater proportion in deeper soils.

Probably more than 85 percent of the area of this soil association is cleared and used for crops or pasture. The agriculture is probably the most prosperous in the county. The farms are large, and the buildings are well constructed and well maintained. Most of the estates of wealthy people are in this area. A considerable part of the association is used for crops, and management is at a high level. Although agriculture is somewhat diversified, beef cattle production predominates. As a group, the soils are productive under good management and are well suited to the agriculture of the area.

This soil association includes about 9.7 percent of the county.

**(7) EUBANKS SILT LOAM-BRANDYWINE-CHESTER LOAMS SOIL ASSOCIATION**

The Eubanks silt loam-Brandywine-Chester loam soil association occurs in the northern part of the county near Upperville and has predominantly rolling relief. Drainage is well established. The well-drained Eubanks soils that have developed over dikes of massive diabase or greenstone predominate, although important areas of Brandywine and Chester soils underlain by granite are scattered throughout the soil association. There are also minor acreages of Belvoir soils, recent colluvial and bottom soils, and stony land types.

Nearly all the areas are cleared and in agricultural use. The agriculture is diversified, but it is based largely on livestock. All the soils are relatively fertile, and the Eubanks and Chester soils are deep and well suited to the production of crops. Generally the soils receive good management and are productive of crops or pasture.

This soil association occupies about 1.6 percent of the county.

**(8) LOUISBURG-STONY LAND-CULPEPER SOIL ASSOCIATION**

The Louisburg-Stony land-Culpeper soil association includes soils and land types underlain by arkosic quartzite. The main area is in the "Free State" region; another area occurs north of The Plains. In the "Free State," the relief is mainly rough and hilly, and here the shallow Louisburg soils and stony land types from acidic rock predominate (pl. 15, B). Smaller acreages of Culpeper, Albemarle, Seneca, and bottom land soils also occur.

The area north of The Plains has somewhat milder relief and contains less of the stony land types and a greater proportion of the moderately deep well-drained Culpeper soils.

Most of this soil association, especially those areas occupied by the stony land types and Louisburg soils, is in hardwood forest. These mapping units are shallow and otherwise poorly suited to cultivated crops. When cleared, they are used largely for pasture. The deeper Culpeper and Albemarle soils are better suited to crop production and are largely cleared and in cultivation. Farming in the "Free State" is of a subsistence type, but it is of a higher level in the area north of The Plains. On many farms, especially those in the "Free State," there is a scarcity of soils suited to cultivated crops; and many farmers, in order to supply their needs for cropland, have had to cultivate less well adapted soils.

As a group, the soils are extremely acid and low in fertility. They are responsive to management, however, especially liming and fertilization, and their productivity can be increased where proper management is feasible.

This soil association occupies about 5.6 percent of the county.

(9) HAZEL-ELIOAK-MANOR SOIL ASSOCIATION

The Hazel-Elioak-Manor soil association occurs in six widely separated bodies in the northeastern and central parts of the county. It contains those soils underlain by mica schist and gneiss. The shallow excessively drained Hazel soils occupy about 45 percent of the soil associations; the deep well-drained Elioak soils about 40 percent; and the moderately deep somewhat excessively drained Manor soils about 10 percent. The rest of the association consists chiefly of small areas of recent colluvial and alluvial soils. The relief is dominantly rolling, but there are some undulating areas on the wider divides and hilly areas along the drains and streams.

About 75 to 80 percent of the land is cleared of its original hardwood forest. The shallow Hazel soils are largely used for pasture, and the Elioak and Manor soils for crops. The soils are moderately low in fertility and strongly acid in reaction and require good management for continued high production of crops or pasture. The agriculture is highly diversified, but general farming and livestock production predominate.

This association comprises about 5.5 percent of the total area of the county.

(10) FAUQUIER-CATOCTIN SOIL ASSOCIATION

The Fauquier-Catoctin soil association includes soils underlain by greenstone in the central greenstone belt. The surface is dominantly rolling, but some areas have hilly relief. Drainage is good to excessive, except in low-lying places along drains and streams. The moderately deep to deep Fauquier soils occupy about 45 percent of the association, and the shallow Catoctin soils about 40 percent. Scattered areas of Myersville-Orange soils, stony land types, and recent colluvial and bottom land soils comprise most of the remaining area.

More than 85 percent of the area is cleared and used for crop or pasture. This soil association comprises one of the more productive sections of the county. The component soils are relatively fertile. The shallow and locally stony Catoctin soils produce good pastures and are used largely for this purpose. The deeper Fauquier soils are used chiefly for cultivated crops and are well adapted to this use if properly managed. Largely because of inadequate management, a considerable part of the Fauquier soils has been severely eroded. Both livestock and general farming are common to this soil association.

This association occupies about 13.9 percent of the county.

(11) BRADDOCK-DYKE-THURMONT SOIL ASSOCIATION

The Braddock-Dyke-Thurmont soil association consists chiefly of soils developed from old colluvial materials washed and rolled from slopes of the Bull Run Mountains. The materials underlying the Braddock and Thurmont soils are of quartzite origin, whereas those underlying the Dyke soils are largely of greenstone. The association also includes small areas of Hazel soils, stony land types, and recent

colluvial and alluvial soils. The Braddock soils predominate, and the Thurmont soils are the least extensive. The relief is undulating to rolling, and drainage is good.

Most of this soil association is cleared, and although a considerable part is idle, most of it is used for crops or pasture. The relatively stone-free fertile Dyke soil is well suited to crops; but the Braddock and Thurmont soils are stony, poor in fertility, and less well adapted to crops. Some areas are too stony to permit tillage, but practically all are well suited to pasture. General and subsistence farming are the chief types of agriculture. The farms are small, management is generally inadequate, and many areas are poorly accessible.

This association covers about 0.8 percent of the total area of the county.

#### (12) MONTALTO SOIL ASSOCIATION

In the Montalto soil association the moderately shallow phase of Montalto soils greatly predominate, although there are smaller areas of Zion, Iredell, Elbert, and recent colluvial and alluvial soils. The association has predominantly undulating relief and is underlain by fine-grained Triassic diabase.

Most of the area is cleared and used for crops or pasture. The well-drained Montalto soils are relatively fertile but are moderately shallow to bedrock. They are largely suited to crops and are productive if adequately supplied with moisture and properly managed. The agriculture is diversified, but it centers on livestock.

This association occupies about 3.8 percent of the county.

#### (13) IREDELL-MECKLENBURG SOIL ASSOCIATION

The Iredell-Mecklenburg soil association consists of soils underlain by coarse-grained Triassic diabase. It is mainly on nearly level to undulating relief and consists chiefly of deep imperfectly drained Iredell soils associated with smaller acreages of Mecklenburg soils. There are also minor areas of Zion, Elbert, Davidson, and first bottom soils.

Most of the soil association, especially areas occupied by the Iredell and Elbert soils, is in forest. The Davidson, Mecklenburg, and Zion soils are largely cleared and used for crops or pasture. The extensive Iredell soils, locally called blackjack land, have plastic and sticky dense subsoils and are poorly suited to crops. Consequently the proportion of soils suited to crops is small. Farming is generally of a subsistence type.

This soil association comprises about 4.4 percent of the county.

#### (14) PENN-CROTON-BUCKS SOIL ASSOCIATION

The Penn-Croton-Bucks soil association is the most extensive in the county and contains the greatest number of soils. It occurs in the parts of the Triassic plain underlain by Triassic shale and sandstone. The shallow Penn soils greatly predominate; the Croton, Kelly, Wadesboro, Calverton, and Bucks soils, listed in the order of their dominance, are less extensive but are important members of the association. There are also minor areas of Catlett soils in the uplands, and terrace and first bottom soils along the streams. Except for the Wadesboro, which are most concentrated near Greenville, the soils are rather evenly distributed.

The slopes range from nearly level to hilly, but the prevailing relief is undulating. All the soils are low in fertility and lime content, and they vary considerably in physical characteristics. They range from shallow to deep and from somewhat excessively to poorly drained. Consequently, they also vary considerably in their suitability to agricultural use.

About 75 percent of the land is cleared and used for crops or pasture. There is a wide range in type of agriculture and soil management. Although some areas are farmed by subsistence methods, the greater part of the association is in well-managed dairy farms. Dairying is most concentrated in this part of the county. As a group the soils are only moderately productive, but they are responsive to good management, especially fertilization and liming.

This soil association includes about 18.9 percent of the county.

#### (15) NASON-TATUM SOIL ASSOCIATION

The Nason-Tatum soil association contains upland soils underlain by sericite schist and gneiss. It consists chiefly of Nason soils, although the Tatum soils are rather extensive. There are minor areas of Manteo and Lignum soils in the uplands; and terrace and alluvial soils along the streams, principally the Rappahannock River. The area is rather highly dissected by numerous streams. The interstream divides are predominantly undulating, and the rolling and hilly slopes occur mainly along the sides of streams.

Very little of this soil association is cleared. The forests are principally mixed hardwood-pine or nearly pure stands of pine on once cleared areas. The upland soils of this association are very low in fertility and extremely acid in reaction. They are considered poor soils, have low yields, and are farmed largely under inadequate management. The association supports a relatively small farm population. Most of the farms are of a subsistence or part-time type, but there are a few small general or livestock farms.

This association includes about 8.3 percent of the county.

#### (16) GOLDVEIN SOIL ASSOCIATION

The Goldvein is a small soil association. It consists almost entirely of moderately well drained Goldvein soils underlain by high-quartz granite or quartz-monzonite. Small areas of Nason, Tatum, Lignum, Manteo, Worsham, and bottom land soils are included. Slopes range from undulating to rolling.

Most of this soil association is in hardwood-pine or pine forest; cleared areas are used mainly for crops. The soils are low in fertility and extremely acid in reaction. Management is generally inadequate, and productivity is low. Most of the farms are of a subsistence type. The soils are thought to be fairly well suited to crops if properly managed.

This soil association comprises about 1.5 percent of the area of the county.

### GENERAL INFORMATION ABOUT THE AGRICULTURE OF FAUQUIER COUNTY

Very little is known about the early agriculture of the county. The Indians who roamed this area were warlike hunters rather than peace-

ful farmers; although Lederer, the first white man to visit the area, reports that they raised some maize. The early pioneers who settled here were largely self-sustaining. The forest furnished wood for the necessary shelter and fuel, and the game and fish furnished some of the food. Game and fruits are reported to have been abundant.

Colonial agriculture consisted of the growing of subsistence crops, and of tobacco for export to England as a cash crop. In addition, returns from the sale of lumber and other forest products probably represented a good part of the farm income. Corn, oats, and wheat were grown for food and feed for animals. Vegetables were of secondary importance. Tobacco is mentioned in connection with the earliest white settlements and was largely used in place of money. Early agriculture had to be self-sustaining because of the long distances to markets and the poor transportation. However, in later years, the ownership of large numbers of slaves and the possession of large plantations made tobacco profitable, and large quantities were grown and exported to England.

The early agricultural practices were generally wasteful of soil resources. Little attention was given to crop rotations, growth of cover crops, or prevention of runoff and erosion. Erosion must have been severe, as remnants of old gullies may still be seen in some of the areas now in pine forest that were once used for cultivated crops. Land was cheap and plentiful, and cultivated fields, depleted of their fertility and eroded, were abandoned for newly cleared land.

After the Civil War, a transition in agricultural methods began. Slave labor was no longer available, and farmers had to work their own land or supervise hired help. Thus a more diversified system of agriculture began. Corn, wheat, and oats continued to be the principal subsistence crops, but livestock and poultry largely took the place of tobacco as sources of cash. Tobacco continued to decrease in production and is not grown commercially today. Beef cattle, hogs, and sheep were fattened on the land. An export type of beef cattle was raised for shipment to England. Livestock, especially beef and dairy cattle, has become increasingly important, mainly because of the better markets opened up by railroads and highways. In the last decade or two, the rapid growth of nearby cities, particularly Washington, D. C., brought a great demand for fluid milk.

A fairly consistent relationship exists between the general well-being of the people living on the land and the general suitability of the soils for the production of the common crops. In general the more progressive agricultural communities, as expressed by good farm buildings, good fences, ample and well-cared-for farm equipment, and favorable management, are in areas where the soils are dominantly well suited to the production of crops. Outstanding examples are areas in the Chester-Brandywine and the Fauquier-Catoctin soil associations. The predominating soils in these soil associations have a wide range of crop adaptation and prevailingly favorable characteristics; consequently, a diversified agriculture has become established. These soils produce most of the alfalfa and orchard-grass and a large part of the corn.

On the other hand, the more unpretentious farm buildings, poorer fences, smaller and more irregular fields, and lower level of management are generally in those areas that are more poorly suited to the

production of crops. The soils of the Nason-Tatum, Goldvein, and Louisburg-Stony land-Culpeper soil associations are largely very low in plant nutrients and lime. Most of these soils are farmed by subsistence methods, and productivity is low. The soils of the Blue Ridge, Bull Run, and other mountains and foothills are for the most part too stony, steep, or shallow for either crops or pasture. The Iredell and Elbert soils of the Iredell-Mecklenburg soil association area have heavy, plastic, and sticky subsoils and other unfavorable characteristics that make them poorly suited to the production of crops.

There are exceptions to these broad relationships between the soils and the well-being of the people. One exception is the estates owned by wealthy people. A great many of these consist of good agricultural land but some have soils poorly suited to agriculture. In general the estates have been made productive under a higher level of management than is economically feasible for most farmers. Another exception is the Penn-Croton-Bucks soil association. Most of the soils here are inherently not well suited to the production of crops. However, because of the excellent transportation afforded by the Southern Railway, this section early became part of the area that supplies milk to Washington, D. C. As a result, dairy farming made it feasible to build up the productivity of the soils to a high level. Although milk is not now transported by rail, the area remains a heavy producer of raw milk and the high productivity of the soils is maintained.

#### NUMBER, SIZE, AND TYPE OF FARMS AND LAND USE

According to the 1950 census, the number of farms in Fauquier County was 1,581. The area in farms was 315,600 acres, or 74.7 percent of the county. The population has increased from 21,071 in 1930 to 21,248 in 1950. During this period, the average size of farms increased from 143.9 to 199.6 acres, whereas the number of farms decreased from 2,640 to 1,581.

In the classification according to size, the 1950 census reported 7 farms less than 3 acres, 404 ranging from 3 to 29 acres, 250 from 30 to 69 acres, 132 from 70 to 99 acres, 354 from 100 to 219 acres, 282 from 220 to 499 acres, 108 from 500 to 999 acres, and 44 more than 1,000 acres. Most of the small farms of less than 50 acres are located near the towns and villages, whereas the larger farms of 500 acres or more are mainly in the northern part of the county where beef cattle production predominates.

The farms were classified by type of farm in 1950 as follows: Livestock 378, dairy 231, general farming 159, poultry 67, fruit and nut 6, field crop (cash-grain) 33, and miscellaneous and unclassified 707. Livestock farming, principally beef cattle but including racehorse and riding-horse production, is carried out largely in the northern part of the county where the Chester, Brandywine, Fauquier, and Catoctin soils predominate. The dairy industry is centered in the Penn-Croton-Bucks soil association. Commercial fruit growing is carried out almost exclusively in the Stony land (acidic rock)-Brandywine soil association, whereas most of the subsistence farms are in the Nason-Tatum, Goldvein, and Iredell-Mecklenburg soil associations. The other types of farms are scattered throughout the county and are not predominant on any particular soil, general area, or soil association.

Farmland, according to use in 1949, as reported by the 1950 census, was as follows: Cropland harvested, 80,615 acres; cropland used only for pasture, 90,933; and cropland not harvested and not pastured, 13,779. Woodland pastured covered an area of 12,954 acres, and woodland not pastured an area of 61,029. All other land pastured occupied a total of 45,602 acres and represents, generally, the area in permanent pasture. The remaining 10,688 acres probably consisted of individual holdings of forest land.

### CROPS

Hay, corn, and wheat are the principal crops grown in the county. Their relative importance, as judged by the acreage changes listed in table 21, has shifted. Since 1920, corn and wheat acreages have decreased, whereas the hay acreage has increased greatly and in 1945 was greater than that of any other crop grown during the history of the county.

The acreage of the principal crops in Fauquier County, Va., in stated years is given in table 21.

TABLE 21.—*Acreage of the principal crops and number of fruit trees of bearing age in Fauquier County, Va., in stated years*

Crop	1919	1929	1939	1949
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>
Corn, for grain.....	45,547	24,711	25,469	15,017
Wheat.....	34,910	18,335	13,588	10,124
Rye.....	3,137	2,487	4,182	816
Barley.....	14	172	2,373	3,340
Oats.....	1,712	823	626	1,833
Mixed grains threshed.....		18	107	292
Cowpeas for peas.....	22	<sup>1</sup> 1,028	15	( <sup>2</sup> )
Soybeans for beans.....	2	<sup>1</sup> 957	46	176
All hay.....	17,045	20,190	28,675	40,296
Timothy and clover, mixed or alone.....	13,219	13,762	12,172	15,286
Lespedeza.....		( <sup>2</sup> )	9,327	14,423
Alfalfa.....	429	298	569	2,245
Annual legumes cut for hay.....	1,926	1,843	874	282
Other cultivated grasses.....	1,352	4,046	4,486	7,745
Wild grasses cut on farms.....	20	118	1,008	( <sup>2</sup> )
Small grains cut for hay.....	99	123	239	315
Silage and forage crops.....	3,226	7,641	4,988	6,968
Irish potatoes.....	414	264	145	<sup>3</sup> 72
Sweetpotatoes and yams.....	46	16	12	<sup>3</sup> 6
All other vegetables for sale.....	34	40	8	10
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Apple trees.....	142,636	155,315	45,655	46,964
Peach trees.....	27,061	19,527	11,205	11,057

<sup>1</sup> Cowpeas and soybeans for all purposes.

<sup>2</sup> Not reported.

<sup>3</sup> Does not include acres for farms with less than 15 bushels harvested.

The most striking trend in agricultural practice brought out in table 21 is the consistent expansion in the acreages of hay and forage crops. The present importance of lespedeza has developed almost

entirely since 1934. According to the county agricultural agent, at the time of the survey<sup>18</sup> the local seed dealers did not stock any lespedeza seed prior to the spring of 1935, and it was necessary for the county agent's office to bring in seed in order to get small plantings started. Today lespedeza ranks second in acreage among the hay and forage crops.

The growing of hay is very important, especially in the livestock sections. The recent increased use of lime and phosphate has encouraged the growing of more leguminous hay crops, particularly alfalfa and red clover. Red clover is seldom grown alone but usually in mixtures with timothy, orchardgrass, and lespedeza. Lespedeza is also grown alone and in mixtures.

The alfalfa acreage is not large but appears to have been increasing steadily since 1910, when only 23 acres were reported. This crop is grown most extensively in sections where good physical conditions prevail and where a high productivity is maintained by good management practices. In contrast, lespedeza is grown on practically all of the well-drained soils, especially those in the southern part of the county. Although sweetclover is not grown on a large acreage, it appears to be increasing in favor, particularly as a green-manure crop.

Orchardgrass has become increasingly important as a hay crop. Fauquier County is one of the major orchardgrass seed-producing areas of the United States. Most of this crop is grown in the northern part of the county, where it is sown alone or in mixtures with red clover and other legumes. Annual legumes such as soybeans and cowpeas are not grown extensively for hay but are used to furnish emergency hay crops on some farms where the regular hay crop has been a failure. Very little Sudangrass is grown. Although part of the hay crop is sold on both local and outside markets, most of it is fed to cattle on the farm.

In addition to the hay grown for feed, some is grown for seed. Although no data are available, large acreages of lespedeza and orchardgrass and smaller acreages of red clover are cut for seed.

According to the census reports, corn led all other crops in acreage until 1939. The average yields have been about 35 bushels an acre. Corn is grown in all parts of the county on areas ranging from well-drained fertile first bottoms to impoverished stony hilly slopes. However, most of it is grown on the nearly level to gently rolling uplands in the beef-cattle and dairying sections, and a large part is cut for silage. In 1949, 5,221 acres of corn were grown for silage and produced 56,758 tons. All of the corn produced is normally used in the county. In years of low yields, some corn is imported, mainly in the form of feed concentrates. In 1944, it was estimated that at least 50 percent of the corn grown in the county was a hybrid variety.

Less wheat is grown today than 60 years ago. Since 1919, there has been a definite trend toward lower wheat acreages. This is probably partly due to the Federal wheat allotment program. Wheat is grown throughout the county, and the average yield is about 15 to 17 bushels an acre. Most of it is sold to local dealers and shipped out of the county, but in years of low corn yields some wheat may be used as feed for livestock. The few flour mills in the county process only a very small part of the wheat produced.

<sup>18</sup> Walter B. Nourse.

Rye was not an important crop until 1890. It is used mainly as a winter cover crop and furnishes early spring pasturage. An estimated 75 percent is pastured and harvested for grain, and the rest is pastured and not harvested. Yields average about 15 bushels an acre.

Practically no barley was grown before 1935, but this crop is becoming increasingly important for feed. It is being substituted for wheat in rotations consisting of corn, wheat, and hay, since it yields more than wheat, and, by weight, is equivalent to corn as a stock feed. Yields average 23 bushels an acre.

Winter varieties of oats are largely grown, mainly because of the labor and expense of seedbed preparation for spring oats. In addition, the soils of the Triassic plain, where oats are grown most extensively, are usually too wet to be prepared for spring-sown oats. The main drawback for winter oats is that they have to be planted before the time for corn harvesting. The yield of oats fluctuates greatly. Yields as high as 70 and low as 5 bushels an acre have been reported; the average yield over a long period is between 18 and 20 bushels.

Soybeans and cowpeas are rather significant crops at present, although ordinarily they are grown and cut for hay rather than harvested for beans or peas.

Irish potatoes occupy a small total acreage that has sporadically declined from the peak year of 1890. They are grown chiefly for home use and occupy a part of practically every farm garden. Most of the potatoes sold go to local markets.

Garden vegetables are produced chiefly for home use. Some, however, chiefly tomatoes, are sold to local markets or to a cannery at Marshall. Most farms have a small garden where lima, snap, string, or wax beans, sweet corn, peas, tomatoes, and onions are commonly grown.

There are several large commercial fruit orchards in the mountainous parts of the Blue Ridge and northern Piedmont Upland physiographic provinces. One of the largest apple orchards in the State is at Leed's Manor. These orchards produce both apples and peaches, but principally apples of the Delicious, Stayman Winesap, Winesap, York Imperial, and Grimes Golden varieties. Some apples and peaches are grown for home use on most farms. Commercial fruit growing has been important in the county only since about 1900. Practically all of the commercial fruit crop is shipped to markets outside of the county. Small quantities of pears, plums, cherries, and grapes are also grown, but none are produced commercially.

#### ROTATIONS, LIME, AND FERTILIZERS

Systematic rotations are widely used in most sections of the county. Corn, small grains, and hay are the principal crops grown. Rotations range from 3 to 7 years or more in length. The longer rotations last 5 to 7 years and are usually more common on the larger farms. For the most part, such farms are in the rolling areas in the northern part of the county where the production of beef cattle predominates. Here, large amounts of hay and large acreages of rotation pasture are needed yearly. The usual rotation is corn-wheat-meadow. The meadows are retained for 3 to 5 years before the rotation is renewed. The meadows are used largely for rotation pasture after any neces-

sary hay has been harvested. The shorter rotations (3 to 4 years) predominate in the general farming and dairying sections.

The land for corn is usually plowed in February or March, although some farmers start plowing as early as November if labor supply and weather conditions permit. The seedbed is prepared by disking, harrowing, and dragging, and then lime is spread. Many farmers, however, spread lime on meadowland to be plowed for corn or on cornland being prepared for small grain. Some time in May, corn is planted with a two-row corn planter. If the corn is fertilized, fertilizer is applied through attachments on the corn planter. In early fall when the corn is ripe, it is usually cut by hand and placed in shocks on the field. Corn for silage is cut several weeks earlier than corn for grain.

The seedbed for small grains is prepared by disking the corn stubble and rolling the land with a cultipacker. Wheat or other small grain is planted with a grain drill, and fertilizer is applied at the same time. Wheat is planted about the time of the first killing frost, barley about 2 weeks earlier, and winter oats about 4 weeks earlier. Small grains are usually harvested by binders in the latter part of June or early part of July. Oats are cut earliest, then barley, and then wheat. The grain is placed in shocks or large stacks until threshed. Some of the small grains are harvested by combines.

Hay usually follows a small grain in the rotation and consists mainly of grasses and legumes grown alone or in various mixtures. Alfalfa is generally grown alone. Timothy and orchardgrass are sown with the small grain in fall; whereas red clover, alfalfa, and lespedeza are sown in spring on the small grain. When hay is in full bloom, it is cut by a mowing machine, dried and collected, and placed in barns or stacked in the field. Fairly large quantities of orchardgrass and some lespedeza and red clover are threshed for seed.

In some parts of the county, many of the farmers do not follow a systematic rotation. The particular needs of the farmer or the general fertility level of the field determines the crop to be grown. Such practices are most widespread in the Nason-Tatum, Goldvein, Iredell-Mecklenburg, Louisburg-Stony land-Culpeper, Stony land (basic rock)-Catocin, and Stony land (acidic rock)-Brandywine soil associations.

Lime in the form of agricultural ground limestone has been made available to most farmers and its use encouraged through government subsidies. According to Agricultural Marketing Service figures, the amount of ground limestone increased from 10,898 tons in 1936 to over 22,000 in 1940. Much of the cropland and some of the permanent pasture land have been limed regularly. Liming every 3 or 4 years with 1 ton of ground limestone an acre or its equivalent is a common practice on well-managed farms. When alfalfa or sweet-clover is grown, lime is applied more heavily.

The use of fertilizer is also a common practice on the well-managed farms. The gradual loss of soil fertility through long use and inadequate management is probably the cause for increased use of commercial fertilizers. Practically all of the fertilizer used is factory-mixed and individually purchased, although some superphosphate is furnished through government subsidies. From 350 to 650 pounds

of complete fertilizer<sup>19</sup> an acre per rotation is commonly applied. Corn is usually fertilized with 100 to 300 pounds of complete fertilizer an acre, whereas small grain generally receives from 250 to 350 pounds. Cornland is sometimes sidedressed and wheat frequently topdressed with 100 to 150 pounds of nitrate of soda per acre or with applications of stable manure. Some superphosphate is applied to hay and pasture lands. The complete fertilizers most commonly used are of 3-12-6 and 4-12-4 analysis.

### PASTURES

The distribution of pastures in Fauquier County is related both to soils and to the type of farming. The bottom land soils throughout the county are commonly kept in pasture, especially the wetter and frequently flooded areas. In the northern part of the county where beef-cattle production predominates, many of the hilly and steep soils, especially the Catoctin and Brandywine and the stony land types, are in permanent bluegrass pastures. In the same section, rotation pastures are extensive on the less steep land suitable for cultivation; in the dairy section of the Triassic Plain they are also quite common. Rotation pastures consist of hay meadows that are grazed after the hay has been cut. Most of the soils of the dairy section are used for pasture at some time or another. A large number of the plowable pastures in Fauquier County are left in bluegrass sod for years and then plowed for corn.

There is a wide range in the composition and quality of pastures. Those that have been adequately limed and fertilized carry excellent stands of bluegrass and white clover. Some of the best pastures in the county are on Chester and Brandywine soils that have been well limed and fertilized. If pastures are treated, white clover commonly volunteers in the bluegrass sod.

The vegetation in permanent pastures that have received some lime and fertilizer have less bluegrass and white clover and higher proportions of undesirable grasses such as broomsedge, poverty oatgrass, crabgrass, and redtop. There are also various weeds such as wild carrots, yarrow, plantain, cinquefoil, sweet sorrell, goldenrod, mullein, thistle, and morning-glory. In the poorest pastures, the vegetation consists largely of dewberry, blackberry, smilax, scrub pine, broomsedge, and poverty oatgrass.

Rotation pastures commonly have sods of orchardgrass or timothy mixed with red clover or lespedeza. In the dairy region, lespedeza alone is popular for pasture.

With the exception of some pastures on bottom land soils, all the better ones in Fauquier County have been limed and fertilized. Many of them have also received applications of barnyard manure. The bottom land pastures commonly are more productive than upland pastures because of the higher moisture-supplying capacity of their soils.

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<sup>19</sup> A complete fertilizer is one that contains nitrogen, phosphoric acid, and potash. Its formula, such as 3-12-6, represents the percentages respectively of nitrogen (N), phosphoric acid ( $P_2O_5$ ), and potash ( $K_2O$ ).

**LIVESTOCK AND LIVESTOCK PRODUCTS**

Cattle are raised for both beef and dairy purposes. According to the census report, there were 45,992 cattle and calves on farms in 1950, the largest number on record. The dairy industry is centered in the Triassic Plain portion of the county in the vicinities of Catlett, Calverton, Midland, Bealeton, and Remington; whereas the beef cattle farms are largely in the northern part of the county. The pastures are most concentrated in these two sections.

The dairy cattle are chiefly grade Holstein-Friesian and Guernsey, although a few grade Jerseys are on some farms. Several farms have purebred dairy stock. The beef cattle are chiefly grade steers of Hereford and Aberdeen-Angus breeds, but some cow and calf herds and bulls are of purebred stock. Most of the beef cattle go to the Lancaster, Baltimore, and Jersey City markets as finished cattle. The feeder and stocker cattle to be fattened are mostly steers and come largely from the western ranges. About 12,000 head of beef cattle, mostly steers, are fattened, sold as finished cattle, and shipped out of the county yearly. Of this total, between 50 and 65 percent are fattened on grass and sold in the fall, and the rest are fattened in feed lots in winter with silage, concentrates, and some grain. The finished animals are sold from the latter part of December until May, the time of sale depending on when feeding started.

In 1949, a total of 37,586,753 pounds of whole milk and 291,503 pounds of butterfat were sold. The bulk of the fluid milk is shipped daily by truck to Washington, D. C. The small amount of milk needed by Warrenton and other towns is supplied by specialized nearby dairies. Most of the cream is sold to the creamery at Marshall or to agents of other creameries located outside of the county. Ordinarily each beef cattle or dairy farm produces all of the feed it needs for livestock, except feed concentrates. In some years, however, fairly large quantities of hay and grain have to be purchased.

The number of hogs decreased from 15,167 in 1945 to 14,258 in 1950. Although the general trend is toward decreased hog production, the yearly variations are largely due to the effects of the corn-hog price ratio, as corn is sold as grain when returns are greater than from marketing it indirectly through hogs. All breeds and cross-breeds of the lard type of hogs are raised. In 1945, about 45 percent of the hogs and pigs were slaughtered on the farm, and 55 percent were sold and shipped to Jersey City or Baltimore markets.

The 1950 census reported 8,605 sheep. The number of sheep has been steadily decreasing since 1910, when 18,573 sheep were reported. According to the county agent at the time of the survey, sheep raising dropped off sharply when the protective tariff was removed from wool immediately after the first World War. Wool prices declined to such an extent that most sheep raisers sold their flocks and allowed fences to deteriorate and disappear. Although sheep raising is now more profitable, the industry has not recovered or been renewed to any great degree. Grade Hampshires and Shropshires are the principal breeds. In 1949, a total of 103 farms reported 3,687 sheep and lambs sold. Spring lambs are marketed in Jersey City and Baltimore. The amount of wool shorn in 1949 was 25,590 pounds.

Nearly every farm has a flock of poultry. Poultry and poultry products are important sources of cash income. In addition to chickens, which represent over 95 percent of the poultry, some turkeys and a few ducks, geese, and guineas are kept. Poultry and poultry products are produced both as a specialty and in conjunction with other types of farming. The 1950 census reported 67 poultry farms in the county, but, in greater part, the poultry and poultry products are produced as a side line on general and other types of farms. In 1949, a total of 459,631 dozen eggs were reported sold. Chickens, 4 months or older, on hand were 85,357, and the number of turkeys raised was 8,333.

Most of the necessary feed for all livestock is grown on the farms where the livestock is raised. However, some feed is purchased in most years. It is usually purchased individually and includes principally mill feed but also some grain and hay.

#### FARM POWER AND MECHANICAL EQUIPMENT

Tractors have been gradually replacing work animals as a source of farm power. Their use is profitable on large farms having land that is productive, well managed, and not too hilly or broken. The 1950 census reports 1,056 tractors on 651 farms, 701 motor trucks on 517 farms, and 1,591 automobiles on 1,006 farms.

The work animals are chiefly horses; in the 1950 census, 4,106 horses and only 218 mules were listed. This total, however, includes many thoroughbred and saddle horses in addition to work animals. The work horses, most of which are of Percheron stock, are raised largely in the county. Several farms keep a yoke or two of oxen. Most of the feed for the work animals is grown on the farm.

Mechanical equipment such as threshing machines, combines, pickup balers, and cornpickers are generally used by several farmers within a community. Well-managed farms that are larger than average are equipped with modern implements and machinery such as: Tractors, tractor breaking plows, disk harrows, spike- or spring-tooth harrows, cultipackers, two-row corn planters with fertilizer attachment, riding or tractor cultivators, grain drills, grain binders, mowing machines, hayrakes, tedders, manure spreaders, lime spreaders, and wagons. In addition to these, many farms, especially those of the livestock type, have a hay loader, ensilage cutter, and silo filler. Most of the beef cattle farms and all of the dairy farms have silos as well as sheds and feeding barns.

#### FARM TENURE

According to the 1950 census, 1,284 of the 1,581 farms were operated by the owners, 146 by part owners, 39 by managers, and 112 by tenants. Of the 112 tenants, a total of 15 were cash tenants, 2 were share-cash, 32 were share tenants, 13 were croppers, and 50 were unspecified as to rental agreement.

The most common type of share tenancy is on a half-and-half basis. The tenant furnishes the equipment, horsepower, labor, and one-half of the seed and fertilizer and receives one-half of the total crop. When the tenant furnishes everything but the land, fences, and buildings, he receives two-thirds of the total crop. If he furnishes

only his labor, he receives one-third of the crop. Lime, if any is used, is usually supplied by the owner under all systems of tenancy.

#### FARM LABOR

The supply of farm labor, ordinarily sufficient before World War II, has become scarce. Most of the labor is hired on a monthly or yearly basis, but some, mainly transient, is hired by the day or week or by contract. The most satisfactory labor is that engaged on a yearly basis. In such instances, the landlord usually supplies the laborer with a house, fuel, water, garden, cow and pasture or milk, plus stated amounts of meat, cornmeal, flour, and cash.

#### THE FORESTS OF FAUQUIER COUNTY<sup>20</sup>

Timber growing is a dominant land use in Fauquier County only in the Nason-Tatum soil association in the extreme southern part and on the steep lands of the Blue Ridge and other mountains. Elsewhere it is confined to relatively small areas of shallow or poorly drained soil and to the Iredell soils.

Except those on the Nason-Tatum soil association, the forests are essentially woodlands occurring in small blocks adjacent to farming areas. A smaller proportion of the total area of Fauquier County than of the State as a whole is in farm woodlands. According to the 1950 census report, 73,983 acres, or 23.4 percent of the land in farms in Fauquier County, was woodland. In contrast, 6,730,711 acres or 43.2 percent of the land in farms in the entire State, was woodland.

Cultivation and pasturage normally take precedence over forestry on the better soils. Erosion, however, has made serious inroads on most of the cleared areas except the relatively level tracts of Triassic shale soils represented by the Penn, Bucks, and associated soil series. Within recent years, however, improved pasture management and a shift from clean-cultivated crops to pasture and other year-round cover crops have improved this situation materially. Where, because of excessive slope, rock outcrop, or some other reason, the use of the soil results in erosion or other deterioration, a shift to forestry before the soil has been destroyed is in the public interest and the long-time interest of the owner.

The forest growth of the county may be grouped roughly into three major types: (1) Pine-hardwood forests, located mostly in the lower end of the county; (2) old-growth hardwood forests, confined almost entirely to the larger estates; and (3) the cutover forests from which practically all of the merchantable timber has been removed. In addition to these three major types, there are (4) small areas of poorly drained uplands where an entirely different association of plants is found, and (5) abandoned pastures that are in various stages of reversion to forest growth. The extensive areas of bare and eroding land characteristic of many sections of the Piedmont, however, are noticeably absent.

*Pine-hardwood forests.*—This type consists of (1) dense stands of young pine that have volunteered on abandoned farmland, and (2) cutover areas where most of the pine has been removed and inferior to

<sup>20</sup> This section of the report was prepared by Wilbur O'Byrne, Extension Forester, Virginia Agricultural Extension Service, Blacksburg, Va.

worthless stands of hardwoods have been left. Both conditions occur extensively in the lower part of the county and to a lesser extent in the arkosic quartzite section represented by the Louisburg-Stony land-Culpeper soil association.

The original forest was the typical Piedmont forest, consisting of a mixture of hardwoods with a few towering pines, known as forest pine or wood pine. The second-growth of the same species is known as old-field pine. As the seed trees became increasingly scarce, however, reforestation took place more slowly, and the individual trees, being wider spaced, developed shorter stems and heavy tops. The slower reversion also resulted in a higher percentage of oak, hickory, and other heavy-seeded hardwoods. Thus, fields that were abandoned before the turn of the present century usually came back as valuable forests in which pine predominated. Those that were abandoned after pine seed trees became scarcer support a less valuable stand, which is either too young for profitable harvesting or has been heavily cut.

The cutover pine-hardwood forests range from promising pine thickets to hardwood sprout growth of little promise. Where the cutting was done when the seed supply was adequate and in a manner to provide a good seedbed, the results were excellent. Where either the time or method was wrong, the results were very poor. As a whole, the forests of the pine-hardwood type are at low ebb, and a long wait and much cultural work are necessary to restore them to full productivity.

*Old-growth hardwood forests.*—This type is mainly confined to large farms and estates located on the better soil types of the Brandywine-Chester loams, Brandywine-Chester silt loams, Chester-Brandywine Fauquier-Catoctin, and to a lesser extent, the Penn-Croton-Bucks soil associations. Yellow-poplar (*Liriodendron tulipifera*), black walnut (*Juglans nigra*), and locust (*Robinia pseudoacacia*) are the characteristic species, although outnumbered by the oaks and other hardwoods of the original forest.

The individual trees are characteristically mature to overmature, and under selective forest management should have been harvested long ago. They have been left standing primarily because the owners consider their esthetic value greater than their lumber value. These stands range from open groves of scattered old trees in a dense sod to a normal forest made up of trees of all ages, an undergrowth of saplings and bushes, and a ground cover of forest litter. Many of these old-growth hardwood forests would make ideal tracts for demonstrations in forest management because they contain enough merchantable material to make them profitable from the beginning.

*Cutover forests.*—These forests differ from the cutover pine-hardwoods principally in that they usually occur on soils better suited to agricultural use. Their present condition depends largely on how recently and how severely they were cut, the amount and severity of the grazing, their exposure, and all the soil characteristics that combine to influence plant growth. Generally, the more promising stands occur on the north-facing slopes where the soil is deep, where the original cutting removed cull trees as well as those that were more salable, and where neither livestock nor fire have been permitted to interfere with reforestation. All that is necessary to develop a

profitable forest on these areas is an improved method of harvesting. Such a method will allow efficient use of the timber now available and will give the younger trees time to reach maturity.

At the other extreme are tracts of shallow soils located on the south-facing slopes that have been grazed and burned until little plant cover remains. Rehabilitating such areas will be slow and expensive. But because these tracts form an integral part of an operating farm, there is no tendency to manage them like areas where timber production is the only economic use.

*Forests on small areas of poorly drained uplands.*—These swampy forest areas are usually of limited extent. Because of their excessive moisture, the forest cover changes from the usual upland species to shallow-rooted species such as pin oak (*Quercus palustris*) and willow oak (*Q. phellos*). This is not an important forest type, and the poorly drained areas it occupies are less extensive than the somewhat related areas found on the Iredell soils. The swampy condition of this forest results from depressions in an otherwise level but well-drained area. The forest areas of Iredell soils, in contrast have impervious subsoil that retards underdrainage to some extent. The characteristic tree in these poorly drained uplands is the pin oak, whereas on the Iredell soils the characteristic trees are blackjack oak (*Quercus marilandica*), post oak (*Q. stellata*), and redcedar (*Juniperus virginiana*). The Iredell soils support many of the common upland species also, but the trees are short and scrubby. The Iredell is probably the poorest forest soil in the county.

*Forests on abandoned pastures.*—Much of the abandoned pastureland is along and adjacent to the Blue Ridge and other mountains in the western part of the county. The soil was well sodded, and pine seed trees, never having been an important component of the forest, were not available to reclaim areas as they were abandoned. The result is a slower reversion to forest, involving a cycle somewhat as follows: Bluegrass and other plants—broomsedge, dewberry, coralberry, blackberry, locust, persimmon, and blackhaw, followed gradually by the common hardwood species as the seed is introduced by birds, animals, and wind.

It is not clear why some of this pastureland has been permitted to reforest, but there is every indication that it is capable of first-class tree growth. If these abandoned areas cannot be economically returned to pasture, it would seem advisable to hasten reversion by planting some of the better pines. A usable crop could thus be produced while the soil is improving to the point where the native hardwoods will again thrive. For such reforestation, white pine (*Pinus strobus*) is suggested for north-facing slopes, provided all currant and gooseberry bushes can be eliminated from an area wide enough to protect the pines against blister rust. If this is not feasible, shortleaf pine is probably the most promising species here as well as on drier sites.

#### MANAGEMENT

The soils of the Nason-Tatum and the Goldvein soil associations are those most generally timbered. Most of the farms on these soils were once largely cleared. They were abandoned, however, between 1860 and 1900 and reverted to valuable stands of pine with some intermingled hardwoods. These forests supported a thriving lumber

industry during and following World War I; but, because of planless cutting, they are now in such poor condition that many years will be required before they will produce anything but pulpwood, mine props, or fuelwood.

Virginia scrub pine (*Pinus virginiana*) is the most abundant single species in the Nason-Tatum soil association, but it is believed that with a reasonable amount of care it could be largely replaced with the more valuable shortleaf pine on all but the poorest and shallowest soils. Heavy cutting during the past 25 years has made serious inroads into the pines. Hardwoods, however, in addition to being less severely cut, sprout vigorously and are taking over large areas that could and should support a predominantly pine forest. The most conspicuous hardwoods are scarlet oak (*Quercus coccinea*), Southern red oak (*Q. falcata*), white oak (*Q. alba*), black oak (*Q. velutina*), hickory (*carya* sp.), red maple (*Acer rubrum*), blackgum (*Nyssa sylvatica*) and, on moister sites, yellow-poplar, beech (*Fagus grandifolia*), and hornbeam (*Carpinus virginiana*). Chestnut (*Castanea dentata*) once formed an important part of the forest but has been eliminated by the blight.

The first consideration in making recommendations for better forest management is one of land use. Because of the physical and chemical characteristics of the Nason and Tatum soils, soil scientists believe that a considerable part of their acreage can be developed profitably for one of the more intensive uses, such as cultivation or pasturage. A study to determine the facts should therefore be made. One factor should not be overlooked: Clearing land and placing it under cultivation is an expensive job, even on areas where there is merchantable timber to help bear the cost. On land that has been stripped of forest, clearing for cultivation is much more expensive. Some income other than from the sale of forest products will be necessary in the vast majority of cases.

A program of stand improvement is imperative for areas to be used for timber growth. The two most urgent measures are to rid the forest of cull trees and then to make sure that there is provision for desirable young growth. The first measure consists largely of making use of the pulpwood and fuelwood markets to dispose of the low-grade material instead of cutting the better trees only because of the greater profit. The second measure is to protect seed trees when suitable ones are available, or to plant seedlings where that is necessary. Shortleaf pine is recommended as the best species to plant, and the Virginia State Forestry Department is the most suitable source of planting stock.

The area dominated by the Penn-Croton-Bucks soil association is largely agricultural; forest growth is confined to the poorly drained and rougher areas. The forest on the better drained areas does not differ greatly from that on the Nason-Tatum soil association except that growth is somewhat taller and sweetgum (*Liquidambar styraciflua*), sycamore (*Platanus occidentalis*), and redcedar become important species. Redcedar is especially conspicuous in rundown pastures and along fence rows. Because most of the forest land is in small areas and is an essential part of the farm, its greatest value is to provide fuel and fencing rather than wood products for sale. It is recommended that livestock be fenced out of the woods and that

the forest be systematically improved by culling a few acres of low-grade trees each year. Shortleaf pine is recommended where planting is needed.

The Iredell soils in this section present a difficult problem. Because of their impervious subsoils, no deep-rooted plants thrive. Although lying within the Triassic shale belt, they are derived from different parent material than the surrounding intensively farmed Penn and Bucks soils. They are not good forest soils and are even less desirable for cultivation or pasturage. Redcedar seems to start well, but it is doubtful that it will grow to merchantable size. Trees on Iredell soils are conspicuously short-bodied and of the less desirable species. Shallow-rooted plants would probably have the best chance of satisfactory growth. The forest products that can be grown are not likely to be good for much more than fuel and fencing on nearby farms.

The greenstone section, made up largely of Fauquier, Myersville-Orange, and Catoctin soils, is definitely agricultural except where it extends into the mountains and other rough areas. The better oaks and hickory are common; white oak, Northern red oak (*Quercus borealis*), black walnut, yellow-poplar, and locust are plentiful. The Fauquier soils, which dominate this region, are strong soils on which pines are apt to occur only on south-facing slopes or where the soil has been badly abused. Where reforestation is advisable, shortleaf pine is recommended. As the soil improves, the native hardwoods will come in naturally.

There is more forest growth on the arkosic quartzite section, made up of the Louisburg, Culpeper, and Albemarle soils, than on the greenstone section, and a considerable number of areas have been recently abandoned. Chestnut oak (*Quercus prinus*) becomes an important species along with the other common oaks and hickories, but walnut, yellow-poplar, and locust are much less common than on the soils of the greenstone section to the east and the soils of the granite area to the west. Shortleaf pine should be planted on abandoned land before it has been taken over by brush. It is believed that shortleaf pine will make good growth and that it will be more profitable than the native hardwood because of the altered condition of the soils and the simpler handling required. It will also serve to stabilize the soils and build them up by supplying organic matter.

The soils of the granite-complex region, represented mainly by Chester and Brandywine, are good agricultural soils. They were largely cleared, and although some areas have been abandoned, they are mainly on steeper slopes of the Blue Ridge. It is difficult to see why some of this land has been abandoned; but if it cannot be profitably pastured, it should be reforested with shortleaf pine before the natural growth becomes too heavy to make planting feasible.

Farm woodlands such as these probably are of greatest value as a source of the fuel, posts, and timber needed on adjacent farms. Pasturing livestock on these areas is not a common practice, but it should be eliminated entirely except where the trees are valued more for shade than for timber. It is impractical under conditions in Virginia to grow trees and grass on the same area profitably. If good timber is to be grown, the woods must be protected from fire and grazing animals, and the cutting must be done in a way to encourage

replacement with desirable species that have a good growth rate. If an area is to be developed for pasture, it should be cleared and seeded to pasture grasses while the soil still has its new-ground fertility.

## MORPHOLOGY AND GENESIS OF SOILS

Soil is the product of forces of weathering and soil development acting on materials deposited or accumulated by geologic agencies. The characteristics of the soil at any given point depend on (1) the physical and mineralogical composition of the parent material, (2) the climate under which the soil material has accumulated and existed since accumulation, (3) the plant and animal life in and on 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.

Climate and vegetation are the active forces of soil genesis. They act on the parent material accumulated through the weathering of rocks and assist in gradually forming a soil with genetically related horizons. The effects of climate and vegetation are conditioned by relief, which largely controls natural drainage and influences natural erosion and the kind of vegetation growing on the soil. If climate and vegetation have not had long enough time to change the parent material into a soil profile, the soil is considered young or immature. In this respect, time is an important factor in soil development. Alluvial soils, for example, are considered to be very young in their development—so young that climate and vegetation have not had sufficient time to produce any apparent morphological results. The time needed for horizon differentiation may be much, or little. Usually a long period is needed for the development of distinct soil horizons.

The interrelationships among the five factors of soil formation are complex, and it is therefore difficult to isolate the effects of any one with certainty. It is possible to locate some areas where four of the factors are constant or nearly so, and in such areas the effects of the fifth can be partially evaluated. It is convenient to discuss each factor and its effect in soil formation, but the reader should remember that it is the integration of these five factors, rather than their simple sum, that determines the nature of the soil profile.

The purpose of this section is to relate the outstanding morphological characteristics of the soils of Fauquier County to the factors of soil formation. The first part of the section deals with the environment under which the soils exist; the second, with specific soil series and the part environment has played in determining their morphology.

## FACTORS OF SOIL FORMATION AS RELATED TO FAUQUIER COUNTY

### PARENT MATERIAL

The soils of Fauquier County have two broad classes of parent material: (1) Material residual from the weathering of rocks in place, and (2) material transported by water, gravity, or both, and laid down in varying proportions as unconsolidated deposits of clay, silt, sand, and rock fragments.

The parent materials formed in place consist of residuum of a wide variety of rocks. For somewhat less than half of the county, the

rocks are of sedimentary origin; that is, they are made up of sands, silts, clay and gravels that were laid down in bodies of water and later formed into solid rock by compaction and cementation. Parts of these sedimentary rocks have been metamorphosed or changed by heat and pressure. The unaltered sedimentary rocks are shale and sandstone of Triassic age; they underlie a large part of the Triassic Plain in the south. Schists, gneisses, phyllites, conglomerates, and quartzites are the important metamorphosed sedimentary (meta-sedimentary) rocks. They underlie much of the undulating to rolling plateau in the south, and several belts in the rolling to steep plateau in the north. These altered sedimentary rocks are very old, ranging from Lower Cambrian to pre-Cambrian in age.

Rocks of igneous origin; that is, rocks formed by hardening of molten masses of rock material, underlie the rest of the county. Parts of these igneous rocks also have been altered or metamorphosed by heat and pressure. Unaltered igneous rocks are the diabases of Triassic age that occur in narrow belts in the Triassic Plain in the south. Also unaltered or only slightly altered are the granites that underlie much of the western part of the Piedmont Plateau and the Blue Ridge Mountains in the north and the narrow belt of granite and quartz-monzonite on the rolling Piedmont Plateau in the south. Greenstones, schists, and gneisses (3) are the principal metamorphosed igneous (meta-igneous) rocks. Metamorphosed igneous rocks underlie fairly broad belts of the Blue Ridge Mountains and northern Piedmont Plateau. Except for the Triassic diabases, the rocks of igneous origin are pre-Cambrian or early Paleozoic in age.

A generalized map showing the distribution of the main kinds of rocks of Fauquier County is given in figure 4. The legend shows the age and the dominant kinds of rock within each map unit. However, some rocks other than those shown in the legend may occur within any of the map units, because the map is generalized and of small scale. Comparison of this geologic map (fig. 4) and the soil association map (fig. 3, p. 182) shows the broad general relationship of soils and parent rock; in many places the boundaries on the two maps coincide. The following paragraphs outline in more detail the relationships of soil series or soil types and kind of rock. Map unit numbers refer to figure 4, the geologic map.

#### EXPLANATION OF FIGURE 4

Generalized distribution of soil parent rocks Fauquier County, Va.  
Sedimentary and meta-sedimentary rocks:

Triassic:

1. Bull Run shale and Manassas sandstone.

Lower Cambrian:

2. Weaverton arkosic quartzite, schist, and gneiss.
3. Loudoun arkosic quartzite and conglomerate.

Pre-Cambrian:

4. Fauquier mica schist, mica gneiss, phyllite, and quartzite.
5. Wissahickon sericite schist and gneiss.

Igneous and meta-igneous rocks:

Triassic:

6. Fine-grained diabase.
7. Coarse-grained diabase.

Pre-Cambrian or Paleozoic:

8. Somerville granite and Stafford Store quartz-monzonite.

- 9. Granite complex (includes Marshall and Old Rag granite and gneiss locally containing dikes of greenstone and diabase).
- Pre-Cambrian:
  - 10. Catoclin greenstone (undifferentiated).
  - 11. Greenstone, massive facies, and diabase dikes in granite (only larger areas shown).
  - 12. Greenstone, schistose facies, dikes in granite (only larger areas shown).
  - 13. Mixed greenstone and mica schist and gneiss.

The Brandywine, Chester, Eubanks, and Belvoir loams are from weathered materials of granitic rocks, chiefly the Marshall and Old Rag granites (9) of pre-Cambrian age. The silt loam type of the Eubanks series has developed mostly over the greenstone and diabase dikes in the granite (pre-Cambrian 9); the silt loam Brandywine and

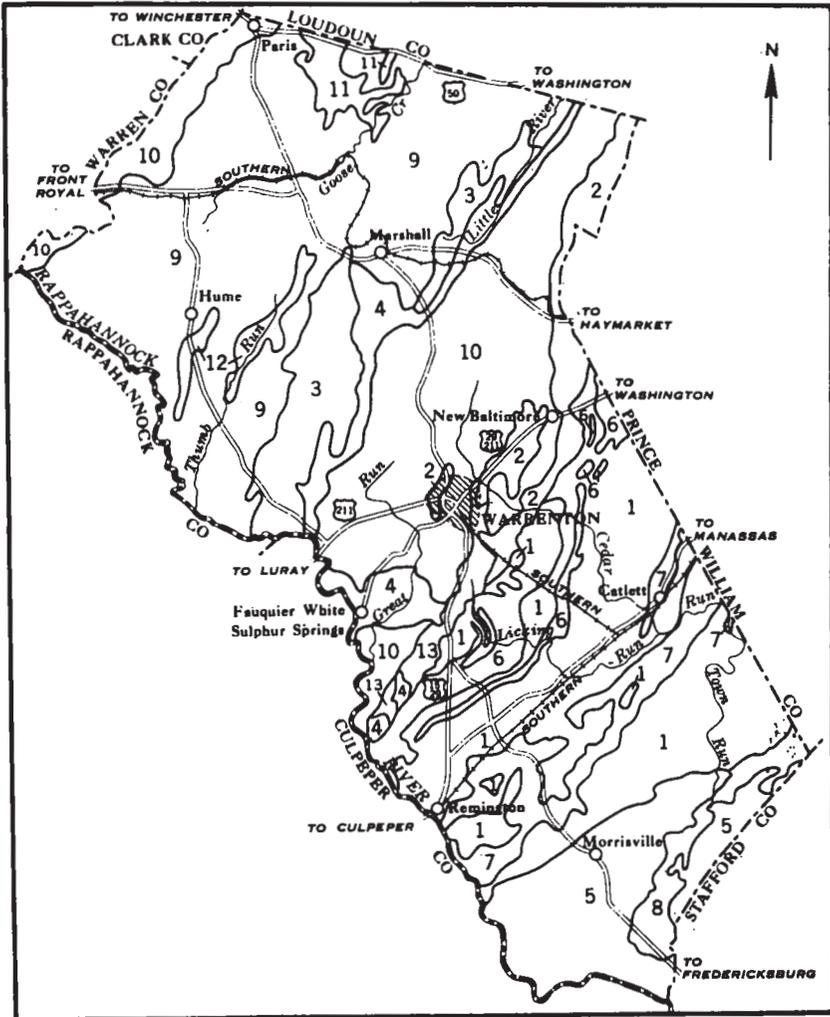


FIGURE 4.—Explanation on page 205.

Chester soils from the pre-Cambrian schistose greenstone dikes in the granite (12). The Catoctin, Clifton, Fauquier, Myersville, and Orange soils are mainly from Catoctin greenstone. Some areas of the Catoctin and Fauquier soils and all of the Lloyd soils are from mixed greenstone, mica schist, and gneiss of pre-Cambrian age (13). From the diabases of the Triassic (6 and 7) have developed the Davidson, Montalto, Mecklenburg, Zion, Iredell, and Elbert soils. Some Montalto soils are from the dikes of massive greenstone and diabase in granite (11.)

Only one soil, the Goldvein, is from the high-quartz granite or quartz-monzonite of the pre-Cambrian Somerville and Stafford Store formations (8). The Louisburg, Culpeper, and Albemarle soils are associated with arkosic quartzites and conglomerates of the Lower Cambrian Loudoun (3) and Waverton (2) formations and the quartzite of the pre-Cambrian Fauquier formation (4). The mica schist and mica gneiss of these three formations are the parent materials of the Hazel, Manor, and Elioak soils. Mainly from the graphitic schist of the Fauquier formation (4) are the Watt soils. The Manteo, Tatum, Nason, and Lignum soils were derived from material weathered from Wissahickon sericite and biotite schist, and gneiss (5), pre-Cambrian in age. The Penn, Bucks, Wadesboro, Calverton, and Croton have developed from the Bull Run shale and Manassas sandstone (1) of Triassic age. Along the contact of the shale and sandstone (1) with coarse grained diabase sills (7) the Catlett soil has developed on baked blue shales. The Kelly is from the Bull Run shale and intruded Triassic diabase (1).

The nature of the transported rock material is reflected in some of the properties of the soils derived from them. The Hiwassee, Dyke, Meadowville, and Rohrersville series were derived from transported materials that consist mainly of greenstone and its weathered products. Soils of the Hiwassee (light-colored variant), Masada, Tusquitee, Starr, Seneca, and Worsham series have formed from transported materials consisting of acidic rocks, such as granite, gneiss, schist, quartzite, slate, and the products of their decomposition. Braddock and Thurmont soils were derived from transported materials that consist mainly of arkosic quartzite and conglomerate, and their decomposition products. The State, Congaree, Chewacla, and Wehadkee were formed from the transported materials derived from a wide variety of rocks—most of those found in the county. Soils of the Bermudian, Rowland, and Bowmansville were derived from transported materials, which washed from upland soils underlain by Triassic shale and sandstone and diabase.

Although there is a fairly consistent relation between the kinds of parent materials and some of the properties of soils, other soil properties, especially those of regional significance from the standpoint of soil genesis, cannot be correlated with kinds of parent material and must be attributed to other factors.

#### CLIMATE

Fauquier County has a humid temperate climate. The average annual rainfall is about 41 inches. The average summer temperature is about 74° F., and the average winter temperature about 36° F. The northern part of the county has a higher average elevation than

the southern part. Here, especially in the mountains and higher uplands, the climate is somewhat cooler throughout the year. Precipitation is also heavier and includes more snow.

The high rainfall throughout the county favors leaching of soluble materials and movement of colloidal materials downward in the soil. The soil is frozen for only short periods and to only shallow depths during the winter; consequently, weathering and translocation of materials are carried on almost all year. The lower temperatures in the higher lying northern part of the county, however, has slowed the chemical reactions in the soils and has retarded leaching correspondingly.

Having developed in such a climate, the well-drained, well-developed soils (the normal soils) are rather highly leached and fairly low in organic matter and have well-developed podzolic features. Because of leaching, plant nutrients are less abundant in the surface layers than in the subsoils. Furthermore, no free lime has accumulated in the soil, although calcium is a constituent of some of the parent rocks—especially those of basic nature.

Climate is the cause of many of the outstanding characteristics that the normal soils within any climatic zone have in common. Besides affecting the weathering of rocks and the formation of the parent material, it is largely the cause of the formation of the soil profile through the actions of leaching, eluviation, and illuviation. Apparently, however, the differences in climate within this county are not great enough to account for the broad differences that exist among the normal soils. The climate over most of the county has characteristics of the climate of both the Red-Yellow Podzolic and Gray-Brown Podzolic soil regions; consequently, Red-Yellow Podzolic and Gray-Brown Podzolic soils are rather intimately associated. Differences in such factors as parent material and drainage appear to have been of primary importance in determining the great soil group to which the normal soils belong.

#### PLANT AND ANIMAL LIFE

Trees, shrubs, grasses, and other herbaceous plants and micro-organisms, earthworms, and other forms of plant and animal life live in and on the soil and are active agencies in soil formation. Soil materials might have definite layers produced by differential weathering, leaching, eluviation, and illuviation; but without the effect of living organisms, they would not have many of the more important characteristics of soil and would be largely residual or transported products of weathering. With the introduction of living organisms, the soil-forming processes become more constructional, and there is established a cycle between intake and outgo of plant nutrients. The surface horizons are renewed to varying extent by nutrients that living organisms bring up from lower horizons.

Micro-organisms decompose raw plant waste into organic matter and incorporate it into the soil. Plants provide organic matter for the soil and bring moisture and plant nutrients from the lower to upper soil horizons. The general type of vegetation is to a large extent controlled by climate, and in this way climate has a powerful indirect effect on soil development. Climate and vegetation, acting together, are the active factors of soil genesis. They change parent material from a heterogenous mass to a body having more or less

definite genetic morphology. Where the variation in either vegetation or climate is significant, the general type of soil varies accordingly.

No great differences existed in the native vegetation of the county. A hardwood or hardwood-pine forest covered most of the soils. There were probably some differences in the density of stands, the relative proportion of species, and the associated ground cover. However, it is doubtful if any of the marked differences in properties among the normal soils can be explained by differences in vegetation. Although some rather minor variations in vegetation are now associated with different soils, it seems likely that they are chiefly the result and not the cause of the differences in soils.

Most of the trees that grow in this area are moderately deep to deep feeders on plant nutrients in the soil. They are chiefly deciduous trees and shed their leaves annually. The leaves vary considerably among species in content of bases and plant nutrients; but, in general, the amounts of bases and phosphorus returned to the soil in leaves of deciduous trees is higher than in those of coniferous trees. Essential plant nutrients are thus returned to the upper part of the soil from the lower part and counteract the depleting action of percolating water.

Much organic matter is added to the soil in the form of dead leaves, roots, and entire plants. Most of it is added to the soil surface, where it is acted on by micro-organisms, earthworms, and other forms of life or by direct chemical reactions. In Fauquier County the rate of decomposition of such material is rather rapid because of favorable temperature and moisture conditions, favorable character of the organic material itself, and presumably favorable micro-population of the soil.

During the process of soil formation, only a relatively small quantity of organic matter derived from the forest has accumulated and become incorporated with the soil. In the present forested areas, thin layers of forest litter and leaf mold cover the soil, and a small quantity of organic matter derived from decayed leaves and twigs is mixed with the first inch or two of the mineral surface soil layer. In some favorable places, as in hollows and in upland depressions, the amount of organic matter that has accumulated is relatively large in comparison to that on the upland slopes. In most places the Chester and Brandywine soils of the uplands apparently have a comparatively large quantity of well-decomposed organic matter mixed with the mineral material of the surface layer. This organic matter is probably the result of a heavier forest growth or of a slower rate of decomposition of the organic materials than on less fertile or less moist soils.

Little is known of the micro-organisms, earthworms, and other population of the soil, but their importance to soil formation is probably no less than that of the higher forms of life.

#### RELIEF

Relief, or lay of the land, varies from nearly level to very steep. It is apparent that differences in this factor of soil formation have influenced greatly the development of different properties in the soils. Relief affects soil formation through its influence on internal drainage, runoff, and other water actions, including normal erosion. It is

significant that the well-developed soils that have a reddish B horizon occur in undulating to rolling areas where the drainage is good; that the soils with little or no subsoil development largely occur in hilly and steep areas where the drainage is excessive; that the soils with a yellowish B horizon chiefly occupy the nearly level or gently undulating areas where the drainage is imperfect; and that the soils with mottled gray and yellow horizons are found in level areas or depressions where the drainage is poor. Relief, therefore, is important in soil formation, and because of it several different soils may develop from similar parent material.

#### TIME

Differences in age account for differences among some of the soils. Two soils of widely different age, for example, may vary greatly in characteristics even though their parent material, relief, vegetation, and climatic conditions are similar. The soils of the first bottom and recent colluvial slopes represent recently accumulated deposits of soil material and are so young that climate and vegetation have not had sufficient time to produce any morphological differences. Nearly all the other soils of the county have required some time to develop their characteristics.

If one soil is old, or mature, and if another is young, or immature, the mature one will show well-defined genetic horizons, and the immature one little or no genetic soil-horizon differentiation.

Mature soils have been defined as those that "have already developed their characteristic properties and are in equilibrium with their environment" (6). The combination of a moderately high rainfall and favorable relief and temperature has fostered a fairly rapid rate of maturity. Nearly all of the soils of the county, except the soils of the bottom lands and recent colluvial lands and the shallow steep soils and land types of the uplands, may be considered mature or nearly mature.

It is important to bring out that the attainment of maturity of a soil does not correlate in all cases with the chronological or geological age of the parent material. However, it does correlate more directly with the time that the parent material has been in place. Shallow soils on steep slopes, for example, are young or immature because soil material has constantly been removed from the surface by normal erosion as fast as it has been formed from the parent material in the lower horizons. As regards soil genesis, the soil materials of these shallow soils are young, although geologically they may be very old. The parent material simply does not remain in place long enough for climate and vegetation to bring about the development of a zonal soil profile.

On the other hand, the shallow Penn soils, although developed on relief favorable for the retention of soil material as it is formed, have not developed mature soil profiles. Their immaturity, therefore, has been the result of factors other than slope and may be due to the relative resistance to weathering of the parent shale rock of Triassic age.

#### THE CHIEF VARIABLE FACTORS

Each soil may be thought of as a product of some particular combination of the five factors—parent material, relief, climate, living organisms, and time. It has been brought out that the climatic and

biological factors, although important in the development of each soil, are relatively uniform over the entire area, and that the cause of the development of broad differences in the soils cannot be attributed to them. This leaves parent material, relief, and time as the three variables that modify the other factors. However, most of the soils have had sufficient time to develop their characteristics and be in equilibrium with their environment. Differences in parent materials and relief are therefore the chief variable factors. In this respect, most of the soils of the county are characterized by a particular combination of parent material and relief.

#### CLASSIFICATION OF SOILS

The soils of Fauquier County are classified in table 22. They are listed according to order, and the great soil groups under each order and the various soil series under each great soil group are given. The dominant relief, drainage, parent material, and profile development of each soil are shown. Study of this table will enable the reader to understand more easily the genetic relationships of the soils of the area.

#### ZONAL SOILS

The zonal soils in Fauquier County are members of the Gray-Brown Podzolic, Red-Yellow Podzolic, and Reddish-Brown Latosol great soil groups. Fauquier County is in the transitional belt between the Gray-Brown Podzolic and the Red-Yellow Podzolic soil regions of the eastern United States.

Zonal soils are those great groups of soils having well-developed soil characteristics that reflect the influence of the active forces of soil genesis—climate and vegetation—upon well but not excessively drained parent material over a long period (6). Pedologists speak of zonal soils as normal soils. In Fauquier County most of the soils of the old colluvial slopes and terraces and many of those developed from residual materials are on well-drained undulating to rolling relief and have well-developed characteristics. These soils owe their main characteristics to the effects of climate and vegetation and are the zonal soils of the county.

It is on zonal soils that climate and vegetation have had a maximum influence, and relief and age a minimum. As a result, these soils, even though developed over various kinds of parent materials, have many properties that are common to all. In their virgin condition, they have a shallow surface layer of organic debris in various stages of decomposition. The  $A_2$  horizons are lighter in color than either the  $A_1$  or the B. The B horizon is uniformly colored red, brown, or yellowish brown and is heavier in texture than the  $A_1$  or  $A_2$ . The C horizon is variable in color and texture among the various soils, but it is usually a light reddish or yellowish brown and lighter in texture than the B horizon.

#### GRAY-BROWN PODZOLIC SOILS

The Gray-Brown Podzolic soils have a comparatively thin organic covering and mixed organic-mineral horizons over a yellowish-brown or grayish-brown leached A horizon that rests on an illuvial, yellowish-brown, brown, or yellowish-red B horizon. They have developed under mainly deciduous forest in a humid temperate climate, and

TABLE 22.—*Soil series of Fauquier County, Va., classified by higher categories, and factors that have contributed to differences in soil morphology*<sup>1</sup>

## ZONAL SOILS

Great soil groups and series	Dominant relief	Drainage	Parent material	Profile development <sup>1</sup>
<b>Gray-Brown Podzolic soils:</b> <sup>1</sup>				
Uplands:				
Chester (loam).....	Undulating to rolling.....	Well drained.....	Residuum from— Granitic rocks <sup>4</sup> .....	Moderately well developed.
Chester (silt loam).....	do.....	do.....	Schistose greenstone dikes in granite.....	Do.
Bucks.....	Undulating.....	do.....	Triassic red shale and sandstone <sup>5</sup> .....	Do.
Manor.....	Rolling to hilly.....	Somewhat excessive.....	Mica schist and mica gneiss (extremely micaceous variety).....	Weakly to moderately well developed.
Old colluvial slopes:			Old colluvium from materials derived from—	
Tusquitee.....	Undulating to rolling.....	Well drained.....	Granite and granite gneiss.....	Moderately well developed.
Terrace lands:			Moderately young alluvium from—	
State.....	Gently undulating.....	do.....	Materials derived from various rock types.	Weakly to moderately well developed.
<b>Red-Yellow Podzolic soils:</b>				
Red members:				
Uplands:				
Culpeper.....	Undulating to rolling.....	do.....	Residuum from— Arkosic quartzite and conglomerate.....	Well developed.
Eloak.....	do.....	do.....	Mica schist and mica gneiss.....	Do.
Eubanks (loam).....	Rolling.....	do.....	Granitic rocks <sup>4</sup> .....	Do.
Eubanks (silt loam).....	Rolling to hilly.....	do.....	Massive greenstone or diabase dikes in granite.....	Do.
Myersville.....	Undulating to rolling.....	do.....	Agglomerate greenstone (largely chloritic, partly epidotic).....	Do.
Tatum.....	do.....	do.....	Sericite and biotite schist, and gneiss.....	Do.
Wadesboro (silt loam).....	do.....	do.....	Triassic red shale.....	Do.
Wadesboro (fine sandy loam).....	Rolling.....	do.....	Triassic red sandstone.....	Do.
Old colluvial slopes:			Old colluvium from materials derived from—	
Braddock.....	do.....	do.....	Arkosic quartzite.....	Do.
Terrace lands:			Old alluvium from materials derived from—	
Hawassee (light-colored variants).....	Undulating to rolling.....	do.....	Coarse-textured material largely from acidic rocks.	Do.
<b>Yellow members:</b>				
Uplands:				
Albemarle.....	do.....	do.....	Residuum from— Arkosic quartzite and conglomerate.....	Moderately well developed.
Nason.....	do.....	do.....	Sericite and biotite schist, and gneiss.....	Well developed.
Old colluvial slopes:			Old colluvium from materials derived from—	
Thurmont.....	Undulating to rolling.....	do.....	Arkosic quartzite.....	Do.
Terrace lands:			Old alluvium from materials derived from—	
Masada.....	Undulating.....	Moderately well to well drained.	Coarse-textured materials largely from acidic rocks.	Do.

ZONAL SOILS

<b>Reddish-Brown Latosols:</b>				
Uplands:				
Clifton.....	Undulating to rolling.....	Well drained.....	Residuum from—	Moderately well developed.
Fauquier.....	do.....	do.....	Massive greenstone (epidotic).....	Well developed.
Montalto.....	do.....	do.....	Massive greenstone (epidotic) and schistose greenstone (chloritic).	Moderately well developed.
Davidson.....	do.....	do.....	Fine-grained diabase intruding Triassic shale and sandstone.	Well developed.
Mecklenburg.....	do.....	Moderately well drained....	Coarse-grained diabase intruding Triassic shale and sandstone.	Do.
Lloyd.....	do.....	Well drained.....	Same.....	Do.
Old colluvial slopes:			Greenstone (undifferentiated) interbedded with mica schist, mica gneiss, and quartzite.	
Dyke.....	do.....	do.....	Old colluvium from materials derived from—	Do.
Terrace lands:			Greenstone (largely the massive epidotic type).	
Hilwassee.....	do.....	do.....	Old alluvium from materials derived from—	Do.
			Fine-textured material largely from basic rocks.	Do.

INTRAZONAL SOILS

<b>Planosols:</b>				
Uplands:				
Croton.....	Level to undulating.....	Poorly drained.....	Residuum from—	Well developed.
Kelly.....	do.....	do.....	Triassic red shale and sandstone.....	Do.
Elbert.....	Level.....	do.....	Triassic shale and coarse-grained diabase.	Do.
Calverton.....	Gently undulating.....	Imperfectly drained.....	Diabase (both coarse-grained and fine-grained) intruding Triassic shale and sandstone.	Do.
Iredell.....	Level to gently undulating..	do.....	Triassic red shale and sandstone.....	Do.
Zion.....	Undulating.....	do.....	Diabase (both coarse-grained and fine-grained) intruding Triassic shale and sandstone.	Moderately well developed.
Lignum.....	Gently undulating.....	do.....	Same.....	Well developed.
Belvoir.....	Level to undulating.....	do.....	Sericite and biotite schist; and gneiss.	Do.
Goldvein.....	Undulating to rolling.....	Moderately well drained....	Granitic rocks.....	Do.
Orange.....	do.....	Imperfect.....	High-quartz granite or quartz monzonite.	Do.
			Agglomerate greenstone (largely chloritic, partly epidotic).	

See footnotes at end of table.

TABLE 22.—*Soil series of Fauquier County, Va., classified by higher categories, and factors that have contributed to differences in soil morphology*<sup>1</sup>—Continued

## AZONAL SOILS

Great soil groups and series	Dominant relief	Drainage	Parent material	Profile development <sup>2</sup>
<b>Lithosols:</b>				
<b>Uplands:</b>				
Louisburg.....	Rolling to steep.....	Excessively drained.....	Residuum from— Arkosic quartzite and conglomerate.....	Weakly developed.
Brandywine (loam and gritty loam).....	do.....	do.....	Granitic rocks <sup>4</sup> .....	Do.
Brandywine (silt loam).....	Rolling to hilly.....	do.....	Schistose greenstone dikes in granite.....	Do.
Catoctin.....	Rolling to steep.....	do.....	Greenstone—all varieties.....	Do.
Hazel.....	Rolling to hilly.....	do.....	Mica schist, mica gneiss, and slate.....	Do.
Manteo.....	Hilly to steep.....	do.....	Sericite and biotite schist; and gneiss.....	Do.
Penn (silt loam).....	Undulating to rolling.....	Somewhat excessively drained.....	Triassic red shale.....	Do.
Penn (loam).....	do.....	Same.....	Triassic red sandstone.....	Do.
Catlett.....	do.....	Well drained.....	Baked Triassic shale (bluish gray).....	Do.
Watt.....	Hilly.....	Excessively drained.....	Black graphitic schist and slate.....	Do.
<b>Alluvial Soils:</b>				
<b>Recent colluvial slopes:</b>				
Starr.....	Undulating.....	Well drained.....	Recent colluvium from materials derived from— Granitic rocks, <sup>4</sup> quartzite, mica schist, mica gneiss, slate (acidic rocks).....	Do.
Seneca.....	do.....	Moderately well drained.....	do.....	Do.
Worsham.....	Almost level.....	Poorly drained.....	do.....	Do.
Meadowville.....	Almost level to gently undulating.....	Well drained.....	Greenstone diabase.....	Do.
Rohrersville.....	Almost level.....	Poorly drained.....	do.....	Do.
<b>Bottom lands:</b>				
Bermudian.....	do.....	Well drained.....	Recent alluvium from materials derived from— Triassic shale, sandstone, and diabase.....	Do.
Rowland.....	do.....	Imperfectly drained.....	do.....	Do.
Bowmansville.....	do.....	Poorly drained.....	do.....	Do.
Congaree.....	do.....	Well drained.....	Various rock types.....	Do.
Chewacla.....	do.....	Imperfectly drained.....	do.....	Do.
Wehadkee.....	do.....	Poorly drained.....	do.....	Do.

<sup>1</sup> This classification is based on the scheme given in the 1938 U. S. Department of Agriculture Yearbook, Soils and Men, and modified by the articles in Soil Science (5).

<sup>2</sup> The degree of profile development roughly indicates the length of time that the material has been in place.

<sup>3</sup> These soils are transitional between the Gray-Brown Podzolic and Red-Yellow Podzolic groups.

<sup>4</sup> Includes granite, granodiorite, granite gneiss, and schistose granite.

<sup>5</sup> Locally from mixed Triassic shale and diabase.

<sup>6</sup> These soils appear to be transitional between the Reddish-Brown Latosols and Red-Yellow Podzolic groups. Morphologically they have certain characteristics of the Reddish-Brown Latosols, but otherwise they may better be classified as Red-Yellow Podzolic soils.

podzolization has been the main soil-forming process. As these soils are zonal, they have well-drained and well-developed profiles. The A<sub>1</sub> and A<sub>2</sub> horizons are light in color and texture and leached of bases. Some of these bases have accumulated in the B horizon, which is therefore more saturated with bases than the surface horizons. This is an evidence of podzolization. The B horizons are fine-textured and show some accumulation of aluminum and iron oxides as well as of colloidal material. The soils are low in bases, particularly calcium and magnesium. They are also low in phosphorus, although some have developed from basic rocks. They range from medium to very strongly acid.

Because the county is in the transition zone between the Red-Yellow Podzolic and Gray-Brown Podzolic zones, these great soil groups are locally intermixed, and transitional in character. Furthermore, there is no sharp line of demarcation between their general areas.

In this county, soils having characteristics transitional between the Gray-Brown Podzolic and Red-Yellow Podzolic soils are members of the Chester, Bucks, Manor, Tusquitee, and State series. Apparently, these soils have formed under similar conditions of climate and vegetation. They are well drained to somewhat excessively drained; and, although they differ somewhat in degree of development, all have at least a moderately well developed Gray-Brown Podzolic profile transitional to Red-Yellow Podzolic. They range from undulating to hilly, but the differences among their profiles probably are not primarily the result of differences in slope. Marked differences exist among the parent materials of the various soils, and many of the differences among their profiles may be attributed to the character and composition of the parent material.

The Chester soils, although not the most extensive, are the most representative of the so-called Gray-Brown Podzolic soils in Fauquier County. They are moderately podzolized and have moderately well developed A, B, and C horizons. Both the parent material and relief are distinctive. The loam types have developed from granite and granite gneiss parent materials, and the silt loam types from greenstone schist dikes intruded into the granite. The relief has dominant gradient of 2 to 14 percent.

The following profile—observed on a virgin area with a 4 percent slope under a forest cover of deciduous trees about 1 mile south of Atoka—is typical of Chester loam, undulating phase:

- A<sub>0</sub> A shallow covering of forest litter and leaf mold.
- A<sub>1</sub> 0 to 1 inch, dark grayish-brown<sup>21</sup> very friable loam with moderate medium granular structure; relatively high in organic matter; contains a few scattered angular granite fragments about ¼ to 1 inch across.
- A<sub>2</sub> 1 to 8 inches, light yellowish-brown to brown very friable loam with weak medium granular structure; contains a few scattered angular granite fragments slightly smaller than those of the above layer.
- B<sub>1</sub> 8 to 17 inches, brown to yellowish-red, friable when moist and slightly hard when dry, loam or light clay loam with moderate medium blocky structure; contains numerous small quartz grains and a few widely scattered small fragments of granite; lighter in color

<sup>21</sup> Soil color names are those adopted by the 1948 Committee on soil color, Soil Survey, U. S. Department of Agriculture.

- and texture, more compact, and contains more quartz grains and considerably less mica flakes than the underlying B<sub>2</sub> horizon.
- B<sub>2</sub> 17 to 31 inches, yellowish-red firm to friable clay loam with strong medium blocky structure; contains a considerable quantity of small mica flakes; light yellowish-brown mineral films surround most of the soil aggregates.
- C<sub>1</sub> 31 to 43 inches, brown, spotted with black and yellowish-brown, compact but friable silty clay loam; the brown parts are apparently weathered soil material, and the light yellowish-brown parts highly weathered granite rock material similar to that in the C<sub>2</sub> horizon described below; both parts are structureless, crush easily to a uniform mass, and contain a considerable quantity of small mica flakes.
- C<sub>2</sub> 43 inches +, yellowish-brown, streaked with black and reddish-brown, compact but friable highly weathered granite rock material; exhibits the original rock structure when broken out in large pieces.

The Bucks soils have developed over red Triassic shale and sandstone. They have reddish-brown subsoils with a purplish cast that are rather characteristic of the Red-Yellow Podzolic soils. The color of the subsoils, however, is inherited from the parent rock and apparently not developed through natural processes of soil formation. The Bucks soil, however, has a well-developed profile that is representative of this group.

Although classified as Gray-Brown Podzolic soils, the Manor soils do not have profiles well developed in either color or texture. This lack of development seems to be closely correlated with the parent materials, which, although they weather to great depths, do not disintegrate readily into soil material. The Manor soils have a low degree of horizon differentiation and do not contain any appreciable quantities of rock fragments. They are underlain by mica schist or gneiss. The Manor soils might be more properly designated as lithosolic Gray-Brown Podzolic soils, as they have characteristics intermediate between the Lithosol and the Gray-Brown Podzolic great soil groups.

The Tusquitee soils, which developed over old colluvial materials derived from granite, and granite gneiss, are similar to the Chester soils except that they are somewhat shallower in profile and generally stony.

The State soils have developed over old alluvial material derived from a wide variety of rocks common to the county. The profiles are weakly to moderately well developed.

#### RED-YELLOW PODZOLIC SOILS

The Red-Yellow Podzolic soils consist of red members and yellow members. The red members have thin organic and organic-mineral horizons over a grayish-brown or yellowish-brown highly leached and eluviated A<sub>2</sub> horizon, which rests on a red, yellowish-red, or reddish-brown illuviated B horizon. The yellow members have similar surface horizons, but the subsoil is yellow, yellowish brown, or reddish yellow.

The Red-Yellow Podzolic soils have developed under coniferous or mixed coniferous-hardwood forest, and podzolization and possibly some laterization have been the soil-forming processes. They are low in bases, particularly calcium and magnesium; and although one of the red members has developed over basic rocks, they are all low in phosphorus. Soil reaction ranges from strongly to extremely acid.

As the soils are zonal, they are well to moderately well drained and have well-developed profiles. Probably because of higher temperature and possibly higher rainfall, the decomposition of organic matter is more rapidly accomplished and the leaching of bases and plant nutrients is more complete in these soils than in the Gray-Brown Podzolic soils.

Although the red and yellow members of the Red-Yellow Podzolic soils have developed under similar climate, the yellow members are thought to have had more humid soil conditions. In Fauquier County, the yellow members are largely on more subdued relief where much of the rainfall passes through the soil profile. On the other hand, the red members, although receiving a similar amount of rainfall, have greater runoff and less percolation; consequently they are less leached.

The exact causes of the development of the pronounced color differences between the red and yellow members are not definitely known. However, it is assumed that the more humid conditions of the yellow members have resulted in a greater degree of hydration and therefore larger particle size of the colloidal iron oxides.

The Red-Yellow Podzolic soils are mainly in the part of the county south of the northern granite belt. For the most part, they have developed from siliceous acidic parent materials. Although they range somewhat in degree of maturity, all have at least moderately well developed profiles. Relief ranges from undulating to rolling, but differences among the soils do not appear to be due primarily to differences in slope. Rather outstanding differences in the kinds of parent material appear to be directly or indirectly the major causes of differences among the soil series.

#### *Red members*

The red members of the Red-Yellow Podzolic soils belong to the Culpeper, Eubanks, Elioak, Myersville, Tatum, and Wadesboro series of the uplands, and to the Braddock series of the old colluvial slopes. The light-colored variant of the Hiwassee soil of the terrace lands also has characteristics common to the soils of the Red-Yellow Podzolic group.

Soils of the Tatum series show characteristics of the red members as fully as the soils of any series of the Red-Yellow Podzolic group. This series is extensive in the extreme southern part of the county and has developed over residuum weathered from Wissahickon sericite schist and gneiss. The following profile observed on a 4 percent slope under a forest cover of mixed deciduous and coniferous trees about 3 miles south of Morrisville is considered typical of Tatum silt loam, undulating phase:

- A<sub>0</sub> A thin layer of moss, forest litter, and leaf mold.
- A<sub>1</sub> 0 to 2 inches, light yellowish-brown very friable mellow silt loam with weak crumb structure; contains a few small fragments of quartz.
- A<sub>2</sub> 2 to 8 inches, reddish-yellow to brown very friable silt loam of weak granular structure; contains a few angular quartz fragments ranging from  $\frac{1}{16}$  to  $1\frac{1}{2}$  inches across.
- B<sub>1</sub> 8 to 13 inches, yellowish-red friable silty clay loam of weak fine blocky structure; contains many small finely divided mica flakes.
- B<sub>2</sub> 13 to 26 inches, red, friable to firm micaceous clay of well-defined medium blocky structure.

- B<sub>3</sub> 26 to 32 inches, red friable to firm micaceous clay of strong medium blocky structure; considerably micaceous and has a greasy or slippery feel when rubbed between the fingers; very small fragments of soft highly weathered schist scattered throughout the lower part.
- C<sub>1</sub> 32 to 36 inches, predominantly red friable clay loam containing a high percentage of yellow and gray, soft, highly weathered schist fragments.
- C<sub>2</sub> 36 inches +, mingled red, yellow, and grayish-brown highly weathered soft schist becoming less weathered with increasing depth.

All the red members of the Red-Yellow Podzolic group are similar to the Tatum soil just described in color, structure, consistence, thickness, and arrangement of the soil horizons. They differ, however, in other features, such as texture and content of stone, content of conspicuous minerals such as quartz and mica, and content of plant nutrients and lime. These differences are largely the result of differences in character of the parent material.

The Culpeper soils, derived from residuum weathered from arkosic quartzite, and the Braddock soils, derived from old colluvial materials of quartzite origin, have similar profiles except that the Braddock are considerably more stony. The soils of these two series differ from the Tatum soils chiefly in containing less mica and more sand throughout their solums.

Soils of the Elioak series are similar to the Tatum soils in most physical features. They differ mainly in having browner surface soils and a higher content of lime and plant nutrients. They are underlain by mica schist, mica gneiss, and some small areas of slate.

The Myersville soils are distinctive in being the only Red-Yellow Podzolic soils in the county that are derived from a basic type of parent rock. They are underlain by an agglomerate schist variety of Catoctin greenstone that is apparently lower in bases than the greenstone giving rise to the Fauquier soils. Since the Fauquier soils have not developed over the agglomerate greenstone, the Myersville are presumably the normal soils derived from this rock type. The Myersville are well-drained soils. In this county they are associated closely with the Orange soils, which have plastic subsoils and are grouped with the Planosols.

The soils of the Wadesboro series have profiles similar to those of the Tatum soils but are deeper and considerably less micaceous. Although they are considered to have developed from residuum weathered from Triassic shale and sandstone, their parent material cannot be definitely ascertained in Fauquier county. In most places the parent material has weathered to such great depth that its identity is obscured. Evidence suggests that the Wadesboro soil possibly may be derived from unconsolidated water-deposited materials of Triassic age or younger.

The light-colored variant of the Hiwassee soil exhibits a profile rather typical of the red members of the Red-Yellow Podzolic groups. It was derived from rather coarse-textured acidic alluvial materials that were deposited on stream terraces. The profile closely resembles that of the Braddock soils but it is less stony. This soil has been mapped as Wickham soil in many areas in the southern Piedmont Plateau.

The Eubanks soils were derived from granite and from greenstone or diabase. Where the parent rock is mostly granite with some

greenstone, the soil is the loam type. Where the parent material is greenstone or diabase, with a little granite, the soil is the silt loam type. Eubanks loam is somewhat similar to the Elioak silt loam but has a shallower subsoil and is less micaceous. Eubanks silt loam is usually associated with Chester loam and Brandywine loam but is distinguished from them by its brown silt loam surface soil and red clay subsoil. The lower subsoil is a dark red, resembling that of Lloyd silt loam.

*Yellow members*

The yellow members of the Red-Yellow Podzolic soils include the Albemarle and Nason soils of the uplands, the Thurmont soils of the old colluvial lands, and the Masada soils of the terraces.

The Nason soils are the most extensive and most representative of the yellow members. They are derived from sericite schist and gneiss of the Wissahickon formation. The following profile observed about 1 mile south of Morrisville on a slope of about 4 percent and under mixed deciduous and coniferous forest is considered typical of Nason silt loam, undulating phase:

- A<sub>0</sub> A shallow covering of forest litter and leaf mold.
- A<sub>1</sub> 0 to 2 inches, light brownish-gray very friable loose silt loam containing some organic matter and a few scattered quartz fragments.
- A<sub>2</sub> 2 to 7 inches, light yellowish-brown very friable almost loose silt loam containing abundant angular quartz fragments up to 1 inch across.
- B<sub>1</sub> 7 to 11 inches, yellowish-brown friable heavy silt loam or silty clay loam with moderate fine blocky structure; a few small quartz fragments.
- B<sub>2</sub> 11 to 21 inches, strong-brown friable somewhat micaceous clay with strong medium blocky structure; lacks quartz fragments characteristic of the above horizons.
- B<sub>3</sub> 21 to 32 inches, strong-brown, streaked with yellowish-red and yellow, friable micaceous silty clay with moderate medium blocky structure; a few scattered small fragments of weathered schist.
- C<sub>1</sub> 32 to 50 inches, predominantly highly weathered schist containing yellowish-red friable silt loam soil material between the schist cleavage planes; quartz veins about 1 inch wide occur locally and include angular quartz fragments about ½ inch across.
- C<sub>2</sub> 50 inches +, highly weathered sericite schist.

The Albemarle soils are perhaps the shallowest and most poorly developed of the yellow members. They are derived from arkosic quartzite and conglomerate and are related to the Culpeper soils. They differ from the Nason soil in showing less distinct profile differentiation in color and texture and in being less micaceous, lighter colored in the B horizon, and considerably more sandy throughout the profile.

The Thurmont soil is derived from old colluvial materials washed and rolled from Bull Run Mountain slopes underlain by quartzite of the Weaverton formation. It closely resembles the Albemarle soils in profile characteristics and differs mainly in being stony and less sandy and in having better developed textural profiles.

The Masada soil closely resembles the Thurmont soil but differs chiefly in being considerably less stony. It was derived from coarse-textured acidic alluvial materials on old high stream terraces and is inextensive in this county.

REDDISH-BROWN LATOSOLS

Reddish-Brown Latosols have been defined as a zonal group of soils with dark reddish-brown granular surface soils, red friable clay B

horizons, and red or reticulately mottled parent material; they developed under humid tropical climate with wet-dry seasons and tropical forest vegetation. Although these conditions of climate and vegetation obviously do not apply to Fauquier County, there are many soils in the county that have characteristics similar to those of this great soil group. Such soils are therefore classified tentatively as Reddish-Brown Latosols.

In the development of these soils, laterization with little or no podzolization may have been dominant. Laterization is the process of silica removal, with consequent increase in the aluminum and iron oxide content and decrease in base-exchange capacity of the soil. In Fauquier County the Reddish-Brown Latosols were derived from parent materials that are comparatively high in bases. None was derived from the acidic, siliceous parent rocks that characterize the Red-Yellow Podzolic soils. Apparently, therefore, parent rocks low in silica and high in bases are a requirement for the development of the Reddish-Brown Latosols in this climatic and vegetative region, and the effects of these parent rocks have overshadowed the normal effects of climate and vegetation. Otherwise, either the so-called Gray-Brown Podzolic or Red-Yellow Podzolic soils presumably would have developed.

Because of the extreme basic nature of the parent rocks, the Reddish-Brown Latosols may be intrazonal rather than zonal soils, although all of them exhibit more or less normal soil profiles. The well-drained rather well-developed profile has a reddish-brown or red friable A horizon and a uniformly red or dark-red firm B horizon that is thicker and finer textured than the A horizon.

The Reddish-Brown Latosols in Fauquier County are of the Clifton, Fauquier, Montalto, Davidson, Mecklenburg, Lloyd, Dyke, and Hiwassee series.

The Fauquier soils, developed over residuum weathered from the massive (epidotic) and schistose (chloritic) varieties of greenstone, are the most extensive and representative soils of this group. Following is a description of a profile of Fauquier silt loam, rolling phase, observed about 2 miles north of Warrenton:

- A<sub>0</sub> 1 to 0 inches, forest litter, moss, and leaf mold.
  - A<sub>1</sub> 0 to 6 inches, dark reddish-brown very friable weak granular silt loam.
  - B<sub>1</sub> 6 to 15 inches, dark reddish-brown friable silty clay loam with weak fine blocky structure; a few widely scattered small greenstone fragments.
  - B<sub>2</sub> 15 to 39 inches, dark-red firm clay or silty clay with moderately developed medium blocky structure; a few small highly weathered greenstone schist fragments; small black specks (possibly concretions) between some of the smaller soil aggregates.
  - C<sub>1</sub> 39 to 54 inches, highly weathered soft greenstone schist containing red friable silty clay loam soil material between the rock cleavage planes.
- 54 inches +, highly weathered greenstone schist grading into less weathered greenstone with increasing depth.

The Clifton soils, developed over greenstone on Blue Ridge Mountain crests, have some properties common to Brown Podzolic soils. Possibly because of the cooler climatic conditions of the Blue Ridge, rock weathering and the podzolization processes have been more retarded and soil stoniness is more pronounced than for the Red-

Yellow Podzolic soils. The Clifton soils, although having moderately well-developed profiles, are rather stony and shallow to bedrock.

The Montalto soils developed over diabase dike rocks, the Davidson soils over coarse-grained Triassic diabase, and the Lloyd soils over greenstone, (undifferentiated) interbedded with mica schist, mica gneiss, and quartzite. All have profiles similar to the Fauquier soil. They differ, however, chiefly in having redder, firmer, and finer textured corresponding horizons, less mica and rock fragments throughout the solum, and greater depth to parent material. The Lloyd soils differ from the Davidson and Montalto soils principally in having lighter colored surface soils and in being more acid. The Davidson soils are deeper and have slightly redder and denser B horizons than the Montalto soils.

The Mecklenburg soils were developed over coarse-grained Triassic diabase. They show one characteristic common to the Planosol great soil group: they have rather plastic and sticky subsoils. Although they exhibit little morphological evidences of restricted internal drainage, their heavy but not impervious subsoils obviously impede the downward movement of water. They differ chiefly from the Fauquier soils in having lighter colored and coarser textured surface soils and more plastic and sticky subsoils.

Soils of the Hiwassee and Dyke series have similar profiles. The Hiwassee soils were derived from fine-textured, stream-terrace alluvium presumably high in bases, whereas the Dyke soil was developed from old colluvial materials washed and rolled from mountain slopes underlain principally by greenstone. Both soils are deeper, more plastic and sticky, and darker red in subsoil color than the Fauquier soils. The Hiwassee soils have slightly deeper and better developed textural and structural profiles than the Dyke soils, although the two soils are separated in mapping largely because of differences in deposition of their parent materials.

Differences in geologic age and resistance to weathering of the parent rock are apparently the causes of differences in development among some of these so-called Reddish-Brown Latosols. Although moderately well developed, some phases of the Montalto soils are moderately shallow to bedrock and contain appreciable quantities of rock fragments in their profiles. These soils were developed from residuum weathered from fine-grained Triassic diabase that is hard and resistant to weathering. Their moderately shallow development is presumably the result of these properties of the parent rock. In contrast, the Davidson soils, developed from weathered products of coarse-grained Triassic diabase, are probably the deepest, densest, and most rock-free normal soils of the county. Since the diabase underlying the moderately shallow Montalto and that underlying the Davidson soil are of the same age and mineralogical composition, differences in the rate and ease of weathering of the two varieties of diabase are believed to be largely the cause of differences in morphology of the two soils.

#### INTRAZONAL SOILS

Some of the soils developed from residual or transported materials have lain in place a comparatively long time and have well-developed profiles; but they have been influenced by extremes in character of parent material, by extremes in relief that inhibit drainage, or by

extremes in age. They possess only a few of the characteristics of zonal soils. Because they are associated geographically with the zonal soils, they are called intrazonal soils.

All the intrazonal soils of Fauquier County are members of the Planosol great soil group. They occur on nearly level areas where both internal and external drainage are restricted or where geologic erosion is negligible. They have certain well-developed characteristics that the zonal soils do not have.

#### PLANOSOLS

Planosols are an intrazonal group of soils with light-colored eluviated mineral surface horizons underlain by mottled yellow and gray mineral B horizons that are more strongly illuviated, cemented, or compacted than those in the associated zonal soils. They have developed under forest vegetation in a humid or subhumid climate, and podzolization, with possibly some gleization, was dominant in their formation. Conditions in the development of the Planosols are: (1) Restricted internal and external drainage caused either by the effects of the parent material or by lack of any appreciable slope, or (2) great age.

In Fauquier County the Planosols are imperfectly to very poorly drained. They have level to gently undulating basinlike relief where the water table, although fluctuating under alternating wet and dry conditions, is relatively high. In such a position their natural erosion and runoff has been low, and they have received much of the runoff from the higher and better drained areas. Thus, the quantity of water percolating through the solum, although slow in movement, has been proportionally great and eluviation and illuviation of the solum have been more severe than for the zonal soils. Under such conditions of relief and drainage, the gradual renewal of the material in the solum by removal of material from the surface and the incorporation of fresh material from below has been small. The soil materials have lain in place a long time, and the Planosols are old not only as regards profile maturity but also in actual years. The humid internal soil conditions have served to restrict aeration and to reduce iron and manganese compounds.

In morphology, the Planosols are characterized by a shallow surface covering of leaf mold and forest litter overlying a uniformly colored or slightly mottled light-colored mineral surface soil. The surface soil is underlain by a heavy plastic mottled yellow and gray subsoil. The strongly illuviated and often waterlogged B horizon, popularly called a claypan, further restricts internal soil drainage. The profiles of the Planosols are strongly developed texturally; but as compared to profiles of the zonal soils, they do not show a marked differentiation in color.

In this county, the Planosols are represented by the Croton, Kelly, Elbert, Calverton, Iredell, Zion, Lignum, Belvoir, Goldvein, and Orange soils of the uplands. The Elbert, Croton, and Kelly have typical Planosol profiles. The others, however, are less poorly drained, occupy more undulating relief, and are less mottled in their B horizons; consequently, their classification as Planosols is less definite.

The Croton soil is underlain by Triassic red shale and sandstone. The following profile, observed about 3 miles north of Bristersburg

on nearly level relief and under deciduous forest, is considered typical of Croton silt loam:

- A<sub>0</sub> 1 to 0 inches, leaf mold and forest litter.
- A<sub>1</sub> 0 to 2 inches, brownish-gray very friable silt loam highly stained with organic matter.
- A<sub>2</sub> 2 to 8 inches, light yellowish-brown, faintly mottled with gray, friable silt loam containing a noticeable quantity of small black concretions.
- A<sub>3</sub> 8 to 12 inches, light yellowish-brown and light brownish-gray friable but somewhat compact heavy silt loam or light silty clay loam; contains some small black concretions.
- B<sub>1</sub> 12 to 22 inches, light to moderate gray, mottled with yellow and light yellowish-brown, silty clay loam; firm and compact when moist and slightly plastic when wet; breaks to rather large blocky aggregates coated with gray mineral films.
- B<sub>2</sub> 22 to 31 inches, strong yellowish-brown, highly mottled with gray, compact very plastic structureless clay or silty clay; contains a few scattered fragments of highly weathered shale in lower part.
- C 31 inches +, highly mottled light olive-gray, light yellowish-brown, and reddish-brown compact plastic and slightly sticky structureless clay or silty clay interbedded with fragments of highly weathered shale; grades into less weathered shale with increasing depth.

The Kelly soils were derived from the weathered products of interbedded Triassic shale and coarse-grained diabase. They are very similar to the Croton soils in profile characteristics. They differ, however, in being considerably more plastic and sticky in their B horizons and in being more fertile and less acid—presumably because of the effects of the diabase component of the parent rocks. The diabase appears to have been forced in between horizons of shale while in a molten state and subsequently solidified.

The Elbert soils were developed over coarse-grained Triassic diabase. They are characterized by profuse mottling throughout the profile and extremely dense sticky impermeable subsoils. They represent a more poorly drained condition of the Iredell soils, which they resemble physically except in being considerably more mottled.

Calverton silt loam is underlain by Triassic red shale and sandstone. It is most typical of the imperfectly drained members of the Planosols. The surface is gently undulating and the vegetation is mixed deciduous-pine forest. The following profile of the soil was observed about 1 mile north of Greenville:

- A<sub>0</sub> ½ to 0 inches, covering of pine needles, deciduous leaves, forest litter, and leaf mold.
- A<sub>1</sub> 0 to 2 inches, light brownish-gray floury very friable almost structureless silt loam.
- A<sub>2</sub> 2 to 12 inches, light yellowish-brown very friable silt loam with weak thin platy structure; a few small dark concretions and scattered small quartz fragments.
- B<sub>1</sub> 12 to 20 inches, light to moderate yellowish-brown, slightly mottled with light-gray, silty clay loam to silty clay; compact and firm when moist and slightly plastic when wet; well developed medium blocky structure; contains a few small black concretions and angular quartz fragments; soil material carried from the A horizon is deposited in old root channels in the upper part of this horizon.
- B<sub>2</sub> 20 to 42 inches, light yellowish-brown, mottled with brown and gray, compact firm silty clay loam with moderate medium angular blocky structure; the gray mottling appears largely as films on the cleavage planes of the soil aggregates; contains a few subrounded quartz rocks and a noticeable amount of small black concretions.
- C<sub>1</sub> 42 inches +, mottled light yellowish-brown, gray, and dark reddish-brown compact firm shaly silty clay loam; dark reddish-brown material consists of highly weathered pieces of shale; a few sub-

rounded quartz pebbles occur locally; unweathered shale appears at a depth of 70 inches.

Soils of the Iredell and Zion series were derived from materials weathered from Triassic diabase. The Iredell soils are conspicuous because of their dense, deep, tough, plastic, and sticky B horizons that have a relatively uniform color and considerably less mottling than those of the Croton soils. Zion soils resemble the Iredell soils in surface soil characteristics, but their B horizons either lack the plasticity of those of the Iredell or contain relatively thin plastic layers.

The Lignum soils were developed over sericite schist and gneiss of the Wissahickon formation. They differ from the Calverton soils chiefly in having slightly thinner profiles and in being slightly micaceous throughout their solums.

Soils of the Belvoir series resemble those of the Calverton series in color, thickness, and arrangement of the soil horizons; but they have denser, more mottled, and plastic B horizons and are more sandy throughout their profiles. Belvoir soils were derived from material weathered from granitic rocks and occur largely on flats in the northern part of the county. These areas appear to be the last remnants of a level divide that once existed between the drainage basins of the Potomac and Rappahannock Rivers.

The Goldvein soils were developed over a coarse-grained, high-quartz granite or quartz monzonite; they are characterized by a high content of moderate-sized quartz crystals throughout the profile. The quartz crystals, left as a residue from the weathering of the rock, are most concentrated in the B horizon and are rather firmly cemented. The Goldvein soils are moderately eluviated and illuviated and have yellowish profiles. They differ chiefly from the Nason soils in having a coarser texture throughout their solums and a semicemented subsoil.

The Orange soils have a very thin dark-gray silt loam surface layer underlain by about 5 inches of pale-yellow to light-gray silt loam. The upper B horizon is a yellow or pale-yellow silty clay loam that is firm in place but crumbles fairly easily with hand pressure. The lower B horizon is a brownish-yellow clay mottled with gray, yellow, and brown. It is tough when dry and plastic when wet. The underlying basic rock is soft and light-colored.

#### AZONAL SOILS

Azonal soils are defined as a group of soils without well-developed profile characteristics, owing to their youth or to conditions of parent material or relief that prevent the development of a normal or zonal profile (6). The azonal soils in Fauquier County are members of the Lithosol and Alluvial great soil groups.

Many of the soils of the uplands have slopes that are steep enough to cause much material developed through soil-forming processes to be removed by geologic erosion and to allow much rainfall to run off instead of percolating through the soil. The normal effects of climate and vegetation are modified and overshadowed by relief. The soils remain young and without well-developed profiles; they develop very few of the characteristics of the zonal soils. The materials are frequently renewed or mixed, and the changes brought about by climate and vegetation are so slight that the soils are essentially A-C

soils, or soils without well-developed B horizons. Where such soils have developed from consolidated bedrock materials, they are of the Lithosol great soil group.

Where the parent materials have been in place only a short time, as, for instance, the transported materials of the alluvial and recent colluvial soils, soil profiles have not developed. The soils in such places are young and have few or none of the characteristics of zonal soils. Although this condition is due largely to lack of time for development, differences within these soils may be due to relief and its affect on drainage. These young soils are of the Alluvial great soil group.

#### LITHOSOLS

Lithosols are an azonal group of soils having no clearly expressed soil morphology and consisting of a freshly weathered mass of rock fragments; they are largely confined to steeply sloping land (6). Such soils are widely spoken of as shallow, mountain, immature, or A-C soils. They have a rather definite A<sub>1</sub> horizon, sometimes a faintly developed A<sub>2</sub>, but no discernible B horizon. The underlying C horizon of parent material may or may not be deeply weathered to consolidated bedrock.

In this county the parent materials of the Lithosols were derived from a great many kinds of rocks. As a result, physical characteristics and productivity of the soils vary widely. These features are also affected by differences in local conditions that govern decomposition of rocks and formation of soil. The Lithosols in Fauquier County are members of the Louisburg, Brandywine, Catoctin, Hazel, Manteo, Penn, Watt, and Catlett series. All of these soils typically are excessively drained and have rolling to steep slopes. Exceptions are the Penn soils, which are undulating to hilly and the Catlett soils, which are on undulating and, in places, nearly level relief. The lack of profile development in the Penn and Catlett soils is believed to be due to resistance to weathering of the underlying baked shale. In places all of the Lithosols have developed miniature profiles—profiles that have fairly distinct A, B, and C genetic horizons but that lack the depth of solum and thickness of horizons possessed by zonal soils.

The Louisburg soils, underlain by arkosic quartzite, have a typical Lithosol profile. The following profile of Louisburg sandy loam was observed about 5 miles south of Marshall on slopes of 14 to 25 percent under vegetation consisting mainly of deciduous trees (largely chestnut oak):

- A<sub>0</sub> 1 to 0 inches, a shallow covering of forest litter, leaf mold, and moss overlying a dense tough mat of plant roots.
- A<sub>1</sub> 0 to 10 inches, light yellowish-brown loose mellow sandy loam containing a few scattered small fragments of partially weathered arkosic quartzite.
- C 10 to 22 inches, yellowish-brown loose sandy loam containing abundant fragments of quartzite; the fragments range from 1 to 6 inches across.

The Lithosols in Fauquier County are naturally shallow and have profiles similar to the Louisburg soil in structure, consistence, thickness, and arrangement of the soil horizons. All of them are rather loose, structureless, or weak-structured throughout their profiles. They differ widely, however, in color, texture, and content of stone,

plant nutrients, and lime. These differences are largely the result of differences in character of the parent rock.

The Brandywine loam and gritty loam soils have developed from materials weathered from granitic rocks. They differ from the Louisburg soils principally in being slightly browner, less sandy, more deeply weathered to bedrock, and more fertile. The granitic rocks underlying the Brandywine soils are more abundantly supplied with plant nutrients than the arkosic quartzite parent rocks of the Louisburg soils.

The Catoctin and Brandywine silt loam soils are distinctive in being the only Lithosols derived from basic parent rocks. Developed over schistose greenstone that occurs as dikes in granite, the Brandywine soils are light textured and relatively stone free throughout their profiles and are considerably browner and more fertile than the Louisburg soils. The Catoctin soils were derived from greenstone; and although they resemble the Louisburg soils in color, they are much finer textured and more fertile.

The Hazel and Manteo soils have similar profiles and differ chiefly from the Louisburg soils in being lighter textured and containing considerably more weathered rock fragments throughout their solums. The Hazel soils were developed over mica schist, mica gneiss, and slate; and the Manteo soils over sericite schist and gneiss. Although both soils are similar physically, the Hazel soil is less acid and apparently more fertile than the Manteo.

The Penn, Catlett, and Watt soils are conspicuous because each exhibits a color inherited from its parent rock. Penn soils are underlain by purplish-red Triassic shale, Catlett soils by blue-gray baked Triassic shale, and Watt soils by black graphitic schist and slate. These soils differ from the Louisburg soils in color and in having lighter textures and a higher proportion of rock fragments.

The Lithosols show a striking relationship between the plant-nutrient and lime content of their parent rocks and their natural fertility and reaction. The Louisburg, Hazel, Penn, Catlett, Manteo, and Watt soils were developed over parent rocks that are low in plant nutrients and lime; consequently they are rather low in natural fertility and strongly to extremely acid in reaction. On the other hand, the parent rocks of the Brandywine and Catoctin soils are more abundantly supplied with plant nutrients and lime, and these soils are more fertile and less acid.

The texture of the soil horizons of the Lithosols appears to be closely related to the texture and content of quartz grains of the parent rocks. For example, the Louisburg and Brandywine loam and gritty loam soils are derived from coarse-textured rocks high in quartz-grain content and have sandy loam, gritty loam, or loam textures throughout their solums. The Hazel, Catoctin, Brandywine silt loam, Penn, Catlett, Manteo, and Watt soils have fine-textured parent rocks low in quartz and are typically a silt loam throughout their profiles.

#### ALLUVIAL SOILS

Alluvial soils constitute an azonal group of soils developed from transported and relatively recently deposited alluvial and colluvial materials characterized by a very weak modification (or none) of the original material by soil-forming processes. These processes are

governed by the characteristics of the region, but they have had very little effect on the Alluvial soils. The soils are young or very young, and their characteristics are closely related to those of the parent material.

Neither horizons of eluviation nor of illuviation are characteristic of the Alluvial soils. Although layers that differ in characteristics do appear within some of these soils, they are the result of differences in drainage or alluvial deposits or various combinations of both. In this county the Alluvial soils are similar in depth, texture of subsurface material, structure, and consistence. All of them are friable to very friable, structureless or weakly granular, and light textured throughout their deep profiles. They differ, however, chiefly in color. Uniform brown or reddish-brown colors prevail throughout well-drained Alluvial soil profiles; these colors are closely related to the color of the parent material. Mottled colors, resulting from reduction of iron and other compounds, prevail in subsurface layers of the imperfectly drained and throughout the profiles of poorly drained Alluvial soils.

Alluvial soils in Fauquier County are the Starr, Seneca, Worsham, Meadowville, and Rohrersville soils of the recent colluvial slopes and the Congaree, Chewacla, Wehadkee, Bermudian, Rowland, and Bowmansville soils of the first bottoms. Differentiation between series in this group is based largely on characteristics that are determined by composition of the parent material and conditions of drainage.

The Starr soil of the recent colluvial slopes consists of soil materials washed chiefly from upland soils having reddish or brownish subsoils and acidic parent rocks. Most of this soil is in the northern part of the county in close association with the Chester and Brandywine soils of the uplands and consists largely of materials washed from these soils. The Starr soil is well drained and is one of the most typical and extensive Alluvial soils. The following profile of Starr silt loam, consisting of recent colluvial material washed from upland soils underlain by granite, was observed about 1½ miles west of Jerry's Shop on a gently undulating area in permanent bluegrass pasture:

- 0 to 23 inches, brown to dark-brown fairly loose mellow silt loam with weak crumb structure; crumbles to a uniform mass with light pressure.
- 23 to 40 inches, brown to dark-brown friable heavy silt loam to silty clay loam in lower part; contains a few, small, angular quartz grains; breaks out in small rather weakly developed blocky aggregates that crush with slight pressure; numerous old root and worm channels; overlies the old land surface at about 40 inches from the present surface.

Soils of the Seneca series were formed from recent colluvial materials that came chiefly from light-colored soils of the uplands underlain by acidic rocks such as granitic rocks (see note 6, table 2), quartzite, mica schist, mica gneiss, or slate. The Seneca soils are moderately well drained. The entire profile is light in color in comparison to the brown or reddish-brown color of the Starr soil, and locally the lower part is faintly mottled with gray.

The Worsham soil is closely related to the Seneca in that it was derived from similar parent materials. However, it is poorly drained and is characterized by highly mottled dense plastic subsurface layers. In places these heavy layers appear to be derived from

materials weathered in place from underlying acidic rocks. The profile resembles that of the Planosols in the lower parts. The Worsham soil therefore may be designated as an alluvial soil with a gley layer, so as to indicate its resemblance to these intrazonal soils. (Humic-Gley and Low Humic-Gley are proposed names for soils with gley horizons.)

The well-drained Meadowville soil consists of recent colluvial materials washed from upland soils, principally those of the Fauquier series, that are underlain by Catocin greenstone. It closely resembles the Starr soil but typically is redder and siltier.

The Rohrsersville soil is closely associated with the Meadowville and is poorly drained. It is derived mainly from parent materials similar to those of the Meadowville soil, but some areas have lower horizons apparently derived from materials weathered in place from the underlying greenstone rock. Like the Worsham soil, the Rohrsersville soil has a rather heavy, plastic, strongly mottled subsoil resembling that of Planosols; consequently it may be designated as an alluvial soil with gley subsoil.

The Alluvial soils of the first bottoms are derived from the two general types of parent material. The Bermudian, Rowland, and Bowmansville soils comprise a catena of first bottom soils derived from alluvium that washed from uplands underlain chiefly by Triassic shale and sandstone. Differences among these soils are due to differences in drainage; the Bermudian soils are well drained, the Rowland imperfectly drained, and the Bowmansville poorly drained. In general, the soils of the Bermudian-Rowland-Bowmansville catena are characterized by a reddish-brown color with a purplish cast. They have this color because their parent materials were washed chiefly from upland Penn and Bucks soils.

Soils of the Congaree, Chewacla, and Wehadkee series also constitute a soil catena, as they were derived from similar parent material and owe their differences mainly to drainage. All are derived from mixed alluvium washed from uplands underlain by a variety of rocks common to the county. In this catena, the Congaree soils are well drained, the Chewacla imperfectly drained, and the Wehadkee poorly drained.

#### CATENAS

Soils of each of the three broad categories—zonal, azonal, and intrazonal—may be derived from similar kinds of parent material. Within any one of these categories, however, major differences among soils appear to be closely related to differences in the kinds of parent material from which the soils were derived. A group of soils derived from similar parent material, but differing greatly in characteristics because of differences in relief and drainage under which they have developed, is called a soil catena. The Manteo, Tatum, Nason, and Lignum soils developed over sericite and biotite schist and gneiss comprise such a group. Within this catena several great soil groups are represented. For example, Manteo is the Lithosol; Tatum, the reddish member of the Red-Yellow Podzolic soils; Nason, the yellowish member of Red-Yellow Podzolic soils; and Lignum, the Planosol.

## SOIL SURVEY METHODS AND DEFINITIONS

Soil surveying consists of the examining, classifying, and mapping of soils in the field. The soil scientist walks over the area at intervals not more than one-quarter mile apart and bores into the soil with an auger or digs holes with a spade. Each such boring or hole shows the soil to consist of several distinctly different layers, called horizons, which collectively are known as the soil profile. Each of these horizons is studied carefully for the things about it that affect plant growth.

The color of each horizon is noted. There is usually a relationship between the darkness of the surface layer and its content of organic matter; streaks and spots of gray, yellow, and brown in lower layers generally indicate poor drainage and poor aeration.

Texture—the content of sand, silt, and clay in each layer—is determined by the feel of the soil when rubbed between the fingers and is checked by mechanical analyses in the laboratory. Texture determines to a considerable extent the quantity of moisture the soil will hold available to plants, whether plant nutrients or fertilizers will be held by the soil in forms available to plants or will be leached out, and the difficulty or ease of cultivating the soil.

Soil structure, or granulation, and the number of pores or open spaces between soil particles determine the permeability or perviousness of the soil, and consequently the ease with which plant roots penetrate the soil and water enters it.

Consistence, or the tendency of the soil to crumble or to stick together, determines the degree of difficulty that will be encountered in keeping the soil open and porous under cultivation. Consistence covers such soil characteristics as hardness, friability, plasticity, stickiness, compactness, toughness, and cementation.

Surface soil ordinarily refers to the surface layer, which is usually 5 to 10 inches thick. The layer just below the surface soil is the subsoil; the layer beneath the subsoil, the substratum.

The kind of rocks and the parent material that develops from these rocks affect the quantity and kind of plant nutrients found in the soil. Simple chemical tests show the degree of acidity<sup>22</sup> of the soil. The depth to bedrock or to compact layers is determined. The quantity of gravel or rocks that may interfere with cultivation, the steepness and kind of slope, erosion, and other external features are observed.

On the basis of all these characteristics, soil areas that are much alike in the kind, thickness, and arrangement of their horizons are mapped as one soil type. Some soil types are separated into two or

<sup>22</sup> The reaction of the soil is its degree of acidity, or alkalinity, expressed mathematically as the pH value. A pH value of 7 indicates precise neutrality, higher values alkalinity, and lower values acidity. Terms referring to reaction that are commonly used in this report are defined in the Soil Survey Manual (?) as follows:

	pH		pH
Extremely acid.....	Below 4.5	Neutral.....	6.6-7.3
Very strongly acid.....	4.5-5.0	Mildly alkaline.....	7.4-7.8
Strongly acid.....	5.1-5.5	Moderately alkaline.....	7.9-8.4
Medium acid.....	5.6-6.0	Strongly alkaline.....	8.5-9.0
Slightly acid.....	6.1-6.5	Very strongly alkaline..	9.1 and higher

more phases. For example, if a soil type has slopes that range from 2 up to 25 percent, the type may be mapped in three phases, an undulating phase (2 to 7 percent slopes), a rolling phase (7 to 14 percent slopes), and a hilly phase (14 to 25 percent). A soil that has been eroded in places may be mapped in two or more phases, an uneroded or normal phase (denoted by the name of the soil type only), an eroded phase, and perhaps a severely eroded phase. A soil type will be broken into phases primarily because of differences in the soil other than those of kind, thickness, and arrangement of horizons. The slope of a soil, the frequency of outcropping bedrock, the extent of erosion, or artificial drainage are characteristics that might cause a soil type to be divided into phases.

Two or more soil types may have similar profiles; that is, the soil horizons may be nearly the same except that the texture, especially of the surface layer, may differ. As long as the other characteristics of the horizons are similar, these soils are considered to belong in the same soil series. A soil series therefore consists of all the soil types, whether the number be only one or several, that are, except for texture—particularly the texture of the surface layer—about the same in kind, thickness, and arrangement of horizons.

The soil type, or where the soil type is subdivided, the soil phase, is the unit of mapping in soil surveys. It is the unit or the kind of soil that is most nearly uniform and has the narrowest range of characteristics. For this reason land use and soil management practices can be more definitely specified for it than for broader groups of soils that contain more variation. One can say, for example, that soils of the Elioak series need lime for alfalfa. Statements can be more specific for Elioak silt loam, undulating phase. It has mild slopes, needs lime, and is suited to row crops grown in a short rotation with a small grain and hay. Similarly, Elioak silt loam, eroded rolling phase, needs lime, has slopes that fall more than 7 feet in 100, is harder to work with heavy machinery than the undulating phase, erodes easily, should be used in a longer crop rotation, and when cropped should be protected by any necessary erosion control devices. Both phases are in the Elioak series.

The name of a place near where a soil series was first found is chosen as the name of the series. Thus, Fauquier is the name of a deep, well-drained, acid soil series found on material weathered from greenstone rock in Fauquier County. Two types of the Fauquier series are found—Fauquier silt loam and Fauquier silty clay loam. These differ in the texture of the surface soil, as their names show. Fauquier silt loam is divided into three phases because some of it is undulating, some is rolling, and some is hilly. These three phases are Fauquier silt loam, undulating phase; Fauquier silt loam, rolling phase; and Fauquier silt loam, hilly phase.

When very small areas of two or more kinds of soil are so intricately mixed that they cannot be shown separately on a map of the scale used, they are mapped together, and the areas of the mixture are called a soil complex. Chester-Brandywine loams, rolling phases, is a complex of Chester loam, rolling phase, and Brandywine loam, rolling phase.

Areas such as stony steep land, gullied land, and stony colluvial land are known as miscellaneous land types. They are not designated

by series and type names but are given descriptive names, such as Stony steep land, acidic rock, Rough gullied land, and Stony colluvium.

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