SOIL SURVEY

Tucker County

Part of Northern Randolph County

West Virginia

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service and Forest Service
In cooperation with
WEST VIRGINIA AGRICULTURAL EXPERIMENT STATION

Major fieldwork for this soil survey was done in the period 1959–64. Soil names and descriptions were approved in 1965. Unless otherwise indicated, statements in the publication refer to conditions in the Area in 1964. This survey was made cooperatively by the Soil Conservation Service, the Forest Service, and the West Virginia Agricultural Experiment Station; it is part of the technical assistance furnished to the Tygart's Valley Soil Conservation District.

HOW TO USE THE SOIL SURVEY

THIS SOIL SURVEY of Tucker County and part of northern Randolph County, W. Va., contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, or other structures; and in appraising the value of tracts of land for agriculture, industry, or recreation.

Locating Soils

The soils of Tucker County and part of northern Randolph County are shown on the detailed map at the back of this report. This map consists of many sheets that are made from aerial photographs. Each sheet is numbered to correspond with numbers shown on the Index to Map Sheets.

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

Finding and Using Information

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

Individual colored maps showing the relative suitability or limitations of soils for many specific purposes can be developed by using the soil map and information in the text. Interpretations not included in the text can be developed by grouping the soils according to their suitability or limitations for a particular use. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and the discussions of the interpretative groupings.

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

Game managers, sportsmen, and others concerned with wildlife will find information about soils and wildlife in the section "Wildlife." Sportsmen may also be interested in the section "Soils in Recreational Areas."

Community planners can find useful information in the sections "General Soil Map," "Engineering Applications," "Soils in Recreational Areas," and "Soils in Residential Developments."

Engineers and builders will find under "Engineering Applications" tables that give engineering descriptions of the soils in the Area and that name soil features that affect engineering practices and structures. They may also be interested in tables that give ratings of the soils for recreational facilities in the section "Soils in Recreational Areas."

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

Students, teachers, and others will find information about soils and their management in various parts of the text.

Newcomers in Tucker and Randolph Counties may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the Area," which gives additional information about the area.

Cover picture.—Pasture, hay, and grain on the Belmont, Calvin, and Dekalb soils in Canaan Valley. The elevation is more than 3,000 feet.

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NOTICE TO LIBRARIANS

Series year and series number are no longer shown on soil surveys. See explanation on the next page.

Issued March 1967

EXPLANATION

Series Year and Series Number

Series year and number were dropped from all soil surveys sent to the printer after December 31, 1965. Many surveys, however, were then at such advanced stage of printing that it was not feasible to remove series year and number. Consequently, the last issues bearing series year and number will be as follows:

Series 1957, No. 23, Las Vegas and Eldorado Valleys Area, Nev.
Series 1958, No. 34, Grand Traverse County, Mich.
Series 1959, No. 42, Judith Basin Area, Mont.
Series 1960, No. 31, Elbert County, Colo. (Eastern Part)
Series 1961, No. 42, Camden County, N.J.
Series 1962, No. 13, Chicot County, Ark.
Series 1963, No. 1, Tippah County, Miss.

Series numbers will be consecutive in each series year, up to and including the numbers shown in the foregoing list. The soil survey for Tippah County, Miss., will be the last to have a series year and series number.

SOIL SURVEY OF TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA

BY CRAIG K. LOSCHE, FOREST SERVICE, AND W. W. BEVERAGE, SOIL CONSERVATION SERVICE

SOILS SURVEYED BY CRAIG K. LOSCHE, ROBERT W. DOUGLASS, JAMES C. BYRNE, CHARLES R. GASS, ALBERT F. IKE, JR., FOREST SERVICE, AND W. W. BEVERAGE AND JOHN W. WARNER, JR., SOIL CONSERVATION SERVICE.

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE AND FOREST SERVICE, IN COOPERATION WITH THE WEST VIRGINIA AGRICULTURAL EXPERIMENT STATION.

TUCKER COUNTY AND RANDOLPH COUNTY are in the northeastern part of West Virginia. The area covered by this soil survey is shown in figure 1. It totals 333,440 acres, or 521 square miles, of which 269,869 acres is in Tucker County and the rest in Randolph County. More than three-fourths of the acreage is forested. Little of it is suited to intensive farming, because the terrain is steep, the surface stony, and the growing season short. Beef cattle, forest products, recreation, and coal mining are significant in the economy.

For convenience, the area covered by this survey is referred to in the text of this report as the Tucker-Randolph Area or as the survey Area.

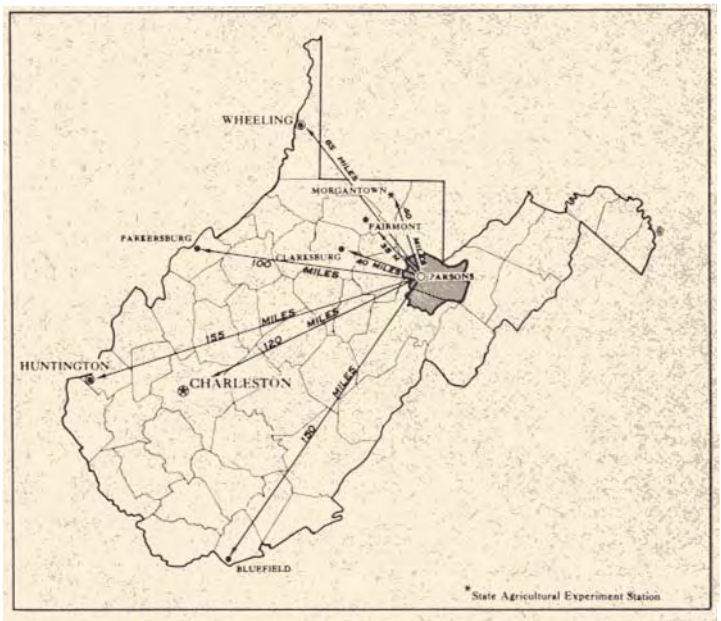

Figure 1.—Location of the Tucker-Randolph Area (Tucker County and part of northern Randolph County) in West Virginia.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in the Tucker-Randolph Area, where they are located, and how they can be used.

They went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. To use this report efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, the major horizons of all the soils of one series are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Dekalb and Meckesville, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that go with their behavior in the natural, untouched landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

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

Some types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Dekalb channery loam, 3 to 10 percent slopes, is one of several phases of Dekalb channery loam, a soil type that has a slope range of 3 to 65 percent.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this report was prepared from the aerial photographs.

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

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed or occur in individual areas of such small size that it is not practical to show them separately on the map. Therefore, they show such a mixture of soils as one mapping unit and call it a soil complex. Ordinarily a soil complex is named for the major kinds of soil in it, for example, Very stony land-Dekalb complex, 20 to 40 percent slopes. Another kind of mapping unit is the undifferentiated group, which consists of two or more soils that may occur together without regularity in pattern or relative proportion. The individual tracts of the component soils could be shown separately on the map, but the differences between the soils are so slight that the separation is not important for the objectives of the soil survey. An example of an undifferentiated group is Brinkerton and Nolo extremely stony soils, 3 to 15 percent slopes.

On most soil maps it is necessary to show areas that are so rocky, so shallow, or so frequently worked by wind and water that they scarcely can be called soils. These areas are shown on the map like other mapping units, but they are given descriptive names, such as Sandstone rubble land or Wet terrace land, and are called land types rather than soils.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way that it is readily useful to different groups of readers, among them farmers, ranchers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in the soil survey reports. On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others, and then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

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

A map showing soil associations is useful to people who want a general idea of the soils in an area, who want to compare different parts of an area, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

The nine associations in the Tucker-Randolph Area are described briefly in this section. More detailed information about the individual soils in each association can be obtained by studying the detailed soil map and by reading the section "Descriptions of the Soils."

1. Gilpin association

Moderately deep, yellowish-brown soils on steep side slopes and narrow ridgetops

In this association are steep-sided ridges that have narrow tops. The ridges are separated by small streams bordered by narrow gravelly flood plains. The soils that make up the association have a yellowish-brown color and are moderately deep and acid. The association occupies about 24 percent of the survey Area and is in the western part.

The Gilpin soils are the most extensive soils on the uplands in this general area, and they occupy about 85 percent of this association. Small areas of the Dekalb soils occur in a mixed pattern with the Gilpin soils on the narrow ridgetops. The Gilpin and Dekalb soils are well drained and are very strongly acid. The Dekalb soils are coarser textured than the Gilpin soils, however, and contain more fragments of sandstone.

Soils that occupy a minor acreage in this association are the moderately well drained Ernest soils on the lower side slopes and around the heads of streams. Gravelly soils on bottom lands occur in the narrow valleys.

Most of this association can be used only for timber and wildlife habitats, because the Gilpin and Dekalb

soils are too steep, acid, and too droughty. At present, the areas farmed are mostly on the wider ridgetops and on the bottom lands. Many of the areas that formerly were farmed, especially the steeper ones, are now used for unimproved pasture or have reverted to woodland.

2. Barbour-Pope-Sequatchie association

Nearly level or gently sloping soils on bottom lands and terraces along the larger streams

This association consists of nearly level or gently sloping soils on bottom lands and terraces along the major streams. It occupies about 5 percent of the survey Area.

The main soils of this association are the Barbour, Pope, and Sequatchie. All of these soils are deep and well drained, but the Barbour and Pope soils are subject to more frequent flooding than the Sequatchie. Philo and Monongahela soils also occupy a considerable acreage in the association. They are moderately well drained, but the Monongahela soils have a firm pan in the subsoil.

Minor soils are gray Atkins soils in low areas that are frequently flooded and gray, dense Tyler and Purdy soils, generally on stream terraces. These and most of the other minor soils of the association are mottled at or near the surface.

At present, most of this association is used for cultivated crops or for hay and pasture. The Barbour, Pope, and Sequatchie soils are generally excellent for crops, and this association is more favorable for farming than any of the other associations in the survey Area. In some places the frequency of flooding and the degree of natural drainage limit the use of the soils. Some of the more poorly drained soils can be used for crops other than hay and pasture if artificial drainage is established.

3. Calvin association

Moderately deep, reddish-brown soils, mainly on steep slopes

This association is on steep-sided ridges in the uplands. Narrow stream valleys separate the ridges. This association occupies about 12 percent of the survey Area.

The Calvin soils, which have slopes of more than 30 percent in most places, occupy about 90 percent of this soil association. Mixed with the Calvin soils are areas of Dekalb soils on gently sloping benches and ridgetops. There are small acreages of other soils, mainly gravelly alluvial soils along the streams and the moderately well drained Ernest soils on the lower slopes.

The steep slopes in the areas of Calvin soils limit the use of the soils in this association mainly to timber and wildlife. These soils are also very acid and are rather low in fertility. Some of the wider gently sloping ridgetops are farmed.

4. Dekalb-Calvin-Belmont association

Moderately deep or deep soils on long, steep mountain slopes

This association is mostly on long and steep slopes in mountainous areas. These long slopes are broken by gently sloping and moderately sloping benches. Many areas are covered with stones. This association, more mountainous than associations 1 and 3, occupies about 18 percent of the survey Area and is mainly in the southern and eastern parts.

The soils of this association are well drained and are moderately deep or deep. Strongly acid Dekalb soils are on the upper part of the slopes; medium acid, reddish-brown Calvin soils that have a neutral substratum are on the middle part of the slopes; and slightly acid to neutral, reddish-brown Belmont soils are on the lower part of the slopes. Deep, well-drained, reddish-brown Meckesville soils that are gently sloping generally occur at the foot of the slopes. The Calvin soils that have a neutral substratum have thin seams of calcareous material in the underlying bedrock. They are less acid than the Calvin soils of association 3.

Most of this association is too steep and stony to be farmed successfully, and the areas are used mainly for timber and wildlife. Some areas of the Belmont, Calvin, and Meckesville soils were formerly cleared and farmed, however, because those soils have higher natural fertility than many of the other soils of the survey Area. Some of the acreage that was formerly cultivated is still used for hay or pasture, but much of it has reverted to woodland.

5. Dekalb-Gilpin association

Moderately deep or deep, well-drained, steep soils that developed in material weathered from sandstone and shale

This association is on Middle Mountain in the southern part of the survey Area. It consists of long, steep slopes on both sides of the narrow, gently sloping mountaintop. The association occupies about 5 percent of the survey Area.

Moderately deep to deep, well-drained Dekalb soils, on the top of the mountain and on the long, steep side slopes, make up about 70 percent of this association. They developed in material weathered from acid sandstone. Mixed with the areas of Dekalb soils are scattered areas of Gilpin soils, which are finer textured than the Dekalb. These Gilpin soils developed mainly in material weathered from shale.

Minor soils of this association are the reddish-brown, well-drained Calvin soils in small areas of the uplands. Alluvial land occupies a small acreage in narrow areas along intermittent streams.

In a large part of this association, the Dekalb and Gilpin soils are too steep, acid, droughty, and low in natural fertility to be suitable for cultivated crops. Most of the steep areas are used for timber and wildlife habitats. However, some of the gently sloping areas on the mountaintop are in cultivated crops or are used for grasses and legumes grown for hay or pasture.

6. Very stony land-Dekalb association

Moderately deep or deep, very stony, steep soils on side slopes in mountainous areas

In this association are steep soils on the sides of mountains. This is the steepest and roughest of the associations, and 40 to 90 percent of the surface is covered with stones and boulders. This association occupies about 3 percent of the survey Area. It is along the canyons of the Blackwater River (fig. 2), Red Creek, and Otter Creek.

Figure 2.—A view of Very stony land and the Dekalb soils of association 6. Blackwater Gorge is in the background.

Well-drained Very stony land and Dekalb soils occupy about 70 percent of this association. The rest of the acreage consists of areas of sandstone rubble land, where more than 90 percent of the surface is covered with stones and boulders, areas of moderately well drained Ernest soils, and areas of rock outcrops.

The steep slopes and stones make this association unsuitable for crops, and its use is limited to timber and wildlife habitats. The scenery attracts a large number of tourists to Tucker County each year. The canyon of the Blackwater River is especially attractive. A spectacular view of the timber-covered slopes can be seen from the high cliffs of erosion resistant rocks that border the canyon.

7. *Dekalb-Brinkerton association*

Gently sloping to moderately steep, well-drained to poorly drained soils of the mountain plain

This association is on the mountain plain near the towns of Thomas and Davis in Tucker County. It is mainly gently sloping, but there are some moderately steep slopes along the streams. This area was severely and repeatedly burned over during and after the logging operations that were started about 70 years ago. In about 2,000 acres, the surface has been disturbed by strip mining for coal. This association occupies about 6 percent of the survey Area.

Well-drained Dekalb soils in the steeper areas and on the gently sloping ridges occupy about 45 percent of this association. About 40 percent is composed of somewhat poorly drained to poorly drained Brinkerton soils on long, gentle slopes near the drainageways. Well-drained Gilpin soils occupy small areas. Other small areas are occupied by soils that are moderately well drained, poorly drained, or very poorly drained.

The large acreage of somewhat poorly drained or poorly drained soils and a growing season that is too short for corn and most other cultivated crops limit the use of this association primarily to timber and wildlife. Most areas of the Dekalb soils support stands of trees. The Brinkerton soils and other poorly drained or very poorly drained soils have a cover of native grasses, ferns, and some small trees.

8. *Very stony land-Ernest-Brinkerton-Leetonia association*

Nearly level to moderately sloping, very stony soils

This association is on Backbone and Canaan Mountains and in areas near Red Creek and Otter Creek (fig. 3). The areas are mainly gently sloping, but some are nearly level or moderately steep. Large fragments of sandstone generally cover 40 to 100 percent of the surface. The areas in Tucker County, especially those on Canaan Mountain and near the headwaters of Red Creek, were severely and repeatedly burned over during and after logging operations that were started about 70 years ago. This association occupies about 20 percent of the survey Area.

The Very stony land-Ernest complex occupies a large part of this association. The soils of that complex are on long, moderate, colluvial slopes. Somewhat poorly drained or poorly drained Brinkerton soils are on gentle slopes near the drainageways. Well-drained Leetonia and Dekalb soils are on the sandstone material of the ridges. The rest of this association is made up of poorly drained soils and of Sandstone rubble land. The areas of Sandstone rubble land are nearly covered with stones and boulders.

Stones, poor drainage, and a comparatively short growing season limit the use of this association to timber and wildlife. Spruce has become established and grows well, mainly in the areas of Sandstone rubble land and on other extremely stony soils. The less stony soils have a good stand of such trees as black cherry, sugar maple, and American beech. Huckleberries grow along Allegheny Mountain in stony areas not covered by forest. Cranberries grow in some of the bogs near the headwaters of Red Creek.

Figure 3.—An area of association 8 on Canaan Mountain near Red Creek.

9. *Wet terrace land-Blago-Dekalb association*

Nearly level to moderately steep, very poorly drained to well-drained soils of the Canaan Valley

This association is in Canaan Valley, which is drained by the Blackwater River and is about 3,200 feet above sea level. It is mainly gently sloping, but some parts are

nearly level or moderately steep. Poorly drained soils and organic soils are dominant. This association occupies about 7 percent of the survey Area.

Wet terrace land, very poorly drained Blago soils, and areas of Muck and Peat make up about 45 percent of this association. Well-drained Dekalb soils, Calvin soils that have a neutral substratum, and Belmont soils occupy the gently sloping areas on ridges. They occur throughout Canaan Valley in a mixed pattern, especially in the southern end of the valley.

Other soils that are fairly extensive in this association are the well-drained, reddish-brown Meckesville soils; the moderately well drained, reddish-brown Albrights soils; and the yellowish-brown Ernest soils. The Meckesville, Albrights, and Ernest soils are gently sloping and are at the foot of the mountains that surround Canaan Valley (fig. 4).

Figure 4.—**Area of association 9 in Canaan Valley north of Weiss Knob. Albrights and Brinkerton soils are in the foreground; Blago soils covered by a stand of spruce and balsam are beyond the fields of cultivated crops; and Dekalb and related soils are on the mountains in the distance.**

The well drained and moderately well drained soils of this association are used for hay, pasture, or trees. Most of the poorly drained soils are covered with sedges, native grasses, and ferns. On the very poorly drained Blago soils are several stands of balsam fir.

Descriptions of the Soils

In this section the soils of the Tucker-Randolph Area are described in detail. The procedure is to describe first each soil series and then the mapping units in that series. Thus, to get full information on any one mapping unit, it is necessary to read the descriptions of that unit and also the description of the soil series to which it belongs.

The soil series contains a description of a profile that is considered typical, or representative, of all the soils of the series. If the profile of a given mapping unit differs from this typical profile, the differences are stated in the description of the mapping unit, unless they are apparent from the name of the mapping unit. Many of the more common terms used in describing soil series and mapping units are defined in the Glossary, and some are defined in the section "How This Survey Was Made."

The approximate acreage and proportionate extent of the soils are shown in table 1. At the back of the report is a list of the mapping units in the Area and the capability unit and the woodland group each is in. The page where each of these groups is described is also given.

Albrights Series

In the Albrights series are deep, moderately well drained, gently sloping to moderately sloping soils that developed in colluvial material. These soils are mainly in Canaan Valley. In many places they are on the lower part of slopes, below areas of the Belmont soils and areas of the Calvin soils that have a neutral substratum. They are near areas of the Meckesville soils and Wet terrace land.

The Albrights soils have moderate natural fertility and are strongly acid. The upper part of their profile is moderately permeable, but the lower part contains a fragipan that is slowly permeable.

Typical profile in an area of Albrights silt loam that has a slope of 6 percent, half a mile southeast of State Route No. 32 in the north-central end of Canaan Valley, in Tucker County:

A1—0 to 2 inches, very dark brown (10YR 2/2) silt loam; moderate, fine, granular structure; friable; strongly acid; abrupt, smooth boundary. 0 to 4 inches thick.

A2—2 to 6 inches, dark reddish-brown (5YR 3/3) silt loam; moderate, medium, granular structure; friable; strongly acid; clear, smooth boundary. 2 to 7 inches thick.

B21t—6 to 18 inches, reddish-brown (5YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; discontinuous clay films on the surfaces of the peds; strongly acid; clear, gradual boundary. 8 to 14 inches thick.

B22t—18 to 28 inches, reddish-brown (5YR 5/4) silty clay loam; common, fine, distinct, strong-brown (7.5YR 5/8) mottles; moderate, coarse, subangular blocky structure; firm; surfaces of the peds are reddish brown (5YR 5/3); manganese concretions are common; strongly acid; clear, smooth boundary. 8 to 14 inches thick.

Bx—28 to 38 inches +, yellowish-red (5YR 4/6) gravelly silty clay loam; few, fine, distinct, strong-brown mottles; massive; very firm; manganese concretions are common; 65 percent gravel and angular fragments of siltstone; strongly acid. 10 to 20 inches thick.

The depth to the fragipan ranges from 18 to 30 inches and the depth to mottling from 15 to 18 inches. The reaction ranges from strongly acid to medium acid. The texture of the B2 horizon and the fragipan ranges from fine silt loam to silty clay loam. The fragipan is weakly defined to evident.

Albrights silt loam, 3 to 8 percent slopes (AbB).—This soil is near drainageways. Included with it in mapping are small areas where the slope is less than 3 percent and small areas of somewhat poorly drained or poorly drained soils. Seep spots and intermittent springs are common.

Slow permeability of the subsoil is the quality that most strongly influences use and management. Natural fertility is moderate, and the reaction is strongly acid.

This soil is well suited to most crops commonly grown in the Area, but not to deep-rooted crops. (Capability unit IIe–13; woodland group 5)

Albrights silt loam, 8 to 15 percent slopes (AbC).—This soil is near drainageways. It has irregular slopes in many places because it has been dissected by these drainageways. Small wet spots are common.

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

Soil	Tucker County		Randolph County		Survey Area	
	Area	Extent	Area	Extent	Area	Extent
	Acres	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*
Albrights silt loam, 3 to 8 percent slopes	953	0.3	15	(1)	968	0.3
Albrights silt loam, 8 to 15 percent slopes	112	(1)	7	(1)	119	(1)
Allegheny silt loam, 3 to 8 percent slopes	232	.1	67	.1	299	.1
Allegheny silt loam, 8 to 15 percent slopes	174	.1	229	.4	403	.1
Alluvial land	1,965	.7	1,280	2.0	3,245	1.0
Atkins silt loam	2,232	.8	213	.3	2,445	.7
Barbour and Pope fine sandy loam	667	.2	405	.6	1,072	.3
Barbour and Pope fine sandy loam, high bottom	697	.3	319	.5	1,016	.3
Barbour and Pope gravelly sandy loam	1,621	.6	375	.6	1,996	.6
Barbour and Pope gravelly sandy loam, high bottom	347	.1	136	.2	483	.1
Barbour and Pope cobbly loamy sand	9	(1)	75	.1	84	(1)
Belmont silt loam, 3 to 10 percent slopes	821	.3	27	(1)	848	.3
Belmont silt loam, 10 to 20 percent slopes	816	.3	57	.1	873	.3
Belmont silt loam, 20 to 30 percent slopes	397	.1	206	.3	603	.2
Belmont silt loam, 30 to 40 percent slopes	195	.1	337	.5	532	.2
Belmont very stony silt loam, 3 to 20 percent slopes	652	.2	124	.2	776	.2
Belmont very stony silt loam, 20 to 30 percent slopes	645	.2	386	.6	1,031	.3
Belmont very stony silt loam, 30 to 40 percent slopes	1,791	.7	650	1.0	2,441	.7
Belmont very stony silt loam, 40 to 70 percent slopes	3,261	1.2	2,480	3.9	5,741	1.7
Blago silt loam	1,730	.6			1,730	.5
Blago silt loam, overflow	1,849	.7	53	.1	1,902	.6
Brinkerton silt loam, 0 to 3 percent slopes	362	.1	22	(1)	384	.1
Brinkerton silt loam, 3 to 8 percent slopes	3,932	1.5	21	(1)	3,953	1.2
Brinkerton silt loam, 8 to 15 percent slopes	481	.2			481	.1
Brinkerton and Nolo extremely stony soils, 3 to 15 percent slopes	12,571	4.7	1,190	1.9	13,761	4.1
Calvin channery silt loam, 3 to 10 percent slopes	235	.1	57	.1	292	.1
Calvin channery silt loam, 10 to 20 percent slopes	1,282	.5	543	.9	1,825	.5
Calvin channery silt loam, 10 to 20 percent slopes, severely eroded	138	.1			138	(1)
Calvin channery silt loam, 20 to 30 percent slopes	1,730	.6	868	1.4	2,598	.8
Calvin channery silt loam, 20 to 30 percent slopes, severely eroded	129	.1	4	(1)	133	(1)
Calvin channery silt loam, 30 to 40 percent slopes	2,267	.8	948	1.5	3,215	1.0
Calvin channery silt loam, 30 to 40 percent slopes, severely eroded	287	.1			287	.1
Calvin channery silt loam, 40 to 65 percent slopes	12,700	4.7	3,780	6.0	16,480	4.9
Calvin channery silt loam, neutral substratum, 3 to 10 percent slopes	1,095	.4	112	.2	1,207	.4
Calvin channery silt loam, neutral substratum, 10 to 20 percent slopes	1,109	.4	494	.8	1,603	.5
Calvin channery silt loam, neutral substratum, 20 to 30 percent slopes	557	.2	159	.3	716	.2
Calvin channery silt loam, neutral substratum, 30 to 40 percent slopes	482	.2	343	.5	825	.2
Calvin channery silt loam, neutral substratum, 40 to 65 percent slopes	1,877	.7	1,065	1.7	2,942	.9
Calvin extremely stony silt loam, neutral substratum, 3 to 20 percent slopes	2,433	.9	432	.7	2,865	.9
Calvin extremely stony silt loam, neutral substratum, 20 to 40 percent slopes	6,582	2.4	2,528	4.0	9,110	2.7
Calvin extremely stony silt loam, neutral substratum, 40 to 65 percent slopes	5,925	2.2	3,797	5.9	9,722	2.9
Cookport silt loam, 2 to 10 percent slopes	1,006	.4	85	.1	1,091	.3
Cookport very stony silt loam, 2 to 10 percent slopes	1,403	.5	282	.4	1,685	.5
Dekalb channery loam, 3 to 10 percent slopes	8,152	3.0	349	.6	8,501	2.5
Dekalb channery loam, 10 to 20 percent slopes	5,334	2.0	1,627	2.5	6,961	2.1
Dekalb channery loam, 20 to 30 percent slopes	3,899	1.5	1,282	2.0	5,181	1.6
Dekalb channery loam, 30 to 40 percent slopes	1,837	.7	1,088	1.7	2,925	.9
Dekalb channery loam, 40 to 65 percent slopes	3,471	1.3	2,355	3.7	5,826	1.7
Dekalb loam, 3 to 10 percent slopes	1,907	.7	86	.1	1,993	.6
Dekalb loam, 10 to 20 percent slopes	458	.2	127	.2	585	.2
Dekalb extremely stony loam, 3 to 20 percent slopes	8,471	3.1	660	1.0	9,131	2.7
Dekalb extremely stony loam, 20 to 40 percent slopes	6,522	2.4	1,682	2.6	8,204	2.5
Dekalb extremely stony loam, 40 to 70 percent slopes	8,050	3.0	3,702	5.8	11,752	3.5
Ernest silt loam, 3 to 8 percent slopes	974	.4	44	.1	1,018	.3
Ernest silt loam, 8 to 15 percent slopes	2,052	.8	230	.4	2,282	.7
Ernest silt loam, 15 to 25 percent slopes	458	.2	158	.3	616	.2
Ernest extremely stony silt loam, 3 to 15 percent slopes	6,327	2.4	594	.9	6,921	2.1
Ernest extremely stony silt loam, 15 to 35 percent slopes	1,848	.7	696	1.1	2,544	.8
Gilpin channery silt loam, 3 to 10 percent slopes	181	.1	43	.1	224	.1
Gilpin channery silt loam, 10 to 20 percent slopes	1,884	.7	386	.6	2,270	.7
Gilpin channery silt loam, 10 to 20 percent slopes, severely eroded	167	.1	15	(1)	182	.1
Gilpin channery silt loam, 20 to 30 percent slopes	5,599	2.1	848	1.3	6,447	1.9
Gilpin channery silt loam, 20 to 30 percent slopes, severely eroded	249	.1	10	(1)	259	.1
Gilpin channery silt loam, 30 to 40 percent slopes	11,344	4.2	1,288	2.0	12,627	3.8
Gilpin channery silt loam, 30 to 40 percent slopes, severely eroded	323	.1	3	(1)	326	.1
Gilpin channery silt loam, 40 to 70 percent slopes	40,077	4.9	6,326	9.9	46,403	13.9
Gilpin channery silt loam, 40 to 70 percent slopes, severely eroded	916	.3	29	.1	945	.3
Leetonia channery loam, 3 to 10 percent slopes	528	.2	26	(1)	554	.2
Leetonia channery loam, 10 to 20 percent slopes	518	.2	3	(1)	521	.2
Lickdale silt loam, 0 to 5 percent slopes	2,006	.7			2,006	.6

See footnotes at end of table.

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

Soil	Tucker County		Randolph County		Survey Area	
	Area	Extent	Area	Extent	Area	Extent
	Acres	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*
Lickdale very stony silt loam, 0 to 5 percent slopes	1, 971	.7			1, 971	.6
Made land	109	(1)	9	(1)	118	(1)
Meckesville silt loam, 3 to 8 percent slopes	319	.1	79	.1	398	.1
Meckesville silt loam, 8 to 15 percent slopes	431	.2	442	.7	873	.3
Meckesville very stony silt loam, 3 to 15 percent slopes	2, 177	.8	510	.8	2, 687	.8
Meckesville very stony silt loam, 15 to 30 percent slopes	1, 677	.6	922	1.4	2, 599	.8
Meckesville very stony silt loam, 30 to 40 percent slopes	390	.1			390	.1
Monongahela silt loam, 0 to 3 percent slopes	71	(1)	10	(1)	81	(1)
Monongahela silt loam, 3 to 8 percent slopes	404	.2	120	.2	524	.2
Monongahela silt loam, 8 to 15 percent slopes	300	.1	171	.3	471	.1
Muck and Peat	917	.3	3	(1)	920	.3
Nolo silt loam, 0 to 5 percent slopes	298	.1	8	(1)	306	.1
Nolo silt loam, 5 to 10 percent slopes	771	.3	17	(1)	788	.2
Philo silt loam	501	.2	133	.2	634	.2
Purdy silty clay loam	110	(1)	2	(1)	112	(1)
Sandstone rubble land	7, 172	2.7	671	1.1	7, 843	2.4
Sequatchie fine sandy loam	542	.2			542	.2
Stony alluvial land	106	(1)			106	(1)
Strip mine	2, 732	1.0	28	(1)	2, 760	.8
Tyler silt loam	328	.1	69	.1	397	.1
Very stony land-Brinkerton-Lickdale association	8, 002	3.0	582	.9	8, 584	2.6
Very stony land-Calvin complex, 40 to 75 percent slopes	271	.1	2, 260	3.5	2, 531	.8
Very stony land-Dekalb complex, 20 to 40 percent slopes	4, 575	1.7	1, 777	2.8	6, 352	1.9
Very stony land-Dekalb complex, 40 to 80 percent slopes	8, 281	3.1	2, 630	4.1	10, 911	3.3
Very stony land-Ernest complex, 3 to 15 percent slopes	5, 971	2.2	1, 231	1.9	7, 202	2.2
Very stony land-Ernest complex, 15 to 35 percent slopes	2, 378	.9	3, 028	4.7	5, 406	1.6
Very stony land-Leetonia complex, 3 to 20 percent slopes	11, 649	4.3	1, 473	2.3	13, 122	3.9
Very stony land-Wet land complex, 3 to 10 percent slopes	1, 257	.5			1, 257	.4
Wet terrace land	2, 396	.9			2, 396	.7
Sandstone quarry	22	(1)	2	(1)	24	(1)
Mine dumps	11	(1)		(1)	11	(1)
Total [2]	269, 440	100.0	64, 000	100.0	333, 440	100.0

[1] Less than 0.05 percent.
[2] 469 acres of water in the survey Area not included in this total: 429 acres in Tucker County, and 40 acres in Randolph County.

Slow permeability of the subsoil most strongly affects use and management. Natural fertility is moderate, and the reaction is strongly acid.

If well managed, this soil is suited to most of the crops commonly grown in the Area. (Capability unit IIIe–13; woodland group 5)

Allegheny Series

In the Allegheny series are deep, well-drained soils that developed in old alluvial material along the major streams. These soils are on terraces as much as 300 feet above the present streams.

Near the Allegheny soils are the moderately well drained Monongahela soils, which developed in similar material. Also near these soils are the well-drained Gilpin soils, which developed in residual material.

The Allegheny soils are moderately permeable and very strongly acid. Natural fertility is moderately low.

Typical profile in an area of Allegheny silt loam that has a slope of 4 percent, in forest on a terrace above the Cheat River, 4 miles from State Route No. 72, on State Route No. 1, in Tucker County:

O1, O2—1 inch to 0, leaf litter from deciduous trees; abrupt, smooth boundary.

A1—0 to 2 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; many fine roots; very strongly acid; clear, wavy boundary. 1 to 2 inches thick.

A2—2 to 10 inches, yellowish-brown (10YR 5/4) silt loam; very weak, fine, subangular blocky structure breaking to weak, fine, granular structure; very friable; common fine roots; very strongly acid; gradual, wavy boundary. 7 to 10 inches thick.

B2t—10 to 26 inches, yellowish-brown (10YR 5/6) loam; weak, medium and fine, subangular blocky structure; friable; faint and broken clay films on the surface of the peds; 20 percent coarse rounded fragments; common fine roots; very strongly acid; gradual, wavy boundary. 12 to 18 inches thick.

B3, C1—26 to 44 inches, yellowish-brown (10YR 5/6) sandy loam; very weak, fine, granular structure tending toward single grain; firm; 80 percent coarse rounded fragments; no roots; very strongly acid; clear, wavy boundary. 15 to 20 inches thick.

C2—44 to 48 inches +, variegated brown (7.5YR 5/4) and strong-brown (7.5YR 5/6) silt loam; moderate, thick, platy structure, inherited from stratified alluvial material; very firm; very strongly acid; cobblestones apparently were derived from Catskill and Pottsville formations. 4 to 12 inches thick.

The Allegheny soils have a well-developed profile. The faint mottling that occurs in the lower part of the B horizon may indicate an incipient fragipan.

Allegheny silt loam, 3 to 8 percent slopes (AgB).—Included in areas mapped as this soil are minor areas of the moderately well drained Monongahela soils.

Soil acidity and moderately low natural fertility most affect use and management of this Allegheny soil. If well managed, this soil is suited to most crops normally grown in the Area. (Capability unit IIe–4; woodland group 9)

Allegheny silt loam, 8 to 15 percent slopes (AgC).—Most areas of this soil are moderately sloping, but some small areas have slopes of less than 8 percent. Generally, the areas of this soil are rather small, and they lie near the gently sloping Monongahela soils or other Allegheny soils. Included with this soil in mapping are minor areas of the moderately well drained Monongahela and Ernest soils.

The moderate hazard of erosion and moderately low natural fertility most affect use and management. This soil is very strongly acid. If well managed, it is well suited to most crops commonly grown in the Area. (Capability unit IIIe–4; woodland group 9)

Alluvial Land

Alluvial land (Al) is made up of recent stream deposits that vary widely in drainage and in texture within short distances. A large part of this land type is gravelly throughout. Small areas are very stony or bouldery. The areas of gravelly materials are well drained or somewhat excessively drained. The areas of fine-textured material and those in depressions are very poorly drained.

Frequent flooding and variations in drainage make this land type better suited to grasses and legumes for hay or grazing than to cultivated crops. This land type is also suitable for timber and for wildlife habitats. Some of the larger areas are used for pasture, but most of them are in forest. (Capability unit VIw–1; woodland group 12)

Atkins Series

In the Atkins series are poorly drained soils that developed in alluvial material. Most areas of these soils are in slight depressions on flood plains and are frequently flooded.

In most of the survey Area, the Atkins soils are adjacent to the well-drained Barbour, Pope, and Sequatchie soils. They are also adjacent to the moderately well drained Philo soils. In Canaan Valley, however, they are near areas of the very poorly drained Blago soils and Wet terrace land.

The Atkins soils are saturated with water near the surface for several months in spring and in fall. Unless artificially drained, they are of limited use. They are strongly acid and have moderate natural fertility.

Typical profile of Atkins silt loam, 1 mile southwest of St. George on the flood plain of the Cheat River, in Tucker County:

Ap—0 to 6 inches, dark-gray (10YR 4/1) silt loam; common, medium, distinct, dark-brown to brown (7.5YR 4/4) mottles; weak, coarse, granular structure tending toward weak, fine, subangular blocky; slightly firm; many fine roots in uppermost 2 inches; roots decrease in number with depth; strongly acid; clear, smooth boundary. 6 to 10 inches thick.

C1—6 to 25 inches, gray (10YR 5/1) heavy silt loam; common, fine, prominent, dark-brown to brown (7.5YR 4/4) mottles; massive tending toward very weak, coarse, prismatic structure; slightly firm; few fine roots; strongly acid; gradual, smooth boundary. 12 to 30 inches thick.

C2—25 to 33 inches +, gray (10YR 5/1) loam; many, fine, prominent, dark-brown to brown (7.5YR 4/4) mottles near root channels; massive tending toward very weak, coarse, prismatic, structure; nonsticky and plastic; few fine roots; strongly acid. 8 to 20 inches thick.

Throughout the profile the texture is generally silt loam, but it ranges from loam to silty clay loam. In most places the substratum below a depth of about 24 inches is coarser textured than the surface layer.

Atkins silt loam (At).—This is the only Atkins soil mapped in the survey Area. Use and management are most affected by poor internal drainage and the hazard of flooding. This soil can be improved by artificial drainage, but its use is severely restricted by frequent flooding. It is strongly acid and has moderate natural fertility. Permeability is slow. This soil is suited to grasses and legumes grown for hay or pasture. It is also suitable for timber and wildlife habitats. (Capability unit VIw–1; woodland group 1)

Barbour Series

The Barbour series consists of deep, well-drained soils that are medium textured to moderately coarse textured. These soils developed on flood plains in recently deposited sediments derived from sandstone and shale. The areas along the larger streams are subject to occasional flooding.

In many places the Barbour soils border the moderately well drained Philo soils and the poorly drained Atkins soils. The Barbour soils are mapped only with the Pope soils in this survey Area. The major difference between these two soils is in color. The Barbour soils are dark reddish brown and are generally adjacent to reddish soils of the uplands; the Pope soils are dark grayish brown and are generally adjacent to yellow and gray soils of the uplands.

The Barbour soils are medium acid to strongly acid. They have moderate natural fertility and moderate to rapid permeability. The gravelly areas of these soils are somewhat droughty. Deep-rooted plants usually can obtain water from the water table, which is commonly at a depth of 3 to 4 feet.

Typical profile of Barbour fine sandy loam, on the flood plain of Dry Fork, Randolph County, 2.2 miles north of Harmon, 50 feet west of State Route 32:

Ap—0 to 7 inches, dark reddish-brown (5YR 3/3) fine sandy loam; moderate, granular structure; friable; 5 percent gravel; many fine roots; neutral; clear, smooth boundary. 6 to 10 inches thick.

C1—7 to 18 inches, dark reddish-brown (5YR 3/3) loam; very weak, medium, granular structure; friable; 5 percent gravel; common fine roots; medium acid; clear, wavy boundary. 8 to 25 inches thick.

C2—18 to 40 inches, dark reddish-brown (5YR 3/3) sandy loam; single grain; very friable; 15 percent gravel and cobblestones, few fine roots in upper 15 inches; strongly acid. 10 to 24 inches thick.

C3—40 inches +, irregularly stratified gravel, cobblestones, and sand. Coarse fragments comprise approximately 90 percent of material.

The Barbour soils vary in texture and in content of coarse fragments. In the narrow valleys along rapidly

flowing streams, the texture generally is cobbly loamy sand. In the larger valleys a short distance downstream, the texture is generally gravelly sandy loam. Along larger streams and on the flood plain of the Cheat River, the texture generally is sandy loam, and there are only a few coarse fragments in the uppermost 12 to 24 inches.

Barbour and Pope fine sandy loam (Ba).—These nearly level soils are in smooth areas, mostly along the larger streams. They are subject to occasional flooding. The profiles are similar to those described as typical of the Barbour and Pope series.

Occasional flooding most affects use and management of these soils. These soils are well drained and moderately permeable. Natural fertility and available moisture capacity are moderate.

If these soils are well managed, they are suited to most crops commonly grown in the Area. A plowpan may develop if these soils are cultivated continuously. (Capability unit IIw–6; woodland group 9)

Barbour and Pope fine sandy loam, high bottom (Bb).—These soils are higher above the streams than Barbour and Pope fine sandy loam, and they are rarely flooded. The profiles closely resemble those described for the Barbour and Pope series.

These soils are well drained and moderately permeable. Available moisture supply and natural fertility are moderate. If these soils are well managed, they are suited to most crops commonly grown in the Area. (Capability unit I–6; woodland group 9)

Barbour and Pope gravelly sandy loam (Bc).—These soils are nearly level or slightly undulating. The undulating surface is caused by old meandering stream channels. These soils are subject to occasional flooding. They have profiles similar to the profiles described as typical of the Barbour and Pope series, except that they are 20 percent coarse fragments 1 to 3 inches in diameter. Below a depth of 12 inches, the content of coarse fragments is generally 90 percent.

Droughtiness and the hazard of occasional flooding most affect use and management. These soils are well drained and have moderately rapid permeability. Natural fertility is moderate. Available moisture capacity is moderately low for shallow-rooted plants, but it is good for deep-rooted plants that can reach the water table, which is at a depth of 3 or 4 feet.

These soils are commonly used for grasses and legumes grown for hay or pasture. If well managed, they are suited to most crops grown in the Area. (Capability unit IIs–6; woodland group 9)

Barbour and Pope gravelly sandy loam, high bottom (Bd).—These soils are nearly level or slightly undulating. They are subject to infrequent flooding. These gravelly sandy loams are more than 20 percent rounded, coarse fragments 1 to 3 inches in diameter. Below a depth of 12 inches in many places, the content of coarse fragments is 50 to 90 percent.

The droughtiness of the surface layer of these soils most affects use and management. These soils are well drained and have moderately rapid permeability. Natural fertility is moderate. Available moisture capacity is moderately low for shallow-rooted plants, but it is good for deep-rooted plants that can reach the water table, which is at a depth of 3 or 4 feet. If these soils are well managed, they are suited to most crops commonly grown in the Area. (Capability unit IIs–6; woodland group 9)

Barbour and Pope cobbly loamy sand (Bf).—These nearly level or slightly undulating soils are in narrow valleys along streams. The profiles are similar to the profiles described as typical of the Barbour and Pope series, except that the texture is coarser. Below a depth of 1 foot, the content of coarse fragments is nearly 90 percent.

Droughtiness, coarse fragments, and the hazard of frequent flooding most affect use and management of these soils. The flooding generally occurs early in spring. These soils are well drained and rapidly permeable. Natural fertility is moderate. Available moisture capacity is moderately low for shallow-rooted plants, but it is good for deep-rooted plants that can reach the water table, which is at a depth of 2 to 4 feet.

These soils are best suited to pasture, timber, and wildlife habitats. Most of the acreage is used for pasture or woods. (Capability unit Vs–2; woodland group 9)

Belmont Series

The Belmont series consists of moderately deep to deep, well-drained soils that are medium textured. These soils developed on uplands in calcareous red and gray material derived from shale, sandstone, and interbedded limestone. They are in steep areas that include moderately to gently sloping benches. The Belmont soils occupy narrow strips along the lower slopes of Limestone Mountain, McGowan Mountain, and Green Mountain and on the floor of Canaan Valley. They are extensive along Dry Fork in the south-central part of the survey Area.

The Belmont soils are adjacent to the Calvin soils that have a neutral substratum; the Calvin soils developed in red, slightly calcareous material weathered from shale and sandstone. The Belmont soils are also adjacent to the Dekalb soils, which developed in acid, gray material weathered from sandstone. In sloping areas below the Belmont soils are the well drained Meckesville soils and the moderately well drained Albrights soils, both of which developed in colluvial material.

The Belmont soils are moderately permeable. Natural fertility is moderately high, and available moisture capacity is moderate to moderately high. The hazard of erosion is moderate to moderately high, especially where the slopes are steep.

Typical profile in an area of Belmont very stony silt loam that has a slope of 40 percent, in Fernow Experimental Forest, 200 yards south of Big Springs Gap, in Tucker County:

O1—3 inches to 1 inch, leaf litter.
O2—1 inch to 0, leaf litter and twigs.
A1—0 to 4 inches, dark-brown (7.5YR 3/2) very stony silt loam; moderate, medium, granular structure; loose; many fine roots; medium acid; clear, smooth boundary. 2 to 5 inches thick.
A2—4 to 9 inches, dark-brown to brown (7.5YR 4/2) silt loam; weak, fine, subangular blocky structure; friable; many fine and medium roots; medium acid; gradual, smooth boundary. 4 to 9 inches thick.
B21t—9 to 18 inches, dark-brown to brown (7.5YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm when moist and slightly sticky when wet; 10 percent coarse sandstone fragments 1 to 6 inches in diameter; many fine and medium roots;

medium acid; gradual, smooth boundary. 8 to 12 inches thick.

B22t—18 to 42 inches, dark-brown to brown (7.5YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm when moist and slightly plastic and sticky when wet; 20 percent coarse sandstone fragments 1 to 6 inches in diameter; many fine roots; neutral reaction; clear, wavy boundary. 13 to 16 inches thick.

C—42 to 51 inches, dark-brown to brown (7.5YR 4/4) sandy clay loam with pockets of silty clay loam; structureless; friable to firm; 30 percent soft sandstone fragments; neutral. 6 to 12 inches thick.

R—51 inches +, hard, gray limestone bedrock.

The Belmont soils vary somewhat in thickness, color, texture, and reaction. These variations are related to the steepness of these soils and to the nature of the material in which they developed.

The depth to bedrock ranges from 20 to 50 inches; the average depth is 35 inches. These soils are generally thinner in areas where they developed in material weathered from shale and in areas where they have steeper slopes. They are generally thicker in areas where they developed in material weathered from sandstone and limestone.

The Belmont soils range from reddish brown to dark brown in color. They are reddish brown where they developed in red material weathered from shale and sandstone and dark brown where they developed in material weathered from limestone and in mixed red and gray material.

The texture of the A horizon is silt loam; that of the B horizon is silty clay loam in most places, but in some places it is silt loam and clay loam. Where it is present, the C horizon ranges from sandy clay loam to clay in texture.

The A and B horizons range from strongly acid to neutral in reaction. Where it is present, the C horizon ranges from medium acid to neutral.

Belmont silt loam, 3 to 10 percent slopes (BmB).—This soil is gently sloping on benches and gently rolling in other areas. It has a profile similar to the one described as typical of the Belmont series, but it has fewer surface stones.

Included in most areas mapped as this soil are minor areas of the Meckesville, Dekalb, and Albrights soils. Areas in Canaan Valley have a larger proportion of these included soils than areas outside the valley.

This Belmont soil is well drained and moderately permeable. Available moisture capacity is moderate to moderately high. (Capability unit IIe–11; woodland group 2)

Belmont silt loam, 10 to 20 percent slopes (BmC).—This soil has a profile that closely resembles the one described as typical of the Belmont series, but it is less steep, has fewer surface stones, and is shallower over bedrock in some areas.

Included with this soil in mapping are small areas of Belmont soil that have slopes of less than 10 percent and small areas that have slopes of more than 20 percent. Also included are some severely eroded areas of limited extent and some minor areas of Meckesville soil.

Runoff is medium on this Belmont soil. This soil is well drained and moderately permeable. Natural fertility is moderately high, and available moisture capacity is good or moderately high. This soil is suited to most crops commonly grown in the survey Area. (Capability unit IIIe–11; woodland group 2)

Belmont silt loam, 20 to 30 percent slopes (BmD).—In places this soil contains a few fragments of limestone and sandstone, and narrow edges of limestone crop out. This soil has a profile similar to the one described as typical for the Belmont series, but it has fewer stones on the surface. Included with it in mapping are a few acres of severely eroded Belmont soils that have lost more than 75 percent of the surface layer.

The moderately high hazard of erosion most affects use and management. This soil is well drained and moderately permeable. Natural fertility is moderately high, and available moisture capacity is good or moderately high.

This soil is suited to most crops commonly grown in the Area surveyed. The cropping system should include several years of sod crops after each year of cultivated crops, if deterioration of this soil is to be prevented. (Capability unit IVe–11; woodland group 2)

Belmont silt loam, 30 to 40 percent slopes (BmE).—This soil has uniform or slightly convex slopes. It contains some coarse fragments, and limestone crops out in some places. The profile closely resembles the one described as typical of the Belmont series, but it has fewer stones on the surface. Included with this soil in mapping is a limited acreage of severely eroded Belmont soils.

Use and management of this Belmont soil are most influenced by the moderately high hazard of erosion. This soil is well drained and moderately permeable. Natural fertility is moderately high, and available moisture capacity is good. This soil is suitable for pasture, timber, or wildlife habitats. (Capability unit VIe–1; woodland group 2)

Belmont very stony silt loam, 3 to 20 percent slopes (BnC).—Generally, less than 3 percent of the surface of this soil is covered with pieces of limestone and sandstone 6 to 24 inches in diameter. This soil has a profile similar to the one described as typical for the Belmont series, but it is thinner over bedrock on some ridges.

Included with this soil in mapping are small areas of the Meckesville, Dekalb, and Albrights soils. Also included are areas of the steep Belmont soils that are thinner over bedrock than these soils.

Stoniness most affects use and management. This soil is well drained and moderately permeable. Natural fertility is moderately high, and available moisture capacity is good to moderately high. Because of the stones, the use of this soil is limited to pasture, timber, or wildlife habitats. (Capability unit VIs–1; woodland group 2)

Belmont very stony silt loam, 20 to 30 percent slopes (BnD).—Stones 10 to 30 inches in diameter cover 1 to 3 percent of the surface of this soil. Limestone ledges crop out in some places. Included with this soil in mapping are some areas of Belmont soils that are not stony and are severely eroded.

The moderately high hazard of erosion and the stones on the surface most affect use and management. This soil is well drained and moderately permeable. Available moisture capacity is moderate or moderately high, and natural fertility is moderately high. This soil is suited to pasture, timber, or wildlife habitats. (Capability unit VIs–1; woodland group 2)

Belmont very stony silt loam, 30 to 40 percent slopes (BnE).—This soil has uniform to slightly convex slopes. Limestone outcrops are common. Pieces of sandstone and limestone 10 to 30 inches in diameter cover 1 to 3 percent of the surface. Numerous stones have accumulated along the drainageways.

Included with this soil in mapping are some areas of Belmont soils that are not stony and are severely eroded. Also included are small areas of the Meckesville soils along drainageways.

Use and management of this Belmont soil are most affected by stones and a moderately high hazard of erosion. This soil is well drained and moderately permeable. Natural fertility is moderately high, and available moisture capacity is moderate. This soil is suitable for timber and wildlife habitats. (Capability unit VIIs–1; woodland group 2)

Belmont very stony silt loam, 40 to 70 percent slopes (BnF).—This soil is more extensive than any other Belmont soil in the survey Area. Stones 10 to 30 inches in diameter cover 1 to 3 percent of the surface. Numerous stones have accumulated in many places along drainageways.

Included with this soil in mapping are small areas that are not stony and a few acres that are severely eroded. Also included are areas of deeper, less steep soils, generally on benches or near the base of long slopes, and small areas of the Meckesville soils along drainageways.

Steepness and stoniness of this Belmont soil most affect use and management. This soil is well drained and moderately permeable. Natural fertility is moderately high, and available moisture capacity is moderate. This soil is suitable for timber and wildlife habitats. (Capability unit VIIs–1; woodland group 2)

Blago Series

In the Blago series are deep, very poorly drained soils that developed mainly in acid material weathered from sandstone and shale and washed from the uplands. These soils are mostly in Canaan Valley (fig. 5). They are saturated with water for long periods. The Blago soils occur near areas of Muck and Peat and Wet terrace land.

Figure 5.—**An area in Canaan Valley showing the Blago and Purdy soils in the foreground. Beyond the field is an area of Muck and Peat where spruce and balsam fir are growing.**

The dark-colored surface layer of the Blago soils contains a large amount of organic matter. The dense, gray, clayey subsoil has very slow permeability. In many places the substratum is less acid than the subsoil and surface layer.

Typical profile of Blago silt loam in a pasture 50 feet east of State Route No. 32 and 400 feet north of the Blackwater River, in Tucker County:

A1—0 to 8 inches, black (N 2/0) silt loam; medium to coarse granular structure; friable; very strongly acid; abrupt, smooth boundary. 6 to 12 inches thick.

A2—8 to 13 inches, very dark grayish-brown (10YR 3/2) heavy silt loam; weak to moderate, fine, subangular blocky structure; slightly firm; extremely acid; clear, wavy boundary. 5 to 10 inches thick.

Bg—13 to 28 inches, dark-gray (2.5Y 4/0) silty clay; strong-brown (7.5YR 5/8) mottles in root channels and on the surfaces of the prisms; moderate, coarse, prismatic structure; plastic and sticky when wet; strongly acid; clear, smooth boundary. 10 to 20 inches thick.

IIc—28 to 40 inches +, reddish-brown (2.5YR 4/4) clay loam; streaks of yellowish-red (5YR 5/8) are common; massive; nonsticky and nonplastic when wet; medium acid.

The texture of the B horizon and the underlying reddish-brown IIc horizon ranges from clay to sandy clay loam. Depth to the reddish-brown soil material ranges from about 16 to 28 inches. The reaction ranges from medium acid to extremely acid.

Blago silt loam (Bo).—This nearly level soil has a water table near the surface.

Very poor internal drainage most affects use and management. The surface layer is very strongly acid to extremely acid. The subsoil is fine textured, has very slow permeability, and is saturated with water for long periods in spring and in fall. The substratum of reddish-brown soil material is medium acid. If drained, this soil is suitable for water-tolerant crops, or for grasses and legumes grown for hay or pasture. Undrained areas are suitable for timber and wildlife. (Capability unit IVw–1; woodland group 1)

Blago silt loam, overflow (Bp).—This soil is in glades in Canaan Valley and is subject to frequent flooding. The water table is near the surface at all times. This soil has a profile similar to the one described as typical for the Blago series, but its subsoil is more sandy in some places. Its dark-colored surface layer is 6 to 14 inches thick. Included with this soil in mapping are some areas that have a calcareous substratum.

Use and management of this Blago soil are most affected by very poor internal drainage and the hazard of frequent flooding. Artificial drainage is necessary if this soil is to be used and managed effectively for hay or pasture crops. Undrained areas are suitable for pasture, timber, or wildlife. (Capability unit VIw–1; woodland group 1)

Brinkerton Series

In the Brinkerton series are deep, nearly level to moderately sloping, somewhat poorly drained or poorly drained, grayish-brown soils that occur extensively on plateaus in the survey Area. Intermittent drainageways are common. These soils developed in acid material. They have a firm, fine-textured horizon in the subsoil. They ordinarily occur near the well drained Dekalb soils,

the moderately well drained Ernest soils, and the very poorly drained Lickdale soils.

The Brinkerton soils are saturated with water in spring and in fall because the firm layer in the subsoil is very slowly permeable. They are strongly acid to extremely acid and have moderately low natural fertility. The intermittent drainageways limit the use of these soils and affect their management.

Typical profile of Brinkerton silt loam that has a slope of 8 percent, in an abandoned pasture of povertygrass, 0.3 mile northwest of Davis and 0.9 mile northeast along the railroad from State Route No. 32, in Tucker County:

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) silt loam; strong, medium, granular structure; friable when moist; many fine roots; extremely acid; abrupt, wavy boundary. 0 to 3 inches thick.

A2—2 to 5 inches, dark grayish-brown (10YR 4/2) silty clay loam; many, coarse, prominent, grayish-brown (10YR 5/2) and yellowish-brown (10YR 5/6) mottles; moderate, coarse, subangular blocky structure tending toward weak, thick, platy structure; friable when moist and slightly plastic and slightly sticky when wet; many fine roots and pores; very strongly acid; clear, wavy boundary. 2 to 6 inches thick.

B21t—5 to 17 inches, mottled gray (2.5Y 5/0) and strong-brown (7.5YR 5/8) silty clay; strong, very coarse, prismatic structure (peds 4 to 7 inches in diameter); firm when moist and plastic and slightly sticky when wet; few fine roots on the surfaces of the peds; surfaces of prisms are gray (2.5Y 5/0); very strongly acid; gradual, smooth boundary. 6 to 15 inches thick.

B22t—17 to 26 inches, gray (2.5Y 5/0) silty clay; many, coarse, prominent, strong-brown (7.5YR 5/8) mottles; strong, very coarse, prismatic structure (peds 12 to 18 inches in diameter); firm when moist and plastic and slightly sticky when wet; grayish-brown (2.5Y 5/2) clay films on surfaces of prisms; few fine roots on surfaces of peds; very strongly acid; gradual, smooth boundary. 8 to 12 inches thick.

Bx1—26 to 38 inches, yellowish-brown (10YR 5/4) silty clay loam; common, distinct, gray (2.5Y 5/0) mottles; massive; very firm when moist and slightly plastic and nonsticky when wet; manganese concretions are common; very strongly acid; gradual, smooth boundary. 10 to 14 inches thick.

Bx2—38 to 53 inches, yellowish-brown (10YR 5/6) silty clay loam; many, fine, prominent, gray (2.5Y 5/0) mottles; massive; very firm when moist and slightly plastic and nonsticky when wet; 10 percent fine gravel (2 to 5 mm. in diameter); strongly acid; gradual, smooth boundary. 10 to 16 inches thick.

C—53 to 88 inches +, brown (10YR 5/3) silty clay loam; massive; firm; 10 percent gravel less than 1 inch in diameter; iron and manganese concretions are common; strongly acid.

The color of the A2 horizon ranges from dark grayish brown (10YR 4/2) to light brownish gray (10YR 6/2). The depth to the firm pan ranges from 13 to 26 inches. Otherwise, the profile characteristics of the Brinkerton soils are nearly uniform throughout the survey Area.

Brinkerton silt loam, 0 to 3 percent slopes (BrA).—This soil is dissected by intermittent drainageways. Included with it in mapping are small areas of the Nolo and Lickdale soils.

Poor internal drainage most strongly influences use and and management. Permeability is slow, and runoff is moderately slow. The reaction is strongly acid to extremely acid.

This soil is suitable for grasses and legumes for hay or pasture, and it can be used for timber and for wildlife habitats. (Capability unit IVw–5; woodland group 3)

Brinkerton silt loam, 3 to 8 percent slopes (BrB).—This soil is near drainageways; in fact, drainageways dissect many areas. Included with this soil in mapping are small areas of the Lickdale and Nolo soils.

Somewhat poor or poor internal drainage most strongly influences use and management. Permeability is slow, and runoff is moderate. Natural fertility is moderately low, and the reaction is strongly acid to extremely acid. The intermittent drainageways also affect use and management.

If drained, this soil is suitable for water-tolerant crops, grasses, and legumes grown for hay or pasture, and also for timber and for wildlife habitats. (Capability unit IVw–5; woodland group 3)

Brinkerton silt loam, 8 to 15 percent slopes (BrC).—This soil is in moderately sloping areas dissected by many intermittent drainageways.

Restricted internal drainage most affects use and management, but the intermittent drainageways also have some effect. Runoff is medium, and internal drainage is somewhat poor. Permeability is slow, but much of the excess water runs off, and consequently this soil is saturated for shorter periods in spring and in fall than the more nearly level Brinkerton soils. The reaction is strongly acid to extremely acid. Natural fertility is moderately low.

This soil is suitable for grasses and legumes grown for hay or pasture, and also for timber and for wildlife habitats. (Capability unit IVw–5; woodland group 3)

Brinkerton and Nolo extremely stony soils, 3 to 15 percent slopes (BsC).—Brinkerton soils make up about 80 percent of this unit, and Nolo soils most of the rest. Stones and boulders 1 to 3 feet in diameter cover 10 to 40 percent of the surface. Except for the stones and coarser textured layers in places, the profiles are like those described for the Brinkerton and Nolo series. Included in mapping are small areas of Lickdale soils, which are in drainageways.

Stoniness and restricted drainage are the characteristics that most affect use and management. These soils are somewhat poorly drained or poorly drained, and they are saturated for long periods in spring and in fall. Permeability is slow. Natural fertility is moderately low, and the reaction is strongly acid to extremely acid.

These soils are suitable for timber or for wildlife habitats. (Capability unit VIIs–5; woodland group 3)

Calvin Series

In the Calvin series are reddish-brown, moderately deep to deep soils that developed on uplands in material weathered from sandstone, acid red shale, and slightly calcareous red shale. These soils occur throughout the survey Area.

Normally these soils are in areas above and below the Belmont soils. They occur with the well-drained Dekalb soils, which developed in acid, gray material weathered from sandstone.

The Calvin soils are well drained, moderately permeable, and strongly acid to very strongly acid. Natural fertility is moderate to moderately low. Runoff is slow in gently sloping areas, but it is moderately rapid in steeper areas that are cultivated. The hazard of erosion is moderate, especially in steeper areas.

Typical profile in an area of Calvin channery silt loam that has a slope of 55 percent, in Fernow Experimental Forest, along skidroad on south side of Wilson Hollow, in Tucker County:

A1—0 to 2 inches, dusky red (2.5YR 3/2) channery silt loam; weak, fine, crumb structure; very friable; a few medium roots and many fine roots; less than 5 percent stones; very strongly acid; abrupt, wavy boundary. 1½ to 3 inches thick.

A2—2 to 5 inches, reddish-brown (2.5YR 4/4) channery silt loam; structureless; friable; many fine roots and some coarse roots; less than 5 percent stones; very strongly acid; boundary discontinuous, but clear where it occurs.

B1—5 to 9 inches, weak-red (10R 4/3) to reddish-brown (2.5YR 4/4) silt loam; weak, medium, subangular blocky structure; firm; faint and broken clay films on surfaces of peds; few fine and coarse roots; 10 percent stones; very strongly acid; clear, wavy boundary. 3 to 5 inches thick.

B2—9 to 19 inches, weak-red (10R 4/3) heavy silt loam; weak to moderate, fine and medium, subangular blocky structure; slightly firm; faint and broken clay films on surfaces of peds; few fine roots and some coarse roots; less than 5 percent stones, and some gravel; very strongly acid; gradual, wavy boundary. 8 to 12 inches thick.

B3—19 to 31 inches, weak-red (10R 4/3) gravelly silty clay loam; weak, fine and medium, subangular blocky structure; firm; distinct and broken clay films on surfaces of peds; few fine roots; 60 percent gravel; very strongly acid; gradual, smooth boundary. 9 to 15 inches thick.

C—31 to 47 inches, weak-red (10R 4/3) gravelly silty clay; structureless; firm; distinct and continuous clay films in pore channels; few fine roots; 85 percent gravel; very strongly acid; abrupt, smooth boundary. 15 to 17 inches thick.

R—47 inches +, weak-red (10R 4/3) and olive-gray (5Y 5/2) shale.

The depth to bedrock ranges from 22 to 48 inches; it averages 32 inches. In color these soils are mostly reddish brown (2.5YR 4/4) in the northwestern part of the survey Area and brown or dark brown (7.5YR 4/4) in the southeastern part. The subsoil ranges from loam to silty clay loam in texture; it is silt loam in most places.

Calvin channery silt loam, 3 to 10 percent slopes (CaB).—This soil developed in red material weathered largely from sandstone. It has a profile similar to the one described as typical of the Calvin series, but its subsoil is coarser textured. It is also shallower over bedrock on narrow ridges and near the places where ridges break to very steep side slopes. Included with this soil in mapping are small areas of Dekalb soils.

Acidity and droughtiness of this Calvin soil most affect use and management. This soil is well drained, moderately permeable, and very strongly acid. Natural fertility is moderately low. The hazard of erosion is moderate. This soil is suited to most crops commonly grown in the Area. (Capability unit IIe–10; woodland group 4)

Calvin channery silt loam, 10 to 20 percent slopes (CaC).—This soil is on ridges. Included in mapping are small areas of Dekalb soils.

Droughtiness and the moderate hazard of erosion most affect use and management. This soil is well drained and very strongly acid. Permeability is moderate, and natural fertility is moderately low. If this soil is well managed, it is suited to most crops commonly grown in the Area. (Capability unit IIIe–10; woodland group 4)

Calvin channery silt loam, 10 to 20 percent slopes severely eroded (CaC3).—This soil has a profile similar to the one described as typical of the Calvin series, but 75 percent or more of the surface soil has been lost through erosion.

Use and management are most affected by droughtiness and a moderate to moderately high hazard of erosion. This soil is well drained and very strongly acid. Permeability is moderate, and natural fertility is moderately low.

This soil is suited to most crops commonly grown in the Area, but the cropping system should include several years of sod crops after each year of cultivated crops. This soil needs to be covered with vegetation most of the time if further erosion is to be prevented. (Capability unit IVe–3; woodland group 4)

Calvin channery silt loam, 20 to 30 percent slopes (CaD).—Use and management of this soil are most affected by droughtiness and a moderate hazard of erosion. This soil is well drained and very strongly acid. Natural fertility is moderately low, and permeability is moderate. This soil is suited to most crops commonly grown in the Area. The cropping system should include several years of sod crops after each year of cultivated crops. (Capability unit IVe–3; woodland group 4)

Calvin channery silt loam, 20 to 30 percent slopes, severely eroded (CaD3).—This soil has a profile similar to the one described as typical of the Calvin series, but most of the surface layer has been lost through erosion. Small gullied areas are common.

Use and management are most affected by droughtiness and a moderate to moderately high hazard of erosion. This soil is well drained and very strongly acid. Permeability is moderate, and natural fertility is moderately low. This soil is suitable for pasture, timber, and wildlife habitats. A plant cover should be maintained to prevent further erosion. (Capability unit VIe–2; woodland group 4)

Calvin channery silt loam, 30 to 40 percent slopes (CaE).—This soil is steep. Included in mapping are some gently sloping areas on narrow ridgetops.

Use and management are most affected by steepness and a moderate hazard of erosion. This soil is droughty on the upper half of steep slopes, particularly in south-facing areas. It is well drained and very strongly acid. Permeability is moderate, and natural fertility is moderately low. This soil is suitable for timber and for wildlife habitats. (Capability unit VIIe–2; woodland group 4)

Calvin channery silt loam, 30 to 40 percent slopes, severely eroded (CaE3).—This soil has a profile similar to the one described as typical of the Calvin series, but most of the surface layer has been lost through erosion. Gullied areas are common.

Use and management are most affected by steepness and a moderate hazard of erosion. This soil is thinner than uneroded Calvin soils and is droughty. It is well drained and very strongly acid. Natural fertility is moderately low, and permeability is moderate. This soil is suitable for timber or for wildlife habitats. (Capability unit VIIe–2; woodland group 4)

Calvin channery silt loam, 40 to 65 percent slopes (CaF).—This soil is more extensive than any other Calvin soil in the survey Area. At the top of the steeper slopes,

outcrops of thin-layered sandstone are common. This soil may be as much as 48 inches thick on the lower third of the slopes, but it is only 30 inches thick or less near the top of the slopes. Included with this soil in mapping are some areas of gently sloping Calvin soils on narrow ridgetops and other areas of severely eroded Calvin soils.

Use and management are most affected by steepness and the moderate hazard of erosion. This soil is droughty on the upper half of the steep slopes, particularly in south-facing areas. It is well drained and very strongly acid. Natural fertility is moderately low, and permeability is moderate. This soil is suitable for timber and for wildlife habitats. (Capability unit VIIe–2; woodland group 4)

Calvin channery silt loam, neutral substratum, 3 to 10 percent slopes (ChB).—This soil is on ridges and benches, and flat fragments of sandstone 3 to 8 inches long cover the surface. On the benches this soil has a profile similar to the one described as typical of the Calvin series, but it is commonly less acid, particularly in the lower part. In these areas this soil is neutral or calcareous at variable depths. On the ridges this soil developed in material weathered from sandstone and is therefore slightly coarser textured. Minor areas of the Dekalb soils are included in mapping.

Droughtiness and a moderate hazard of erosion most affect use and management of areas of this soil on ridges. This Calvin soil has a moderate supply of plant nutrients. It is well suited to most crops commonly grown in the Area. (Capability unit IIe–11; woodland group 11)

Calvin channery silt loam, neutral substratum, 10 to 20 percent slopes (ChC).—This soil is on benches and ridges. Its surface is covered with flat fragments of sandstone 3 to 8 inches long. On the benches this soil has a profile similar to the one described as typical of the Calvin series, but it is commonly less acid, particularly the lower part. In many of these places, the underlying material is neutral or calcareous. On the ridges this soil developed partly in material weathered from sandstone and is therefore slightly coarser textured. Minor areas of the Dekalb soils on ridges are included in mapping.

Droughtiness and a moderate hazard of erosion most affect use and management of the areas on ridges. This Calvin soil has a moderate supply of plant nutrients. It is well suited to most crops grown in the Area. (Capability unit IIIe–11; woodland group 11)

Calvin channery silt loam, neutral substratum, 20 to 30 percent slopes (ChD).—This soil has convex slopes and is dissected by numerous drainageways. Its surface is covered with flat fragments of sandstone 3 to 10 inches long. This soil has a profile that closely resembles the one described as typical of the Calvin series, but it is commonly less acid. The substratum contains thin seams of calcareous material. Included with this soil in mapping are minor areas of Ernest soils and some areas of stony soils along the drainageways.

Use and management are most affected by a moderate hazard of erosion. This soil is well drained and has moderate natural fertility. It is suited to most crops commonly grown in the survey Area. The cropping system should include several years of sod crops after each year of cultivated crops. (Capability unit IVe–11; woodland group 11)

Calvin channery silt loam, neutral substratum, 30 to 40 percent slopes (ChE).—This soil has slightly concave slopes. The surface is covered with flat fragments of sandstone 3 to 10 inches long. This soil has a profile similar to the one described as typical for the Calvin series, but the substratum contains some calcareous soil material.

Included with this soil in mapping are minor areas of the Ernest and Meckesville soils. Also included are some areas of stony soils.

Use and management of this Calvin soil are most affected by steepness and a moderate hazard of erosion. This soil is well drained, is strongly acid, and has moderate natural fertility. Areas on the upper half of the steep slopes, particularly those facing south are droughty. This soil is suited to timber and to wildlife habitats. (Capability unit VIIe–1; woodland group 11)

Calvin channery silt loam, neutral substratum, 40 to 65 percent slopes (ChF).—The very steep slopes of this soil are uniform; they have a few rock outcrops near the top. The surface is covered with flat fragments of sandstone 3 to 10 inches long; areas along most drainageways are extremely stony. Unlike some of the Calvin soils, this soil is underlain by bedrock that has thin seams of calcareous material. Included with this soil in mapping are small areas of the Ernest and Meckesville soils.

Use and management are most affected by steepness and a moderate hazard of erosion. This soil is well drained, is strongly acid, and has moderate natural fertility. Areas on the upper half of the very steep slopes, particularly those facing south, are droughty. This soil is suitable for timber and for wildlife habitats. (Capability unit VIIe–1; woodland group 11)

Calvin extremely stony silt loam, neutral substratum, 3 to 20 percent slopes (CnC).—This soil is on benches where stones from higher areas have accumulated. In some areas as much as 40 percent of the surface is covered with boulders and other stones 1 to 4 feet in diameter. This soil has a profile similar to the one described as typical of the Calvin series, but it contains more stones and its substratum contains some calcareous soil material. Included with this soil in mapping are minor areas of the Meckesville soils.

Use and management are most affected by stones. This soil is well drained, is strongly acid, and has moderate natural fertility. It is suitable for timber and wildlife habitats. (Capability unit VIIs–1; woodland group 11)

Calvin extremely stony silt loam, neutral substratum, 20 to 40 percent slopes (CnE).—This soil is moderately steep to steep. On the upper edges of the slopes, outcrops of sandstone are common. In some areas stones and boulders 1 to 4 feet in diameter cover as much as 40 percent of the surface, and in many places along drainageways, they cover more than 40 percent of the surface. This soil has a profile closely resembling the one described as typical of the Calvin series, but it contains more stones. Also, it is commonly less acid in the lower part of the profile. Included with this soil in mapping are minor areas of the Meckesville and Ernest soils along drainageways.

Use and management are most affected by stones and steepness. Natural fertility is moderate. This soil is suitable for timber and wildlife habitats. (Capability unit VIIs–1; woodland group 11)

Calvin extremely stony silt loam, neutral substratum, 40 to 65 percent slopes (CnF).—This is one of the more

extensive soils in the survey Area. It has uniform slopes. In most places this soil is below areas of the Very stony land complexes. In some places stones and boulders 1 to 4 feet in diameter, from areas of Very stony land, cover as much as 40 percent of the surface of this Calvin soil. In the eastern part of the survey Area, some of the boulders are 10 to 12 feet in diameter. This soil has a profile similar to the one described as typical of the Calvin series, but it contains more stones and its substratum contains seams of calcareous soil material.

Use and management are most affected by stones and steepness. This soil is well drained and strongly acid. Natural fertility is moderate. This soil is suitable for timber and wildlife habitats. (Capability unit VIIs–1; woodland group 11)

Cookport Series

The Cookport series consists of moderately deep to deep, moderately well drained soils that developed on uplands in acid, gray material weathered from sandstone and shale. A firm, mottled fragipan is generally at a depth of about 20 inches. In most places these nearly level or gently sloping soils are on concave (saucer-shaped) ridgetops or benches. Generally, they do not extend over large areas.

The Cookport soils occur with the Dekalb soils. They also occur with the somewhat poorly drained or poorly drained Nolo soils and the very poorly drained Lickdale soils.

The Cookport soils are very strongly acid to extremely acid and have moderately low natural fertility. Permeability is moderate in the surface layer, but it is slow in the subsoil, which contains a fragipan. Because of slow internal drainage, deep-rooted plants may not grow well.

Typical profile in an area of Cookport very stony silt loam that has a slope of 5 percent, 500 yards northwest of Bell Knob Tower on Allegheny Mountain, in Tucker County:

A1—0 to ½ inch, very dark grayish-brown (10YR 3/2) very stony silt loam; moderate, fine, granular to crumb structure; friable; many very fine roots; 40 to 50 percent sandstone fragments 5 to 8 inches in diameter; extremely acid; abrupt, smooth boundary. ½ to 1 inch thick.

A2—½ inch to 7 inches, brown (10YR 5/3) very stony silt loam; weak, fine, subangular blocky structure tending toward thick, platy structure; friable; many fine and medium roots; 60 percent sandstone fragments 3 to 5 inches in diameter; extremely acid; clear, wavy boundary. 6 to 8 inches thick.

A3—7 to 10 inches, dark-brown (7.5YR 3/2) silt loam; moderate, fine, granular structure and fine, subangular blocky structure; friable; 10 percent siltstone fragments 3 to 5 inches in diameter; many fine roots; very strongly acid; horizon is discontinuous; abrupt boundary. 0 to 3 inches thick.

B21—10 to 15 inches, strong-brown (7.5YR 5/6) silt loam; moderate, fine and medium, subangular blocky structure; firm; 10 percent siltstone fragments 3 to 5 inches in diameter; fine roots; old root channels; very strongly acid; clear, wavy boundary. 3 to 7 inches thick.

B22—15 to 21 inches, yellowish-brown (10YR 5/6) stony loam; weak, fine, granular structure; firm; 30 percent siltstone fragments 3 to 5 inches in diameter; few fine roots in old root channels; very strongly acid; abrupt, wavy boundary. 4 to 8 inches thick.

Bx—21 to 37 inches +, yellowish-brown (10YR 5/6) matrix of loam; common, fine, distinct, light yellowish-brown (2.5Y 6/4) mottles surrounded by strong-brown (7.5YR 5/8) films 1 to 2 millimeters thick; massive; very firm; few fine roots in old root channels; very strongly acid. 5 to 20 inches thick.

The depth to the fragipan horizon ranges from 18 to 25 inches. In places where the fragipan horizon is at a depth of 25 inches, the color of the B horizon is strong brown (7.5YR 5/6), but where the fragipan horizon is at a depth of 18 inches, the B horizon is yellowish brown (10YR 5/6). The texture within the profile ranges from silt loam to loam.

Cookport silt loam, 2 to 10 percent slopes (CoB).—This soil has smooth slopes and is near ridgetops. It has a profile similar to the one described as typical of the Cookport series, but it contains fewer stones. Included with this soil in mapping are small areas of finer textured soils and minor areas of soils that have slopes of less than 2 percent.

Use and management of this Cookport soil are most affected by acidity and moderately slow internal drainage. Natural fertility is moderately low. If this soil is well managed, it is suited to most crops commonly grown in the Area, except the deep-rooted ones. (Capability unit IIe–13; woodland group 5)

Cookport very stony silt loam, 2 to 10 percent slopes (CsB).—This soil is in areas similar to those in which Cookport silt loam, 2 to 10 percent slopes, occurs. Stones 1 to 2 feet in diameter cover as much as 15 percent of the surface. Included with this soil in mapping are small areas of Dekalb extremely stony loam and Ernest extremely stony silt loam.

Use and management of this Cookport soil are most affected by stones and moderately slow internal drainage. This soil is very strongly acid and has moderately low natural fertility. It is well suited to timber and to wildlife habitats. (Capability unit VIIs–2; woodland group 5)

Dekalb Series

In the Dekalb series are moderately deep to deep, well-drained soils that developed on uplands in acid, gray material weathered from sandstone and siltstone. These soils range from gently sloping to very steep; they are moderately steep to very steep in most areas. In most places these soils are covered with a considerable amount of stones and boulders.

Narrow strips of the Dekalb soil are adjacent to the Calvin soils in the western and southern parts of the survey Area. On mountain slopes in the eastern half of the Area, they are above the Calvin soils that have a neutral substratum. In the center of Canaan Valley and on the plateaus, these soils are in gently sloping areas adjacent to the somewhat poorly drained or poorly drained Brinkerton and Nolo soils and the moderately well drained Cookport soils.

The Dekalb soils are very strongly acid or extremely acid and are moderately permeable. Natural fertility is moderately low. On narrow ridgetops and in steep, south-facing areas, these soils are droughty. The hazard of erosion is moderate, especially in steep areas.

Typical profile in a forested area of Dekalb extremely stony loam that has a slope of 35 percent, 1.8 miles

east of the entrance to Weiss Knob ski area, on U. S. F. S. Road No. 80, in Tucker County:

O1, O2—3 inches to 0, leaf litter and humus from hardwoods; clear, smooth boundary. 0 to 4 inches thick.

A1—0 to 5 inches, dark yellowish-brown (10YR 3/4) extremely stony loam; weak, fine, granular structure; loose; less than 10 percent coarse fragments; many fine and few coarse roots; extremely acid; abrupt, smooth boundary. 1 to 5 inches thick.

A3, B1—5 to 8 inches, dark-brown to brown (7.5YR 4/4) loam; weak, fine and medium, granular structure; loose; less than 10 percent coarse fragments; many fine and few medium roots; extremely acid; clear, smooth boundary. 2 to 4 inches thick.

B2—8 to 14 inches, yellowish-brown (10YR 5/4) loam; weak, fine, subangular blocky structure; friable; 15 percent coarse fragments, 3 millimeters in diameter; common fine and few medium roots; very strongly acid; clear, smooth boundary. 6 to 12 inches thick.

C—14 to 34 inches, dark grayish-brown (2.5Y 4/2) channery loam; very weak, fine, granular structure; friable; 80 percent coarse fragments 2 to 5 inches in diameter; few fine roots in upper 6 inches of horizon; very strongly acid. 10 to 25 inches.

R—34 inches +, slightly weathered, fine-grained sandstone and siltstone.

The depth to bedrock ranges from 20 to 48 inches; it averages 30 inches. The thickness of the solum ranges from about 14 to 30 inches and averages about 16 inches. In areas on narrow ridges and benches and in gently sloping areas on plateaus, these soils are shallower over bedrock. On plateaus where the texture of these soils is loam, the B horizon has moderate, fine, subangular blocky structure. In steep areas and in areas where the texture is slightly coarser than usual, the B horizon has weak, fine, granular structure or is almost structureless (single grain).

Dekalb channery loam, 3 to 10 percent slopes (DaB).—This soil is in slightly convex areas. About 15 percent of the surface is covered with thin fragments of sandstone about 6 inches long. Included with this soil in mapping are small areas of Dekalb loam and Gilpin channery silt loam.

Acidity and droughtiness of this Dekalb soil are the characteristics that most affect use and management. This soil is generally well drained and moderately permeable. Natural fertility is moderately low. This soil is well suited to most crops commonly grown in the Area. (Capability unit IIe–10; woodland group 6)

Dekalb channery loam, 10 to 20 percent slopes (DaC).—This soil is on mountain plateaus, benches, and ridges. About 15 percent of the surface is covered with channery fragments.

Included with this soil in mapping are small areas of the Ernest soils on benches and along drainageways. Also included are small areas of the Gilpin soils.

Acidity and droughtiness most affect use and management. This soil is well drained and moderately permeable. Natural fertility is moderately low. This soil is suited to most crops commonly grown in the Area. (Capability unit IIIe–10; woodland group 6)

Dekalb channery loam, 20 to 30 percent slopes (DaD).—This soil has smooth slopes. It has a profile that resembles the one described as typical of the Dekalb series, but there are no large boulders on the surface. The surface layer and subsoil contain numerous fragments of sandstone 2 to 5 inches in diameter. Included in mapping are small areas of the Ernest and Gilpin soils.

Droughtiness and the moderate hazard of erosion most affect use and management. This soil is well drained and moderately permeable. It is very strongly acid and has moderately low natural fertility. It is suited to most crops commonly grown in the Area. The cropping system should include several years of sod crops after each year of cultivated crops. (Capability unit IVe–3; woodland group 6)

Dekalb channery loam, 30 to 40 percent slopes (DaE).—About 15 to 30 percent of the surface of this soil is covered with fragments of sandstone 2 to 5 inches in diameter, but there are no boulders. A few outcrops of sandstone are at the top of slopes in some places.

Included with this soil in mapping are small areas of the Gilpin soils. Also included are small areas of the Ernest soils on lower slopes, on benches, and along drainageways.

Use and management of this Dekalb soil are most affected by steepness and a moderate hazard of erosion. This soil is well drained, moderately permeable, and very strongly acid. It is also droughty on the upper half of slopes, especially those that face south. Natural fertility is moderately low. This soil is suitable for timber and wildlife habitats. (Capability unit VIIe–2; woodland group 6)

Dekalb channery loam, 40 to 65 percent slopes (DaF).—This soil is on mountains and ridges. Numerous fragments of sandstone 2 to 5 inches in diameter are on the surface and in the soil. At the top of slopes, outcrops of sandstone are fairly common. Some coarse fragments that have broken from the outcrops are scattered over the surface. In some areas near ridgetops, this soil is less than 20 inches thick. This soil has a profile similar to the one described as typical for the Dekalb series, but fewer coarse fragments of sandstone are on the surface.

Included with this soil in mapping are small areas of Ernest and Gilpin soils. The Ernest soils are on narrow benches, along drainageways, and at the bottom of long slopes. The Gilpin soils are in areas where moderately thick seams of shale are interbedded with soil material weathered from sandstone.

Use and management of this Dekalb soil are most affected by steepness and the moderate hazard of erosion. This soil is well drained, very strongly acid, and moderately permeable. It is also droughty on the upper half of slopes, especially those facing south. Natural fertility is moderately low. This soil is suitable for timber and wildlife habitats. (Capability unit VIIe–2; woodland group 6)

Dekalb loam, 3 to 10 percent slopes (DkB).—This soil is on the tops of ridges and plateaus. It is most extensive near the towns of Thomas and Davis. It has a profile similar to the one described as typical of the Dekalb soils, but it is generally 4 to 12 inches shallower over bedrock, is free of stones and boulders, and in some areas is finer textured. Included in mapping are a few acres that have slopes of less than 3 percent.

Acidity and droughtiness most influence use and management. This soil is well drained, is moderately permeable, and has moderately low natural fertility. It is suited to crops normally grown in this part of the survey Area. (Capability unit IIe–10; woodland group 6)

Dekalb loam, 10 to 20 percent slopes (DkC).—This soil is mostly on plateaus near the towns of Thomas and

Davis. It has a profile similar to the one described as typical of the Dekalb series, but it is thinner in most areas. Except for scattered small fragments of sandstone, this soil is free of stones. Included with it in mapping are a few areas that have finer texture than typical.

Use and management of this Dekalb soil are most affected by acidity and the moderate hazard of erosion. This soil is well drained and moderately permeable. Natural fertility is moderately low. This soil is suited to most crops commonly grown in this part of the survey Area. (Capability unit IIIe–10; woodland group 6)

Dekalb extremely stony loam, 3 to 20 percent slopes (DmC).—This soil is on ridgetops and benches. As much as 40 percent of the surface is covered with stones 1 to 2 feet in diameter. Included with this soil in mapping are small areas of soils that resemble the Ernest and Gilpin soils. Also included are small areas of Very stony land.

Use and management of this Dekalb soil are most affected by the stones on the surface. This soil is well drained, very strongly acid, and moderately permeable. Natural fertility is moderately low. This soil is suitable for timber and wildlife habitats. (Capability unit VIIs–2; woodland group 6)

Dekalb extremely stony loam, 20 to 40 percent slopes (DmE).—Most areas of this soil are in the mountainous eastern half of the survey Area. Stones and boulders 1 to 3 feet in diameter cover as much as 40 percent of the surface. Included with this soil in mapping are small areas of the Ernest soils, which are on benches and along drainageways, and some areas of Very stony land. Other inclusions are areas of Gilpin soils and of soils that have profiles intermediate between the profiles of the Gilpin and Dekalb soils.

Use and management of this Dekalb soil are most affected by the surface stones. This soil is well drained, very strongly acid, and moderately permeable. Natural fertility is moderately low. This soil is suitable for timber and wildlife habitats. (Capability unit VIIs–2; woodland group 6)

Dekalb extremely stony loam, 40 to 70 percent slopes (DmF).—This is the most extensive Dekalb soil in the survey Area. Stones and boulders 1 to 4 feet in diameter cover as much as 40 percent of the surface. Outcrops of sandstone are common.

Small areas of moderately well drained Ernest soils on benches, along drainageways, and at the bottom of long slopes are included with this soil in mapping. Also included are some areas of Very stony land. Other inclusions are minor areas of soils that have a profile resembling the one described as typical of the Gilpin soils and areas of soils that have a profile intermediate between that of the Gilpin and that of the Dekalb soils.

Stones on the surface and steep slopes most affect use and management. This soil is well drained, very strongly acid, and moderately permeable. Natural fertility is moderately low. This soil is suitable for timber and wildlife habitats. (Capability unit VIIs–2; woodland group 6)

Ernest Series

The Ernest series consists of deep, moderately well drained soils along drainageways and at the heads of streams. These soils have a moderately firm fragipan below a depth of 18 to 24 inches. They developed in medium-textured, acid, colluvial material that generally is covered with a considerable amount of stones and boulders.

Near the Ernest soils are areas of the well-drained Dekalb soils and the somewhat poorly drained or poorly drained Brinkerton soils.

Permeability of the Ernest soils is moderate above the fragipan, but it is slow in the fragipan layer. These soils normally furnish enough moisture for plants during the growing season. They are strongly acid or very strongly acid and have moderately low natural fertility. The hazard of erosion is moderate.

Typical profile in an area of Ernest silt loam that has a slope of 12 percent, in a forest of black cherry, birch, and maple, 30 feet south of Otter Creek Road 1.9 miles north of its intersection with U.S. Highway No. 33 at Alpena Gap (Roosevelt Picnic Area on Shavers Mountain), in Randolph County:

O1—3 inches to 1 inch, leaves. 0 to 4 inches thick.
O2—1 inch to 0, decayed leaves. 0 to 1½ inches thick.
A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; loose; very strongly acid; clear boundary. 0 to 3 inches thick.
A2—2 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; very friable; very strongly acid; 15 percent channery fragments; clear, wavy boundary. 3 to 5 inches thick.
B21—6 to 16 inches, yellowish-brown (10YR 5/6) channery silt loam; weak, fine and medium, subangular blocky structure; friable; 15 to 20 percent small fragments of stone less than 3 inches in diameter; very strongly acid; irregular boundary. 6 to 12 inches thick.
B22t—16 to 23 inches, yellowish-brown (10YR 5/4) channery heavy silt loam; dark-brown to brown (7.5YR 4/2) and strong-brown (7.5YR 5/8) mottles are common, fine, and distinct, and are well defined as streaks and pockets around stones or root channels; weak, fine and medium, subangular blocky structure; friable; 20 percent angular fragments of sandstone and flat fragments of siltstone (1 inch to 3 inches in diameter); strongly acid; clear, irregular boundary. 6 to 10 inches thick.
Bx—23 to 37 inches, yellowish-brown (10YR 5/4) channery silty clay loam; few, fine, faint, dark-brown to brown (7.5YR 4/2) mottles; massive; firm; 50 percent siltstone fragments; strongly acid; gradual boundary. 10 to 20 inches thick.
Cx1—37 to 57 inches, yellowish-brown (10YR 5/4) channery silty clay loam; few, fine, faint, yellowish-brown (10YR 5/6) and strong-brown (7.5YR 5/6) mottles; massive; firm; 50 to 60 percent small siltstone fragments less than 3 inches in diameter; strongly acid; gradual boundary. 18 to 25 inches thick.
Cx2—57 to 72 inches, brown (10YR 5/3) channery silty clay loam; mottles same colors as in Cx1 horizon, but common, medium, and distinct; massive; firm; a large accumulation of iron concretions; 35 to 40 percent siltstone fragments 2 to 4 inches in diameter; strongly acid; gradual boundary. 10 to 18 inches thick.
R—72 inches +, gray, platy siltstone.

The subsoil ranges from heavy silt loam to silty clay loam, depending on the proportions of shale and sandstone in the parent material. The amount of coarse fragments ranges from less than 5 percent in shaly areas to more than 40 percent in areas where these soils developed in material weathered from coarse sandstone.

Ernest silt loam, 3 to 8 percent slopes (EnB).—This soil is near drainageways. In most areas there are a few fragments of sandstone and shale on the surface. The profile is similar to the one described as typical of the Ernest series, but the subsoil is finer textured in some

areas. Included with this soil in mapping are small areas of reddish soils.

Use and management of this Ernest soil are most affected by a moderate hazard of erosion and slow internal drainage in the subsoil. Seep spots and intermittent drainageways also restrict use. This soil is very strongly acid and has a moderately low supply of plant nutrients. It is suited to most crops commonly grown in the Area. Because of the slowly permeable fragipan, deep-rooted plants may not do well. (Capability unit IIe–13; woodland group 5)

Ernest silt loam, 8 to 15 percent slopes (EnC).—This soil is on lower slopes and near drainageways. In most areas a few fragments of sandstone and shale are on the surface.

Included with this soil in mapping are small areas of well-drained soils and small areas of soils that have a finer textured subsoil. Also included are some areas of reddish soils.

Use and management of this Ernest soil are most affected by a moderate hazard of erosion and slow internal drainage caused by the fragipan. Seep spots and intermittent drainageways also restrict use. Slow permeability of the fragipan restricts the growth of roots below a depth of about 20 inches. This soil is very strongly acid and has a moderately low supply of plant nutrients. It is suited to most crops commonly grown in the Area. (Capability unit IIIe–13; woodland group 5)

Ernest silt loam, 15 to 25 percent slopes (EnD).—This soil is near drainageways and on lower slopes in the eastern part of the survey Area. Included with it in mapping are small areas of well-drained soils and reddish soils.

Use and management of this Ernest soil are most affected by the moderate hazard of erosion and slow internal drainage in the fragipan. This soil is very strongly acid and has a moderately low supply of plant nutrients. It is suited to most crops commonly grown in the Area. The cropping system should include several years of sod crops after each year of cultivated crops. (Capability unit IVe–9; woodland group 5)

Ernest extremely stony silt loam, 3 to 15 percent slopes (ErC).—This soil is near drainageways. In most areas stones and boulders 1 to 2 feet in diameter cover 3 to 15 percent of the surface and in some areas as much as 40 percent. This soil has a profile similar to the one described as typical of the Ernest series, but it contains more coarse fragments. Included with it in mapping are small areas of reddish soils, somewhat poorly or poorly drained soils, and Very stony land.

Use and management of this Ernest soil are most affected by stones on the surface and a moderate hazard of erosion. This soil is very strongly acid and has a moderately low supply of plant nutrients. It is suitable for timber and for wildlife habitats. (Capability unit VIIs–2; woodland group 5)

Ernest extremely stony silt loam, 15 to 35 percent slopes (ErD).—This soil is near drainageways and on benches midway down the slopes. Stones 1 to 4 feet in diameter cover as much as 40 percent of the surface, but generally they cover only 3 to 15 percent. This soil has a profile similar to the one described as typical of the Ernest series, but it contains more coarse fragments. Included in mapping are reddish soils and Very stony land.

Use and management of this Ernest soil are most affected by stones on the surface and a moderate hazard of erosion. This soil is very strongly acid and has a moderately low supply of plant nutrients. It is suitable for timber and wildlife habitats. (Capability unit VIIs–2; woodland group 5)

Gilpin Series

In the Gilpin series are medium-textured, moderately deep to deep, well-drained soils that developed on uplands in acid material weathered from shale and sandstone. The major acreage of these soils is on steep-sided ridges that lie west of McGowan Mountain and Backbone Mountain. Smaller areas are on plateaus east of the town of Parsons, mostly on Middle Mountain and near the town of Benbush.

In small areas on ridgetops in the western half of the survey Area, the Gilpin soils occur with well-drained Dekalb soils that developed in material weathered from sandstone. They also occur with the Dekalb soils on Middle Mountain. On plateaus the Gilpin soils are near the Dekalb soils, the moderately well drained Ernest soils, and the somewhat poorly drained to poorly drained Brinkerton soils.

The Gilpin soils are very strongly acid to extremely acid. They are moderately permeable and have moderately low natural fertility. Runoff is slow in gently sloping areas, but it is moderately rapid in steep, cultivated areas. The hazard of erosion is moderate, especially in steeper areas.

Typical profile in an area of Gilpin channery silt loam that has slopes of 60 percent, on State Route No. 17, half a mile northwest of Left Fork of Clover Run, in Tucker County:

O1—2 inches to 1 inch, leaves and twigs.
O2—1 inch to 0, matted humus and fragments of siltstone 3 to 5 inches in diameter.
A1—0 to 2 inches, black (10YR 2/1) channery silt loam; moderate, fine, granular structure; very friable; fine roots; very strongly acid; abrupt, smooth boundary. 1 inch to 2 inches thick.
A2—2 to 6 inches, brown (10YR 5/3) channery silt loam; moderate, fine and medium, granular structure; friable; many fine roots; very strongly acid; gradual, smooth boundary. 4 to 7 inches thick.
B1—6 to 12 inches, yellowish-brown (10YR 5/6) silt loam; weak, medium, subangular blocky structure; friable; many fine and medium roots; very strongly acid; gradual, smooth boundary. 5 to 8 inches thick.
B2t—12 to 22 inches, yellowish-brown (10YR 5/6) channery silty clay loam; weak, medium, subangular blocky structure; firm when moist and slightly sticky when wet; 25 percent fragments of siltstone and shale; faint, broken clay films in pores and on the surfaces of the fragments of siltstone; few fine and medium roots; very strongly acid; gradual, smooth boundary. 9 to 12 inches thick.
C—22 to 33 inches, yellowish-brown (10YR 5/6) channery silty clay loam; weak, fine, subangular blocky structure; firm when moist and slightly sticky when wet; 35 to 40 percent fragments of siltstone and shale; few fine roots; extremely acid; gradual, irregular boundary. 9 to 12 inches thick.
R—33 inches +, olive-gray (5Y 4/2) siltstone and sandstone.

The thickness of the solum ranges from 14 to 30 inches, but it averages 22 inches. On lower slopes the average depth to bedrock ranges from 30 to 36 inches; on upper slopes, from 24 to 30 inches; and on ends of ridges, from 20 to 25 inches. The A1 horizon of the Gilpin soils ranges from ¼ inch to 2 inches in thickness. The texture of the

B2 horizon ranges from heavy silt loam to silty clay loam. The B horizons have subangular blocky structure that ranges from weak to moderate. In a small area of plateau near Benbush, the Gilpin soils are gently sloping to steep and have a well-developed profile. In these areas the structure of the B horizon is well defined, or moderate. Fragments of sandstone and shale as much as 8 inches long and 2 inches thick are throughout the profile of the Gilpin soils. In many places these fragments make up 10 to 30 percent of the upper 22 inches of the solum and as much as 90 percent of the deeper part.

Gilpin channery silt loam, 3 to 10 percent slopes (GcB).—This soil is on narrow ridgetops. It has a profile similar to the one described as typical of the Gilpin series, but it is slightly coarser textured and is shallower over bedrock.

Included with this soil in mapping are minor areas of the Dekalb soils. Also included are areas of soils that are intermediate between the Gilpin and Dekalb soils in degree of profile development and in texture of the subsoil.

Acidity and droughtiness most affect use and management of this Gilpin soil. This soil is generally well drained and moderately permeable. Natural fertility is moderately low. This soil is suited to most crops commonly grown in the Area. (Capability unit IIe–10; woodland group 8)

Gilpin channery silt loam, 10 to 20 percent slopes (GcC).—This soil is mainly on ridgetops. It has a profile similar to the one described as typical of the Gilpin series, but it is slightly coarser textured in many places. This soil is only about 20 inches thick on some of the narrow ridgetops.

Included with this soil in mapping are small areas of Dekalb soils. Also included are areas of soils that are intermediate between the Gilpin and the Dekalb soils in degree of profile development and in texture of the B horizon.

Acidity, droughtiness, and a moderate hazard of erosion most affect use and management of this Gilpin soil. This soil is generally well drained, is moderately permeable, and has moderately low natural fertility. It is suited to most crops that are commonly grown in the Area. (Capability unit IIIe–10; woodland group 8)

Gilpin channery silt loam, 10 to 20 percent slopes, severely eroded (GcC3).—Accelerated erosion has caused the loss of 75 percent or more of the surface layer of this soil. Small gullies have cut into the subsoil in most areas that do not have a plant cover. This soil has a profile similar to the one described as typical for the Gilpin soil, but it is thinner over bedrock and in many places has a more clayey subsoil.

Droughtiness and the hazard of erosion most affect use and management. This soil is well drained and moderately permeable. Natural fertility is moderately low.

This soil is suited to most crops commonly grown in the Area. A plant cover should be maintained to prevent further erosion. The cropping system should include several years of sod crops after each year of cultivated crops. (Capability unit IVe–3; woodland group 8)

Gilpin channery silt loam, 20 to 30 percent slopes (GcD).—This soil is normally on the upper part of ridges. On the ridgetops the slopes are complex and are mainly between 20 and 30 percent; in minor areas, however, they are between 10 and 20 percent or between 30 and 40 percent. Included with this soil in mapping are small areas of Dekalb soils. Other inclusions are soils that are intermediate between the Gilpin and the Dekalb soils in degree of profile development and texture of the subsoil.

Use and management of this Gilpin soil are most affected by droughtiness and the moderate hazard of erosion. This soil is well drained and moderately permeable. Natural fertility is moderately low. This soil is suited to most crops commonly grown in the Area. The cropping system should include several years of sod crops after each year of cultivated crops. (Capability unit IVe–3; woodland group 8)

Gilpin channery silt loam, 20 to 30 percent slopes, severely eroded (GcD3).—This soil is on the upper part of ridges. Numerous small fragments of sandstone and shale are on the surface. Most of the original surface layer has been lost by accelerated erosion. Small gullies have cut into the subsoil in areas that do not have a plant cover. This soil has a profile similar to the one described as typical of the Gilpin series, but it is thinner over bedrock. Mapped with this soil are minor areas of Gilpin soils that have slopes of 10 to 20 percent or of 30 to 40 percent.

Use and management of this severely eroded soil are most affected by droughtiness and the hazard of erosion. This soil is generally well drained and is moderately permeable. Natural fertility is moderately low. A plant cover should be maintained to control further erosion. This soil is suitable for pasture or for timber and wildlife habitats. (Capability unit VIe–2; woodland group 8)

Gilpin channery silt loam, 30 to 40 percent slopes (GcE).—The areas of this soil are uniform and are dissected by many small parallel drainageways. On narrow ridges this soil has complex slopes that are gently sloping and moderately steep. This soil has a profile similar to the one described as typical of the series, but it is shallower over bedrock.

Included with this soil in mapping are small areas of Dekalb soils. Other inclusions are areas of soils that are intermediate between the Gilpin and the Dekalb soils in degree of profile development and in texture of the subsoil.

This Gilpin soil is well drained, is moderately permeable, and has moderately low natural fertility. It tends to be droughty on the upper half of steep slopes, particularly south-facing slopes. Steepness and a moderate hazard of erosion are the characteristics that most affect use and management. This soil is suitable for timber and wildlife habitats. (Capability unit VIIe–2; woodland group 8)

Gilpin channery silt loam, 30 to 40 percent slopes, severely eroded (GcE3).—The areas of this soil are uniform and are dissected by many small parallel drainageways. Numerous fragments of sandstone and shale are on the surface. This soil has a profile similar to the one described as typical of the Gilpin series, but it is thinner. Most of the surface layer has been lost through accelerated erosion.

Steepness and a moderate hazard of erosion most affect use and management. This soil is well drained and moderately permeable. Runoff is rapid in areas that have little plant cover, and the soil is somewhat droughty. Natural fertility is moderately low. This soil is suitable for timber and for wildlife habitats. (Capability unit VIIe–2; woodland group 8)

Gilpin channery silt loam, 40 to 70 percent slopes (GcF).—This soil has straight slopes and is dissected by many parallel drainageways. Sandstone crops out in many places at the top of the slopes. Included with this soil in mapping are areas of Gilpin soil that are less than 20 inches thick and have slopes of nearly 70 percent. Also included are Gilpin soils that contain more channery fragments than this soil. Other inclusions are soils that are intermediate between the Gilpin and the Dekalb soils in profile development and in texture of the subsoil.

Steepness and a moderate hazard of erosion most affect use and management. This Gilpin soil is well drained, is moderately permeable, and has moderately low natural fertility. It is also droughty on the upper half of slopes, particularly those that face south. This soil is suitable for timber and wildlife habitats. (Capability unit VIIe–2; woodland group 8)

Gilpin channery silt loam, 40 to 70 percent slopes, severely eroded (GcF3).—This soil has straight slopes and is dissected by many parallel drainageways. Its surface is covered with small fragments of shale and sandstone in many places. Accelerated erosion has caused the loss of 75 percent or more of the surface layer, and small gullies that cut into the subsoil are common.

Steepness and a moderate hazard of erosion most affect use and management. This soil is well drained and moderately permeable. It is thinner than uneroded Gilpin soils and is droughty. Natural fertility is moderately low. This soil is suitable for timber and wildlife habitats. (Capability unit VIIe–2; woodland group 8)

Leetonia Series

In the Leetonia series are excessively drained, moderately deep to deep soils of the uplands. These soils developed in gray, acid, coarse-textured material weathered from sandstone and conglomerate. Most areas of these soils are in Canaan Valley. The Leetonia soils occur with the well-drained Dekalb soils, the somewhat poorly or poorly drained Brinkerton soils, and Wet terrace land.

The Leetonia soils are moderately to rapidly permeable and very strongly acid or extremely acid. Natural fertility is moderately low.

Typical profile in an area of Leetonia channery loam that has a slope of 12 percent, in forest on Canaan Mountain at the community of Canaan Heights, about a quarter of a mile north of State Route No. 32, in Tucker County:

O1, O2—1 inch to 0, thin leaf litter of deciduous trees; abrupt, smooth boundary.

A2—0 to 8 inches, gray (5YR 5/1) channery loam; weak, moderate, granular structure; very friable; 15 percent coarse fragments; many fine roots at the contact with the O2 horizon and few fine roots throughout; extremely acid; abrupt, smooth boundary. 6 to 10 inches thick.

B2h—8 to 10 inches, dark reddish-brown (5YR 3/2) loam; weak, fine, granular structure; very friable; 10 percent coarse fragments; few fine roots; extremely acid; abrupt, wavy boundary. 1 inch to 3 inches thick.

B2—10 to 20 inches, strong-brown (7.5YR 5/6) channery loam; weak, fine, subangular blocky structure; friable; 30 percent coarse fragments; common, fine and medium roots, mostly at the top; extremely acid; clear, smooth boundary. 8 to 13 inches thick.

C—20 to 27 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; massive; firm; 90 percent coarse fragments; very strongly acid; clear, smooth boundary. 5 to 10 inches thick.

R—27 inches +, highly siliceous conglomerate sandstone of the Pottsville and Allegheny formations.

The depth to bedrock ranges from 20 to 48 inches. Undisturbed Leetonia soils can be distinguished by a dark reddish-brown band 1 to 3 inches thick between a leached, gray, granular subsurface layer and a strong-brown subsoil. The subsurface layer varies in thickness, and in places tongues of the leached, gray material extend into the subsoil to a depth of 12 inches or more.

Leetonia channery loam, 3 to 10 percent slopes (LcB).—Most areas of this soil are in Canaan Valley. Channery fragments cover 15 percent or more of the surface in some areas. Included with this soil in mapping are some areas that have a profile similar to that described as typical of the Dekalb series.

Acidity and droughtiness of this Leetonia soil most affect use and management. This soil is excessively drained and moderately to rapidly permeable. Natural fertility is low. If this soil is well managed, it is suited to most crops grown in the survey Area. (Capability unit IIe–12; woodland group 6)

Leetonia channery loam, 10 to 20 percent slopes (LcC).—Most areas of this soil are in Canaan Valley. In some areas 15 percent or more of the surface is covered with channery fragments. Included with this soil in mapping are areas that have a profile similar to the profile described as typical for the Dekalb series.

Acidity and droughtiness of this Leetonia soil most affect use and management. This soil is well drained and moderately to rapidly permeable. Natural fertility is moderately low. If this soil is well managed, it is suited to most crops commonly grown in the survey Area. (Capability unit IIIe–12; woodland group 6)

Lickdale Series

In the Lickdale series are deep, very poorly drained soils that are in upland depressions and at the heads of streams. These soils developed in medium-textured alluvial material derived from shale and sandstone on adjacent uplands.

Near the Lickdale soils are the well-drained Dekalb soils of the uplands. Also near these soils are the somewhat poorly drained or poorly drained Brinkerton soils, which are in gently sloping areas near streams.

The Lickdale soils are very slowly permeable, and they are saturated with water for long periods in spring and in fall.

Typical profile of Lickdale silt loam, along Beaver Creek, three-fourths of a mile north of the town of Davis, in Tucker County:

O1—8 to 3 inches, moss. 0 to 10 inches thick.

O2—3 inches to 0, decayed moss and roots. 0 to 5 inches thick.

A1—0 to 5 inches, black (10YR 2/1) silt loam; weak, coarse, crumb structure; loose; strongly acid; abrupt, smooth boundary. 4 to 10 inches thick.

A2—5 to 20 inches, dark-gray (10YR 4/1) silt loam; massive, tending toward weak platy structure; friable; strongly acid; clear, smooth boundary. 10 to 20 inches thick.

Bg—20 to 24 inches, olive-brown (2.5Y 4/4) silty clay loam; few, fine, distinct, strong-brown (7.5YR 5/8) mottles; massive; slightly plastic; strongly acid; clear, wavy boundary. 3 to 6 inches thick.

IICg—24 to 37 inches +, gray (10YR 5/1) sandy loam; common, medium, distinct, strong-brown (7.5YR 5/8) mottles; massive; friable to firm; strongly acid. 10 to 20 inches thick.

The texture of the solum ranges from sandy loam to light silty clay loam. The A1 horizon of the Lickdale soils is 5 to 10 inches thick.

Lickdale silt loam, 0 to 5 percent slopes (LdA).—Use and management of this soil are most affected by very slow permeability and poor drainage. This soil is suitable for timber and for wildlife habitats. (Capability unit IVw–1; woodland group 1)

Lickdale very stony silt loam, 0 to 5 percent slopes (LsA).—Stones cover 1 to 5 percent of the surface of this soil. Poor drainage, very slow permeability, and stones on the surface most affect use and management. This soil is suitable for timber and for wildlife habitats. (Capability unit VIIs–5; woodland group 1)

Made Land

Made land (Ma) is in areas that have been excavated or graded. The original soil characteristics have been destroyed. Areas mapped as Made land in this survey Area vary so widely from place to place that it is not feasible to describe them. (Capability unit VIIIs–1; woodland group 12)

Meckesville Series

The Meckesville series consists of deep, well-drained soils that developed on lower slopes in colluvial material.

The Meckesville soils are below the Dekalb and Belmont soils. They are also below the Calvin soils that have a neutral substratum. These soils are near the moderately well drained Albrights soils and the well drained Belmont soils.

The Meckesville soils are strongly acid to very strongly acid. Below a depth of 36 to 48 inches is a faint to evident fragipan that is slowly permeable. Natural fertility is moderate, and available moisture capacity is moderately high. Runoff is medium in gently sloping areas, but it is moderately rapid in steep, cultivated areas. The hazard of erosion is moderate, especially in steep areas.

Typical profile in an area of Meckesville very stony silt loam that has slopes of 8 percent, in a pasture 3 miles north of Alpena on Alpena-Sully Road, in Randolph County:

A1—0 to 4 inches, very dark grayish-brown (10YR 3/2 when dry) very stony silt loam; moderate, medium, granular structure; slightly hard; less than 10 percent fragments of siltstone 2 to 4 inches in diameter; 2 to 20 percent fine roots; neutral; abrupt, smooth boundary. 1 inch to 4 inches thick.

A2—4 to 7 inches, dark reddish-brown (5YR 3/4 when dry) silt loam; moderate, medium, granular structure; hard; less than 10 percent fragments of siltstone 2 to 4 inches in diameter; few fine roots; strongly acid; abrupt, smooth boundary. 3 to 7 inches thick.

B11—7 to 15 inches, yellowish-red (5YR 4/6) loam; weak, fine, subangular blocky structure; friable; less than 10 percent fragments of siltstone 1 to 3 inches in diameter; few fine roots; very strongly acid; clear, irregular boundary. 6 to 9 inches thick.

B12—15 to 24 inches, dark-brown to brown (7.5YR 4/4) gravelly loam; weak, fine, subangular blocky structure; friable to slightly firm; faint, broken clay films on the surfaces of the peds; 25 percent fragments of siltstone; few fine roots; very strongly acid; abrupt, smooth boundary. 8 to 11 inches thick.

B2t—24 to 34 inches, dark reddish-brown (2.5YR 3/4) clay loam; moderate, fine and medium, subangular blocky structure; firm; 15 percent coarse fragments; very strongly acid; clear, wavy boundary. 9 to 11 inches thick.

B3t—34 to 44 inches, yellowish-red (5YR 4/6) and strong-brown (7.5YR 5/8) fine sandy clay loam; weak, fine and medium, subangular blocky structure; friable to slightly firm; less than 10 percent coarse fragments; very strongly acid.

Cx—44 inches +, reddish-brown (2.5YR 4/4) fine sandy clay loam; few, fine, distinct, strong-brown (7.5YR 5/8) mottles; massive; firm; a few manganese concretions; very strongly acid. The fragipan is faint to evident and is at a depth of 36 to 48 inches.

The texture of the A horizon is silt loam or loam. The texture of the B and C horizons ranges from sandy clay loam to silty clay loam. The color of the A2 horizon ranges from brown (10YR 5/3) to dark reddish brown (5YR 3/4). Coarse fragments, 6 to 30 inches in diameter, are evenly distributed throughout the profile.

Meckesville silt loam, 3 to 8 percent slopes (McB).—This soil has a profile similar to the one described as typical for the Meckesville series, but it contains fewer coarse fragments. Included with it in mapping are small areas of the Albrights and Ernest soils.

Use and management of this Meckesville soil are most affected by the slight to moderate hazard of erosion. This soil is well drained and moderately permeable. Natural fertility is moderate, and available moisture capacity is moderately high. This soil is suited to most crops commonly grown in the Area. (Capability unit IIe–11; woodland group 2)

Meckesville silt loam, 8 to 15 percent slopes (McC).—This soil is dissected by many intermittent drainageways. It has a profile similar to the one described as typical of the Meckesville series, but it contains fewer coarse fragments.

Included with this soil in mapping are a few areas of soils that are severely eroded and a few areas of soils that have slopes of more than 15 percent. Also included are small areas of moderately well drained Albrights and Ernest soils.

Use and management of this Meckesville soil are most affected by the moderate hazard of erosion. This soil is well drained and moderately permeable. Natural fertility is moderate, and available moisture capacity is moderately high. If this soil is well managed, it is suited to most crops commonly grown in the Area. (Capability unit IIIe–11; woodland group 2)

Meckesville very stony silt loam, 3 to 15 percent slopes (MkC).—This is the most extensive Meckesville soil in the survey Area. Most areas are cut by intermittent drainageways. Generally, 1 to 10 percent of the surface is covered with boulders and other stones, and limestone bedrock crops out in some places.

Included with this soil in mapping are some areas of soils that are not stony and other areas where as much as 40 percent of the surface is covered with boulders and other stones. Also included are some areas that are moderately well drained and other areas of soils that have a profile similar to the one described as typical of the Belmont series.

Use and management of this Meckesville soil are most affected by stones and a moderate hazard of erosion. This soil is well drained and moderately permeable.

Natural fertility is moderate, and available moisture capacity is moderately high. This soil is suited to pasture, to timber, and to wildlife habitats. (Capability unit VIs–1; woodland group 2)

Meckesville very stony silt loam, 15 to 30 percent slopes (MkD).—This is one of the more extensive Meckesville soils in the survey Area. Numerous drainageways dissect the areas of this soil. Generally, 1 to 10 percent of the surface is covered with boulders and other stones.

Included with this soil in mapping are some areas of soils that are not stony and other areas where as much as 40 percent of the surface is covered with stones. Also included, in some areas that have slopes of nearly 30 percent, are soils that have profiles similar to the profiles described as typical of the Calvin and Belmont series.

Use and management of this Meckesville soil are most affected by stones and the moderate hazard of erosion. This soil is well drained and moderately permeable. Natural fertility is moderate, and available moisture capacity is moderately high. This soil is well suited to timber and wildlife habitats. (Capability unit VIs–1; woodland group 2)

Meckesville very stony silt loam, 30 to 40 percent slopes (MkE).—This soil developed on stream terraces along Black Fork and Dry Fork in a mixture of colluvial and alluvial material. On the steep finger ridges and between the intermittent drainageways that dissect them, the deposits of colluvial and alluvial material are 4 to 10 feet or more thick.

In very steep areas along the intermittent drainageways, this Meckesville soil occurs in a mixed pattern with areas of rock outcrops and areas of the Belmont and Calvin soils. The outcropping rocks are limestone and red shale or sandstone.

Use and management of this Meckesville soil are most affected by stones, steepness, and a moderate hazard of erosion. This soil is well drained and moderately permeable. Natural fertility is moderate, and available moisture capacity is moderately high. This soil is suitable for timber and for wildlife habitats. (Capability unit VIIs–1; woodland group 2)

Monongahela Series

In the Monongahela series are deep, moderately well drained soils that developed in material weathered from sandstone and shale. These soils are on terraces along the major streams, mainly on high terraces along the Cheat River.

The Monongahela soils are generally adjacent to the deep, well-drained Allegheny soils. They are also adjacent to the somewhat poorly drained Tyler soils, which developed in fine-textured material.

The Monongahela soils have a slowly permeable, firm pan layer at a depth of 18 to 24 inches. Because of restricted drainage, deep-rooted plants may not do well in these soils. Acidity and moderately low natural fertility also influence use and management of Monongahela soils.

Typical profile in an area of Monongahela silt loam that has slopes of 7 percent, in a woodlot on the east side of State Route No. 15, three-fourths of a mile north of Bretz, in Tucker County:

A1—0 to 1 inch, very dark gray (10YR 3/1) silt loam; weak, fine, granular structure; very friable; less than 5 percent stones; many fine roots; extremely acid; abrupt, smooth boundary. 0 to 3 inches thick.

A2—1 inch to 5 inches, light yellowish-brown (10YR 6/4) loam; weak to fine, subangular blocky structure to moderate, medium, granular structure; friable; less than 5 percent stones; common fine and medium roots; very strongly acid; clear, smooth boundary. 0 to 5 inches thick.

B1—5 to 8 inches, brownish-yellow (10YR 6/6) loam; moderate, medium, subangular blocky structure; friable; less than 5 percent stones; common fine roots; strongly acid; clear, wavy boundary. 2 to 5 inches thick.

B2t—8 to 20 inches, yellowish-brown (10YR 5/6) clay loam; strong, medium, subangular blocky structure; friable; less than 5 percent stones; common fine roots; strongly acid; abrupt, wavy boundary. 6 to 15 inches thick.

Bx—20 to 36 inches +, yellow (10YR 7/6) sandy clay loam; many, coarse, distinct, light-gray (10YR 7/2) and dark-brown to brown (7.5YR 4/4) mottles; strong, medium, subangular blocky structure; firm; less than 5 percent stones; strongly acid. 10 to 20 inches thick.

The depth to the fragipan ranges from approximately 18 to 24 inches. In many places small rounded pebbles occur throughout the profile. In areas along major drainageways, there are cobblestones of various sizes and in various amounts in the lower horizons. The texture of the A1 horizon is loam or silt loam; that of the B2 horizon is silty clay loam or clay loam.

Monongahela silt loam, 0 to 3 percent slopes (MoA).—This soil is on high stream terraces. It has a profile similar to the one described as typical of the Monongahela series, but the fragipan is at a slightly greater depth. Included with it in mapping are minor areas of Tyler silt loam.

Use and management of this Monongahela soil are most affected by slow permeability. Drains may be needed to eliminate seep spots. This soil is strongly acid and has moderately low natural fertility. If it is well managed, it is suited to most crops commonly grown in the Area. (Capability unit IIw–1; woodland group 9)

Monongahela silt loam, 3 to 8 percent slopes (MoB).—This soil, the most extensive Monongahela soil in the survey Area, is on high stream terraces. Use and management are most affected by slow permeability and a moderate hazard of erosion. This soil is strongly acid and has moderately low natural fertility. It is suited to most crops commonly grown in the survey Area. (Capability unit IIe–13; woodland group 9)

Monongahela silt loam, 8 to 15 percent slopes (MoC).—This undulating soil is on high stream terraces. It has a profile similar to the one described as typical of the Monongahela series, but it may be slightly coarser textured and generally contains more cobblestones. Included with this soil in mapping are minor areas of the Allegheny soils.

Use and management of this Monongahela soil are most affected by slow permeability and a moderate hazard of erosion. This soil is strongly acid and has moderately low natural fertility. If well managed, it is suited to most crops commonly grown in the Area. (Capability unit IIIe–13; woodland group 9)

Muck and Peat

These are organic soils that occur mostly in Canaan Valley. The deposits of organic material are generally more than 2 feet thick. These soils occur near the very

poorly drained Blago and Lickdale soils, the somewhat poorly drained or poorly drained Brinkerton and Atkins soils, and Wet terrace land.

Typical profile, in a pasture where there are drainage ditches, 200 yards west of State Route No. 32, near the center of Canaan Valley, in Tucker County:

I—0 to 24 inches, very dark brown (10YR 2/2) muck; extremely acid; diffuse boundary. 8 to 20 inches thick.
II—24 to 44 inches, dark reddish-brown (5YR 3/4) peat; very strongly acid; abrupt boundary. 12 to 110 inches thick.
III—44 to 85 inches +, bluish-gray (5GY 5/1) clay; massive; neutral.

In most places this organic soil is extremely acid or very strongly acid. The thickness of the muck above the peat depends upon the stability of the water table. Peat oxidizes and changes to muck when it is exposed to air, and a thick layer of muck indicates that the level of the water table has fluctuated widely.

Muck and peat (Mp).—These organic soils are nearly level and are waterlogged. They are used mainly for trees and for wildlife habitats. (Capability unit VIIw–1; woodland group 12)

Nolo Series

In the Nolo series are moderately deep, somewhat poorly drained or poorly drained soils that developed on uplands in acid, gray material weathered from siltstone and shale. These soils are on mountain plateaus in the eastern half of the survey Area. They have a mottled, very firm layer, generally below a depth of 13 to 18 inches.

Near the Nolo soils are areas of the well drained Dekalb soils and of the moderately well drained Cookport soils. Also near these soils are areas of the very poorly drained Lickdale soils. The Nolo soils occur with the somewhat poorly drained or poorly drained Brinkerton soils.

The Nolo soils are slowly permeable and are saturated with water for extended periods in spring and in fall because of the firm, medium-textured layer in the subsoil. These soils are very strongly acid and have a moderately low supply of plant nutrients.

Typical profile of Nolo silt loam that has slopes of 1 percent, in an area where the vegetation consists of brackens, mosses, povertygrass, and scattered scrubby serviceberry bushes and red maple trees, on north side of gorge in Blackwater Falls State Park, 115 feet north of road to overlook, half a mile north of lodge and 0.6 mile southwest of store, in Tucker County:

O2—1 inch to 0, decayed ferns and mosses. 0 to 2 inches thick.
A21—0 to 3 inches, dark-brown to brown (7.5YR 4/2) silt loam streaked with reddish gray (5YR 5/2); moderate, fine, granular structure tending toward weak, medium, platy structure; friable to firm; a discontinuous ¼-inch layer of black (10YR 2/1) silt loam is at the top of this horizon; very strongly acid; abrupt, wavy boundary. 0 to 5 inches thick.
A22—3 to 6 inches, light brownish-gray (10YR 6/2) silt loam; moderate, medium, prismatic structure breaking to weak, coarse, angular blocky structure; firm and dense; black (10YR 2/1) coatings on the surfaces of the prisms; very strongly acid; abrupt, smooth boundary. 0 to 5 inches thick.
A23—6 to 9 inches, grayish-brown (10YR 5/2) fine sandy loam; weak, coarse, prismatic structure breaking to weak, fine, subangular blocky structure; friable, very strongly acid; abrupt, irregular boundary; tongues of soil material from this horizon extend through the lower horizons almost to bedrock. 0 to 5 inches thick.
B21—9 to 15 inches, yellowish-brown (10YR 5/4) clay loam; strong-brown (7.5YR 5/8) and grayish-brown (10YR 5/2) coarse mottles are common; weak, medium and coarse, blocky structure; friable to firm; common, discontinuous clay patches on horizontal planes; isolated pockets of soil material of this horizon extend into the A23 horizon above; less than 5 percent fragments of sandstone ½ inch to 4 inches in diameter; fragments have iron weathering rinds, ironlike coatings, or both; very strongly acid; clear, smooth boundary. 4 to 9 inches thick.
B22—15 to 21 inches, yellowish-brown (10YR 5/4) and grayish-brown (10YR 5/2) loam; distinct, common, yellowish-brown (10YR 5/8) mottles in places; weak, thick, platy structure breaking to moderate, medium, blocky structure; firm; very strongly acid; clear, irregular boundary. 4 to 9 inches thick.
Bx—21 to 23 inches, 80 percent yellowish-brown (10YR 5/8) and 20 percent grayish-brown (10YR 5/2) silty clay loam; mottles fewer than in the B22 horizon, but the same color; massive; firm and dense; very strongly acid; abrupt boundary. 2 to 10 inches thick.
R—23 inches +, hard, fine-grained sandstone.

The Nolo soils developed in coarse-textured and medium-textured material. Where these soils developed in material derived mostly from sandstone, the texture of the Bx horizon is generally loam. The Nolo soils have a thinner solum and are shallower to bedrock than the Brinkerton soils.

Nolo silt loam, 0 to 5 percent slopes (NoA).—This soil on the top of broad, nearly level to gently sloping plateaus, where surface drainage is poor and internal drainage is slow. Fragments of sandstone 2 to 6 inches in diameter are generally on the surface and throughout the profile. Included with this soil in mapping are small areas of the somewhat poorly drained or poorly drained Brinkerton soils and the well-drained Dekalb soils.

Acidity and slow internal drainage of this Nolo soil most affect use and management. This soil is wet for long periods in spring and in fall because of slow internal drainage. It has a moderately low supply of plant nutrients. This soil is suited to grasses and legumes grown for hay or pasture and to an occasional row crop; it is also suitable for timber and for wildlife habitats. It requires good management that includes drainage practices. (Capability unit IVw–5; woodland group 3)

Nolo silt loam, 5 to 10 percent slopes (NoB).—This soil has a profile that closely resembles the one described as typical of the Nolo series, but there are numerous boulders, ranging from less than 1 foot to more than 3 feet in diameter, on the surface and throughout the profile. Included in mapping are small areas of the Brinkerton and Dekalb soils.

Slow internal drainage and a moderate hazard of erosion most affect use and management. This soil is very strongly acid and has a low supply of plant nutrients. It is suited to grasses and legumes grown for hay or pasture and to an occasional row crop. It requires good management, including practices that establish drainage and control of erosion. This soil is also suitable for timber and wildlife habitats. (Capability unit IVw–5; woodland group 3)

Philo Series

In the Philo series are deep, moderately well drained soils that developed in alluvial material weathered from shale and sandstone and washed from the uplands. These soils are subject to frequent flooding. Below a depth of about 17 inches, they are saturated with water in spring and in fall. The Philo soils are near the well-drained Barbour and Pope soils and the poorly drained Atkins soils.

The Philo soils are strongly acid and have moderate natural fertility. They have moderate permeability, but they are mottled throughout the profile because of the high water table in spring and in fall.

Typical profile of Philo silt loam, 1 mile south of Porterwood along Shavers Fork, in Tucker County:

Ap—0 to 7 inches, dark-brown (10YR 3/3) silt loam; moderate, medium, granular structure; friable; strongly acid; abrupt, smooth boundary. 5 to 9 inches thick.

C1—7 to 17 inches, dark-brown to brown (10YR 4/3) loam; moderate, medium, granular structure; friable; strongly acid; clear, smooth boundary. 8 to 12 inches thick.

C2—17 to 38 inches, mottled gray (10YR 5/1), strong-brown (7.5YR 5/8), and very dark brown (10YR 2/3) loam; structureless; friable; strongly acid. 15 to 25 inches thick.

The frequency of flooding ranges from two or three times a year to once every 10 years. The depth to mottling generally ranges from 15 to 18 inches. The texture of the C horizon ranges from silt loam to loam. Along small streams the upper part of the C horizon is dominantly silt loam and the lower part is gravelly. In many places, however, gravel occurs above a depth of 18 inches. The content of gravel grades to 100 percent in the lower part of the C horizon.

Philo silt loam (Ph).—This is the only Philo soil mapped in this survey Area. It is on nearly level flood plains that are subject to occasional flooding. Use and management are most affected by the frequency of flooding. This soil is strongly acid and has moderate natural fertility. It is mottled because of a seasonally high water table. Flood damage is likely in some years, but this soil is well suited to most crops normally grown in the Area. (Capability unit IIw–7; woodland group 9)

Pope Series

The Pope series consists of well-drained soils that developed on flood plains in acid, gray material washed from areas underlain by sandstone and shale. Bordering the Pope soils in most places are the moderately well drained Philo soils and the poorly drained Atkins soils. All the Pope soils in this survey Area are mapped in undifferentiated units with the Barbour soils.

The Pope soils are strongly acid. The tilth is good in areas that are not gravelly, and the natural fertility is moderate. The soils are moderately to rapidly permeable. They are subject to occasional flooding along the larger streams and frequent flooding along the smaller streams.

Typical profile of Pope fine sandy loam, approximately 2 miles south of State Route No. 38, in Tucker County:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) fine sandy loam; moderate, fine, granular structure; friable; strongly acid; clear, smooth boundary. 6 to 10 inches thick.

C1—8 to 26 inches, dark yellowish-brown (10YR 4/4) loam; moderate, fine, granular structure; friable; 10 percent coarse fragments 1 inch to 2 inches in diameter; few fine roots; strongly acid; gradual, smooth boundary. 10 to 25 inches thick.

C2—26 to 37 inches, dark yellowish-brown (10YR 4/4) sandy loam; massive; friable; 10 percent coarse fragments 1 inch to 2 inches in diameter; strongly acid; clear, smooth boundary. 10 to 30 inches thick.

C3—37 inches +, sand and gravel.

The Pope soils range from loam and fine sandy loam to sandy loam and, in small areas, to loamy sand in texture. The finer textured soils are generally on the broader flood plains along the larger streams. The coarser textured soils are more common along the smaller, steeper streams. Gravelly and cobbly soils are also common along the smaller streams. The depth to a gravelly or cobbly substratum is generally less on the small flood plains than in the larger valleys. Generally, flooding is more frequent along the smaller streams than along the larger streams.

Purdy Series

The Purdy series consists of deep, poorly drained, gray soils that developed in fine-textured alluvial material. These soils occupy a small acreage, mainly on terraces along the Cheat River. They are near the moderately well drained Monongahela soils and the somewhat poorly drained Tyler soils.

The Purdy soils are slowly permeable. They are saturated and have water near the surface for long periods in spring and in fall. These soils are strongly acid or very strongly acid. Their supply of plant nutrients is moderately low.

Typical profile of Purdy silty clay loam, in a pasture 1 mile north of Parsons along State Route No. 1, 0.2 mile from the intersection of that road with State Route No. 72, in Tucker County:

Ap—0 to 8 inches, gray (N 5/0) silty clay loam; common, fine, prominent, strong-brown (7.5YR 5/8) mottles around root channels; massive; firm when moist; many fine roots; medium acid; gradual, smooth boundary. 6 to 9 inches thick.

B1g—8 to 26 inches, gray (N 5/0) silty clay; many, fine, prominent, strong-brown (7.5YR 5/8) mottles near old root channels; weak, coarse, prismatic structure; nonsticky and plastic when wet; faint and complete clay films on the surface of the peds; few fine roots; strongly acid; gradual, smooth boundary. 10 to 20 inches thick.

B2—26 to 36 inches +, gray (N 5/0) silty clay; many, medium, prominent, yellowish-red (5YR 4/8) mottles; moderate, coarse, prismatic structure breaking to moderate to strong, fine, subangular blocky structure; nonsticky and plastic when wet; faint and complete clay films on the surfaces of the prisms; few fine roots; very strongly acid. 10 to 20 inches thick.

In places the texture of the surface layer is clay loam instead of silty clay loam. The texture of the subsoil ranges from clay loam to clay, but it is dominantly silty clay loam.

Purdy silty clay loam (Pu).—This is the only Purdy soil mapped in the survey Area. It is smooth and nearly level. Surface drainage and internal drainage are slow. The use and management of this soil are influenced

most by the poor drainage. Because of the dense subsoil, open ditches are used in preference to tile for improving drainage. This soil is suited to grasses and legumes grown for hay or pasture, but it is also suitable for timber and wildlife habitats. (Capability unit IVw–1; woodland group 1)

Sandstone Rubble Land

Sandstone rubble land (Sa) is made up of areas where more than 90 percent of the surface is covered with stones and boulders 2 to 6 feet in diameter, and there commonly is little or no soil material between them. On plateaus in some areas, this land supports a cover of red spruce, growing mostly in its own needle litter. Slopes range from gentle to very steep. Management is most affected by the stones on the surface. (Capability unit VIIIs–1; woodland group 12)

Sequatchie Series

In the Sequatchie series are deep, well-drained soils that developed in acid alluvial material derived from sandstone and shale. These soils are on low, nearly level terraces along the Cheat River and are occasionally flooded. Near the Sequatchie soils are well-drained Barbour and Pope soils and poorly drained Atkins and Purdy soils.

The management of the Sequatchie soils is most affected by occasional flooding and the formation of a plowpan if use is intensive. These soils are moderately permeable and slightly acid to very strongly acid. Natural fertility and available moisture capacity are moderate. If good management is used, including additions of lime and fertilizer, these soils are excellent for growing most plants.

Typical profile in an area of Sequatchie fine sandy loam that has slopes of 1 percent, in a pasture adjacent to bridge over the Cheat River on road to Horseshoe Run, in Tucker County:

Ap—0 to 7 inches, dark-brown to brown (7.5YR 4/2 when dry) fine sandy loam; moderate, fine, crumb structure; slightly hard; common fine roots, neutral; abrupt, smooth boundary. 6 to 12 inches thick.

Bt—7 to 23 inches, yellowish-red (5YR 4/6 when dry) fine sandy clay loam; weak, coarse, subangular blocky structure that ruptures to weak, medium and fine, subangular blocky structure; slightly hard; few fine roots; slightly acid; clear, smooth boundary. 13 to 30 inches thick.

C—23 to 36 inches +, yellowish-red (5YR 4/6) sandy loam; very friable; single grain; no roots; very strongly acid. 10 to 20 inches thick.

The texture of the A horizon ranges from loam to fine sandy loam. The B horizon is weakly developed and ranges from sandy loam to fine sandy clay loam. The C horizon is generally coarse sandy loam or loamy sand that contains various amounts of gravel.

Sequatchie fine sandy loam (Se).—This is the only Sequatchie soil mapped in the survey Area. It is on low, nearly level terraces along the Cheat River.

This soil is well drained and moderately permeable. Natural fertility is moderate, and available moisture capacity is good. If this soil is well managed, it is suited to most crops commonly grown in the Area, but a plowpan may develop in areas used continuously for row crops. (Capability unit I–6; woodland group 9)

Stony Alluvial Land

Stony alluvial land (Sl) is made up of very coarse, recent stream deposits and is subject to frequent flooding. Most areas do not have a plant cover. This land is stony, strongly acid, and droughty. It is generally not suitable for planned management, but some areas can be used for pasture, timber, or wildlife habitats. (Capability unit VIIIs–1; woodland group 12)

Strip Mine

Strip mine (Sm) consists of areas in which the soil and underlying rocks have been disturbed to mine coal seams that are mostly 20 to 40 feet below the surface. Mining and leveling the spoil result in the mixing of slate, coal, rocks, and soil material. Areas that are successfully revegetated generally have 20 percent or more of soil material in this mixture.

Strip-mined areas generally follow the contour of the coal seams. In a steep area, a single cut is generally made, but in a more gently sloping area several cuts are likely to be made. The last cut leaves a vertical wall, generally 20 to 40 feet high. Some areas have been regraded so that the surface slope in the main part of the disturbed area drains toward the vertical wall. This leaves the outer slope at the angle of repose, commonly between 70 and 80 percent, depending on the texture and on the number of coarse fragments and rocks in the material. The coal seams are generally covered, in order to reduce the formation of extremely acid drainage water. Reaction of the spoil material varies widely within short distances; it ranges from nearly neutral to extremely acid. In some small areas the spoil material is so acid that it is toxic to plants. Most of the material in this survey Area has a pH of 4.0 to 5.5.

Because areas of Strip mine vary widely in texture, reaction, and slope, it is necessary to study each site carefully before plans for revegetation can be made. Black locust, Scotch pine, Virginia pine, red pine, and other trees and shrubs grow well in some places, and also autumn-olive and other shrubs. Native trees, such as black locust, fire cherry, black birch, aspen, and ash, have volunteered in places. Adapted grasses and legumes can be grown if the leveled area is not extremely acid and if there is enough fine soil material. (Not placed in a capability unit; woodland group 12)

Tyler Series

In the Tyler series are deep, somewhat poorly drained or poorly drained clayey soils that developed on stream terraces in fine-textured material derived from sandstone and shale. This material was washed from the surrounding uplands and deposited by slack water. A fragipan occurs below a depth of 18 or 20 inches. Near the Tyler soils are the moderately well drained Monongahela soils and the poorly drained Purdy soils.

The Tyler soils are slowly permeable and strongly acid. Natural fertility is moderately low. These soils remain wet in spring and in fall.

Typical profile of Tyler silt loam, 200 feet north of large barn on county farm, in Tucker County:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, crumb structure; friable; strongly acid; abrupt, smooth boundary. 6 to 8 inches thick.

B2t—7 to 18 inches, grayish-brown (2.5Y 5/2) silty clay loam; common, fine and medium, prominent, yellowish-brown (10YR 5/8) mottles; moderate, coarse, subangular blocky structure; firm; strongly acid; clear, smooth boundary. 7 to 15 inches thick.

Bx—18 to 36 inches +, light brownish-gray (2.5Y 6/2) clay loam; common, medium, prominent, strong-brown (7.5YR 5/8) mottles; moderate, coarse, prismatic structure; firm or very firm; fine roots and many fine and medium pores along the surfaces of the prisms; few manganese concretions, increasing in number with depth; strongly acid. 15 to 30 inches thick.

The depth to mottling ranges from 6 to 14 inches. The texture of the B horizon ranges from clay loam to silty clay loam. Normally these soils have a weak to evident fragipan.

Tyler silt loam (Ty).—This is the only Tyler soil mapped in the survey Area. It has a profile similar to the one described as typical of the Tyler series, but in some small areas the lower part of the B horizon is finer textured and lacks a fragipan.

The poor internal drainage of this soil most affects use and management. This soil is strongly acid and has a moderately low supply of plant nutrients. It is suited to grasses and legumes grown for pasture or hay, to timber, and to wildlife habitats. Some kind of artificial drainage, however, is needed if this soil is to be improved for pasture, hay, or cultivated crops. (Capability unit IIIw–5; woodland group 3)

Very Stony Land

Very stony land consists of areas where identifiable soil characteristics are lacking. This land type is fairly extensive in this survey Area, but it was mapped with the Brinkerton and Lickdale soils as part of an association, and with the Calvin, Dekalb, Ernest, and Leetonia soils and Wet land as part of a complex.

Very stony land-Brinkerton-Lickdale association (Vb).—This association occurs extensively on mountain tops and plateaus. In most areas 40 to 90 percent of the surface is covered with stones and boulders that are 1 to 4 feet in diameter. Some small areas are less stony. Slopes are mostly gentle or moderate. Some of the more stony areas lack prominent soil features. The Brinkerton soils occupy about 85 percent of areas where soil profiles can be recognized; the Lickdale soils occupy about 15 percent. These soils are described under the headings "Brinkerton Series" and "Lickdale Series." Areas of this association are near the Ernest and Dekalb soils.

Stones and wetness most affect use and management. Both the Lickdale and Brinkerton soils are strongly acid to extremely acid, and both have moderately low natural fertility.

This association is used mainly for timber and wildlife habitats, but water storage and recreation are other uses that should be considered. The plant cover in most areas consists of red spruce, yellow birch, hemlock, red maple, and rhododendron, but there are open areas where the cover consists of brackens, grasses, and scattered cherry, red spruce, and hemlock trees. (Capability unit VIIs–5; woodland group 10)

Very stony land-Calvin complex, 40 to 75 percent slopes (VcF).—Areas of this complex are commonly adjacent to major streams flowing through areas of the Calvin soils. In most areas 10 to 40 percent of the surface is covered with stones and boulders that are 12 to 30 inches long. Rock outcrops are numerous. Small parts of this complex are extremely stony and ledgy. The Calvin soils in this complex have a profile similar to the one described as typical of the Calvin series. Included with this complex in mapping are a few areas that have moderate or gentle slopes.

Steepness and stoniness are the characteristics that most affect use and management of this complex. The Calvin soil is strongly acid and somewhat droughty. This complex is used mainly for timber and wildlife habitats. (Capability unit VIIs–2; woodland group 7)

Very stony land-Dekalb complex, 20 to 40 percent slopes (VdE).—Areas of this complex are in many parts of the survey Area but are mainly in the mountainous eastern and central parts. Generally, 40 to 90 percent of the surface is covered with stones and boulders that are 2 to 10 feet in diameter. Part or all of the normal profile is obscured in most areas that contain more than 70 percent stones. The Dekalb soils in this complex developed mainly in material that weathered from sandstone. They have a profile similar to the one described as typical of the Dekalb series, but are more stony. Some moderately well drained areas along drainageways and on narrow benches are included with this complex in mapping.

The stones most affect use and management. They hinder the operation of equipment. The Dekalb soils in this complex are strongly acid, are moderately permeable, and have moderately low natural fertility. The acreage of this complex is used mainly for timber and wildlife habitats. (Capability unit VIIs–4; woodland group 7)

Very stony land-Dekalb complex, 40 to 80 percent slopes (VdF). Areas of this complex are in many parts of the survey Area, but mainly in the mountainous eastern and central parts. Generally, 40 to 90 percent of the surface is covered with stones and boulders 2 to 12 feet in diameter. Rock outcrops are common. The acreage of this mapping unit is one of the more extensive in the survey Area. The Dekalb soils in this complex developed mainly in material weathered from sandstone. They have a profile similar to the one described as typical of the Dekalb series, but are more stony.

Steep slopes and stones most affect use and management of this complex. The stones hinder the operation of equipment. The acreage is used mainly for timber and wildlife habitats. (Capability unit VIIs–4; woodland group 7)

Very stony land-Ernest complex, 3 to 15 percent slopes (VeC).—This complex is along drainageways and at the head of streams in the eastern and central parts of the survey Area. Generally, 40 to 90 percent of the surface is covered with stones and boulders 1 to 6 feet in diameter. Many of the areas that contain more than 70 percent stones and boulders lack prominent soil features. The Ernest soils in this complex have a profile similar to the one described as typical of the Ernest series, but they are more stony. Areas of this complex occur with areas of other Very stony land complexes.

Included with this complex in mapping are some areas that are more poorly drained and areas of Sandstone rubble land.

Stoniness most affects use and management of this complex. The stones hinder the operation of equipment. The acreage is used mainly for timber and wildlife habitats. (Capability unit VIIs–4; woodland group 7)

Very stony land-Ernest complex, 15 to 35 percent slopes (VeD).—This complex is along drainageways and at the head of streams in the eastern and central parts of the survey Area. Generally, 40 to 90 percent of the surface is covered with stones and boulders that are 2 to 10 feet in diameter. The Ernest soils in this complex have a profile similar to the one described as typical of the series, but they are more stony. Areas of this complex occur with other areas of Very stony land complexes.

Stoniness most affects use and management of this complex. The stones hinder the operation of equipment. The acreage is used mainly for timber and wildlife habitats. (Capability unit VIIs–4; woodland group 7)

Very stony land-Leetonia complex, 3 to 20 percent slopes (VlC).—This complex is along mountain ridges in the eastern half of the survey Area. The largest acreage is on Canaan Mountain. Generally, 40 to 90 percent of the surface is covered with stones and boulders. In some areas the stones replace part or all of the soil horizons. Some of the more stony areas lack prominent soil features. The Leetonia soils in this complex have a profile similar to the one described as typical of the Leetonia series, but they are more stony and are coarser textured. Also, their surface layer is covered with a layer of black organic matter that is 3 to 4 inches thick and consists of matted roots and well-decomposed humus.

Included with this complex in mapping are numerous small areas of Sandstone rubble land and other areas that are less stony than normal. Also included are some areas of Dekalb soils.

Stoniness most affects use and management of this complex. The acreage is used mainly for timber and wildlife habitats. (Capability unit VIIs–4; woodland group 7)

Very stony land-Wet land complex, 3 to 10 percent slopes (VwB).—This complex is most extensive on Canaan Mountain, where approximately 1,200 acres has been mapped. It consists of a mixed pattern of Very stony land and somewhat poorly drained soils. Generally, 40 to 90 percent of the surface is covered with stones and boulders. Most of the stony areas lack prominent soil features. This complex commonly occurs with areas of Very stony land-Dekalb complex, Very stony land-Leetonia complex, and the Brinkerton soils.

Profile of the dominant soil in Wet land between areas of stones and boulders:

I—1 inch to 0, litter mat of lichens, mosses, lycopodium, and ferns.

II—0 to 2 inches, black (N 2/0) gravelly sandy loam; single grain; friable; 60 percent gravel ⅛ to ½ inch in diameter; many fine and few medium roots; extremely acid; abrupt, smooth boundary.

III—2 to 6 inches, grayish-brown (10YR 5/2) gravelly loamy sand; weak massive structure breaking to single grain; slightly firm; 60 percent gravel ⅛ to ½ inch in diameter; few fine roots; extremely acid; abrupt, smooth boundary.

IV—6 to 10 inches, very dark gray (5YR 3/1) gravelly sandy loam with pockets of grayish brown (10YR 5/2); single grain; slightly firm; 60 percent gravel ⅛ to ½ inch in diameter; few fine roots; extremely acid; abrupt, broken boundary.

V—10 to 13 inches, variegated dark reddish-brown (5YR 3/3), very dark gray (5YR 3/1), and reddish-brown (5YR 5/4) gravelly sandy loam that occurs as pockets ½ inch deep; single grain; friable; 60 percent gravel ⅛ to ½ inch in diameter; few fine roots; extremely acid; abrupt, smooth boundary.

VI—13 to 14 inches, yellowish-red (5YR 5/8) gravelly sandy loam; massive; very firm (ortstein); 60 percent gravel ⅛ to ½ inch in diameter; extremely acid; abrupt, smooth boundary.

VII—14 to 20 inches, strong-brown (7.5YR 5/8) gravelly sandy loam; single grain; friable to slightly firm; 60 percent gravel ⅛ to ½ inch in diameter; extremely acid; clear, smooth boundary.

VIII—20 to 24 inches +, light olive-brown (2.5Y 5/4) gravelly loamy sand; single grain; firm; 60 percent gravel ⅛ to ½ inch in diameter; extremely acid.

The profile varies from place to place. Horizon III ranges from 4 to 24 inches in thickness. In places a layer of gray or light olive-brown gravelly loamy sand lies beneath horizon V, and horizons VI and VII are lacking.

Stones on the surface and slow internal drainage most affect use and management. This complex is extremely acid and has low natural fertility. It is suited to timber and wildlife habitats, but water storage and recreation are other uses that should be considered. (Capability unit VIIs–5; woodland group 10)

Wet Terrace Land

Wet terrace land (Wt) is a moderately deep to deep, somewhat poorly drained land type that developed in various kinds of material. All of this land is in Canaan Valley in nearly level areas at an elevation of more than 3,000 feet. The material in the uppermost 15 to 18 inches is similar to that of comparable layers in the Tyler soils.

Near Wet terrace land are the very poorly drained Blago soils, the well drained Belmont soils, and the somewhat poorly drained Nolo soils. Also near this land type are the well drained Calvin soils, neutral substratum, and the moderately well drained Albrights soils.

The texture of the surface layer of Wet terrace land ranges from loam to silty clay loam, but it is dominantly silt loam. The uppermost 15 to 18 inches is mainly material deposited by slack water. Unconforming residual material occurs below this depth, except in minor areas. In these small areas the unconforming material is alluvial. The residual material developed in material weathered from limestone, red shale, or sandstone bedrock. Limestone is dominant, particularly in the southern end of Canaan Valley; red shale increases in the northern end of the valley, and sandstone is intermixed with the other bedrock throughout the valley. The reaction of the residual material ranges from strongly acid to slightly acid.

Poor drainage and slow permeability most affect use and management. Wet terrace land is slowly permeable and is saturated with water in spring and in fall. It is very strongly acid in the upper part. Natural fertility is moderate.

A few acres of this land have been improved for pasture and hay, but in most places the cover is pover-

tygrass, sedges, and brackens. Some kind of artificial drainage is needed to produce satisfactory yields of hay, pasture, or rotated crops. Because this land has a slowly permeable, clayey subsurface layer, open ditches provide more effective drainage than tile in most areas. (Capability unit IVw–5; woodland group 3)

Use and Management of the Soils

In this section use and management of soils for crops, pasture, woodland, wildlife, engineering, recreation, and residential development are discussed. The system of capability grouping used by the Soil Conservation Service is explained. Estimates of yields for major crops are given.

Capability Groups of Soils

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

In the capability system, all kinds of soils are grouped at three levels, the capability class, subclass, and unit. These are discussed in the following paragraphs.

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

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

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

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

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

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

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

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

Class VIII. Soils and landforms have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes.

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

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

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–4 or IIIe–6. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation, and the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph. The Arabic numeral specifically identifies the capability unit within each subclass.

Management of Soils by Capability Units

In the following pages each capability unit of this survey Area is described and some suggestions for use and management are given. The units are not numbered consecutively, because not all of the units in the statewide system are represented in this Area. Further information concerning the management of soils can be obtained from the local soil conservationist and the County Agricultural agent.

CAPABILITY UNIT I-6

This capability unit consists of deep, well-drained, nearly level soils of the bottom lands. These dark-gray or reddish-brown soils developed in acid material derived from sandstone and shale. Their moderately coarse texture is fairly uniform to a depth of 3 feet or more. The soils in this unit are Barbour and Pope fine sandy loams, high bottom, and Sequatchie fine sandy loam.

These soils are rather loose and are easy to work. Their available moisture capacity is moderate, and they are slightly droughty when rainfall is below normal. These soils are naturally acid and have a moderate supply of plant nutrients. They need more frequent applications of lime and fertilizer than some of the less sandy soils, and organic matter tends to burn out quickly. A plowpan has formed in some areas that have been intensively farmed.

These soils are well suited to all crops commonly grown in the Area. An intensive cropping system may be used if the content of organic matter and the supply of plant nutrients are maintained. An example of such a crop-

ping system is corn grown every year and followed by a winter cover crop. An occasional hay crop in the cropping system improves tilth and supplies organic matter. Crops are damaged infrequently by floods. In some places it may be necessary to stabilize the streambank in order to control erosion.

These soils are good for pasture. Rotation grazing, maintenance of fertility, and mowing are all needed to keep pastures productive. In well-managed pastures, yields of deep-rooted tall grasses and legumes are excellent.

CAPABILITY UNIT IIe-4

In this unit there is one soil of the Allegheny series, a yellowish-brown, deep, well-drained soil. The available moisture capacity of this soil is moderate, and the content of organic matter is moderately low.

Erosion can be controlled and the content of organic matter maintained by growing cover crops or leaving residue from row crops on the surface and by farming on the contour or stripcropping on the contour. Natural drainageways should be maintained as grassed waterways. The supply of potash is likely to be low.

This soil is well suited to all crops commonly grown in the survey Area. A moderately intensive cropping system can be used if erosion is controlled and the content of organic matter is maintained. An example of such a cropping system is corn, a small grain, and 2 years of hay. A less intensive cropping system is also suitable.

This soil can be used for pasture from early in spring till late in fall. It is not readily damaged by trampling. If pastures are well managed, yields of tall grasses and legumes are good. Bluegrass is usually short in July and August. Pastures improve if they are mowed to control weeds and excessive growth of other plants.

CAPABILITY UNIT IIe-10

In this unit are moderately deep to deep, well-drained, red and yellowish-brown soils of the Calvin, Dekalb, and Gilpin series. These soils developed on uplands in acid, red and gray material weathered from sandstone and shale. They are acid and have a moderately low supply of plant nutrients. Their subsoil is fairly friable and is permeable to water. Available moisture capacity is moderate to moderately low. In some areas on narrow ridgetops, these soils are only about 20 inches deep and are droughty.

Controlling erosion and maintaining the content of organic matter are the main problems of management. Narrow strips need to be farmed on the contour, and long slopes require stripcropping on the contour. Residue from row crops should be worked into the soil. Natural drainageways should be maintained as grassed waterways.

The soils in this unit are fairly well suited to all crops commonly grown in the Area. A suitable cropping system includes corn, a small grain, and 2 years of a grass-legume mixture grown for hay. Corn should be followed by a cover crop or a winter grain crop. A cropping system in which row crops are grown less often is also suitable. At an elevation of more than 3,000 feet, the growing season may be too short for corn.

These soils are fair for pasture. They can be grazed early in spring or late in fall if the growth of grass has been adequate. A bluegrass-white clover mixture makes good pasture, but growth is likely to be slow in the drier months of summer. Pastures that have been seeded to tall grasses and those that have recently been used as hayland provide more days of grazing per season.

CAPABILITY UNIT IIe-11

This unit consists of deep to moderately deep, well-drained soils that have good structure and hold moisture well. They are generally strongly acid to medium acid and have a moderate to moderately large supply of plant nutrients. The soils are of the Belmont, Calvin, and Meckesville series and have slopes of 3 to 10 percent.

Controlling erosion and maintaining the content of organic matter are the main management problems. Narrow strips should be farmed on the contour, and long slopes should be stripcropped on the contour.

The soils in this unit are suited to all crops commonly grown in the Area. A moderately intensive cropping system may be used if tillage is kept to a minimum and residue from row crops is left on the surface or a cover crop is grown. An example of such a cropping system is a row crop, a small grain, and 2 years of hay. A less intensive cropping system is also good. In Canaan Valley, where the growing season is too short for corn, a cropping system that includes a small grain followed by a legume-grass mixture does well, and some special crops, such as cauliflower, have been successfully grown.

If soils of this unit are properly managed, they are excellent for pasture. Control of weeds and stocking according to carrying capacity are necessary for top production and utilization. Bluegrass and white clover grow well, although slowly in July and August, and the growth of deeper rooted grasses and legumes is generally good throughout the growing season.

CAPABILITY UNIT IIe-12

This unit consists of one channery Leetonia soil, which is moderately deep to deep, somewhat excessively drained, and moderately coarse textured. This soil formed at an elevation of more than 3,000 feet. It has slopes of 3 to 10 percent.

Because rainfall is generally abundant at the high elevation where this soil occurs, the moisture supply is generally adequate for plants. The supply of plant nutrients is moderately low, and the reaction is very strongly acid or extremely acid. Stones 2 to 5 inches in diameter are common on the surface and throughout the profile. The subsoil is loose and friable.

Most of this soil is in woods or unimproved pasture. It is of more limited use than many other soils in the survey Area because its fertility is moderately low and the growing season is short. It is suited to alfalfa or clover-grass mixtures, but with good management, good yields of cool-weather crops, such as potatoes, oats, and hay, can be obtained.

Pastures improve if they are mowed to control weeds. Grazing should be distributed to make the best use of the grasses and legumes.

CAPABILITY UNIT IIe-13

This unit consists of moderately deep to deep, moderately well drained soils of the Albrights, Cookport, Ernest, and Monongahela series. A firm, slowly permeable layer is at a depth of about 18 inches. The soil mate-

rial above the pan is normally moist early in spring or in prolonged wet periods. Plenty of moisture is normally furnished throughout the growing season. The supply of plant nutrients is moderate or moderately low. The supply of potash is generally very low in the Monongahela soils. Seep spots are common, particularly in the Ernest soil.

Maintaining fertility and controlling erosion are the main management problems. Tillage should be kept to a minimum, and residue from row crops should be left on the surface or a cover crop grown. Erosion can be controlled by cultivating on the contour or stripcropping on the contour. Placing the strips on a slight grade improves drainage. Diversion terraces may be needed in some places to intercept runoff from higher areas. Drainage of some wet spots may be necessary before cultivation is feasible. Natural drainageways should be maintained as grassed waterways.

Corn, oats, wheat, alfalfa, orchardgrass, and other common crops of the Area can be grown. Alfalfa may be damaged if water accumulates above the pan. Stands of deep-rooted legumes are not likely to last long, because of the pan. A moderately intensive cropping system can be used if erosion is controlled and the content of organic matter is maintained. An example of a suitable cropping system is a row crop followed by a small grain and 2 years of hay. A cropping system less intensive than this makes it easier to maintain the content of organic matter and to control erosion.

These soils are good for pasture. Available moisture capacity is good, and response to lime and fertilizer is excellent. A mixture of orchardgrass and Ladino clover is commonly grown for pasture, and yields of this mixture are frequently better than those of a mixture of bluegrass and white clover. Rotation grazing, mowing of the pasture, and applying adequate amounts of lime and fertilizer are important for satisfactory production. Grazing should be delayed until the soil is firm. On the Ernest and Albrights soils, many sites for livestock ponds are available.

CAPABILITY UNIT IIw-1

This unit consists of one moderately well drained soil of the Monongahela series. At a depth of about 18 inches, this soil has a firm, compact layer, which slows penetration of water and limits the growth of roots. Above this firm layer, the soil material is rather loose, easy to work, and permeable to water. Seep spots are common. The reaction is acid. The supply of potassium is generally low, and the supply of other plant nutrients is moderately low.

This soil is likely to be waterlogged early in spring and in wet periods at other times of the year. Improvement of both surface drainage and internal drainage is needed. Spot tiling may be feasible as a means of drainage.

This soil is suited to corn, oats, wheat, orchardgrass, and other crops. Alfalfa is not likely to do well in wet periods when the soil becomes waterlogged. A moderately intensive cropping system can be used if the organic-matter content is maintained, tillage is kept to a minimum, and residue from row crops is left on the surface or a cover crop is grown.

Pastures should not be used early in spring before the soils are dry and firm. Grazing while the soils are still wet results in breaking the sod, compacting the soils, and damaging the soil structure.

CAPABILITY UNIT IIw-6

This unit consists of deep, well-drained Barbour and Pope soils, which were mapped together. These soils are flooded occasionally. They are uniformly medium textured or moderately coarse textured to a depth of about 3 feet in most places, but below this depth they are generally gravelly and sandy. Included are a few areas of soils that are gravelly or sandy throughout.

These soils are loose and easy to work. They are acid and have a moderate supply of plant nutrients. The content of organic matter is moderately low.

The loss of soil from the gradual cutting back of the streambanks is the most extensive damage caused by flooding. The damage caused by the deposition of sand and silt on bottom lands is minor. The flood hazard and the need to maintain the content of organic matter and an adequate level of fertility are the main management problems. Organic matter can be supplied by working crop residue into the soil and plowing under green-manure crops and barnyard manure.

Nearly all crops commonly grown in the Area do well if the content of organic matter is maintained and if lime and fertilizer are applied. Crops are damaged occasionally by flooding.

Gravelly areas and areas that are frequently flooded are better suited to hay or pasture than to cultivated crops. In a pasture seeded to a bluegrass-white clover mixture, the plants are likely to be short in July and August.

CAPABILITY UNIT IIw-7

This unit consists of only one soil, a deep, nearly level, moderately well drained soil of the Philo series. Some areas along the smaller streams are flooded several times a year. In some areas the profile is gravelly throughout.

This soil is loose and granular. It is acid, has a moderate supply of plant nutrients, and holds moisture well. The response to lime and fertilizer is good. Mottling indicates that there is excess water at a depth of about 15 to 18 inches for a good part of the year.

Organic matter can be supplied by working the residue from row crops into the soil and plowing under green-manure crops and barnyard manure. In some places flooding can be reduced by straightening and deepening stream channels.

This soil is suited to corn, small grain, orchardgrass, and clover. It is only fairly well suited to alfalfa because the water table is seasonally high. Intensive cropping is not feasible unless drainage is improved. Crops are damaged occasionally by flooding.

Pastures on this soil are damaged by trampling if they are grazed when wet.

CAPABILITY UNIT IIs-6

In this unit are deep, well-drained, sandy and gravelly soils that are subject to flooding. These soils are of the Barbour and Pope series. They are acid and have a moderate supply of plant nutrients. These soils tend to be droughty because of their coarse texture, but seepage from the streams and from adjacent hills makes adequate moisture available for most crops. The lower bottom

lands are flooded frequently but usually early in spring before row crops are seeded. Cutting back and gouging of streambanks cause considerable damage.

The use of farm equipment is somewhat limited in the more gravelly areas.

These soils are well suited to deep-rooted grasses and legumes. They are also well suited to row crops, except in dry years. A good cropping system is corn, oats, and 2 years or more of hay. Occasionally, crops are washed out or damaged by floods.

If the pasture is carefully managed, a mixture of tall grasses generally produces more grazing than a mixture of bluegrass and white clover. Also tall grasses provide grazing earlier in spring and later in fall.

CAPABILITY UNIT IIIe-4

This unit consists of one Allegheny soil, which is deep and well drained. This soil occurs as small areas on old stream terraces. It is acid and holds moisture moderately well. The supply of plant nutrients and the content of organic matter are rather low. Slopes range from 8 to 15 percent.

Controlling erosion and maintaining the content of organic matter are the main management problems. Using a suitable cropping system and working the residue from row crops into the soil help to control erosion and to maintain the content of organic matter. Farming on the contour or in contour strips is also necessary for controlling erosion.

Under good management, yields of corn, small grains, and most grasses and legumes commonly grown in the Area are good. A suitable cropping system includes hay at least 2 years out of 4. A row crop should be followed by a cover crop, a winter grain, or hay.

This soil is commonly used for pasture because it ordinarily occurs as small areas adjacent to other soils used for pasture. A mixture of bluegrass and white clover or a mixture of tall grasses provides good grazing if the pasture is properly managed, but growth of bluegrass and white clover is usually slow in July and August.

CAPABILITY UNIT IIIe-10

This unit consists of well-drained, red and yellowish-brown, moderately deep to deep Calvin, Dekalb, and Gilpin soils on uplands. Stone fragments 2 to 5 inches in diameter are on the surface and throughout the profile in most areas.

These soils are acid and have a moderately low supply of plant nutrients. The stones do not seriously interfere with normal tillage, and they help to make the soil loose and porous.

These soils are acid and have a moderately low supply of plant nutrients. Unless eroded, they are permeable to air and water. In some areas they are excessively drained, and in some eroded areas available moisture capacity is low.

Controlling erosion is the main problem in using these soils. Erosion can be controlled and the structure of the soil maintained by using a suitable cropping system, growing a cover crop, leaving the residue from row crops on the surface, and farming on the contour or stripcropping on the contour. The content of organic matter is also maintained by these practices. Natural drainageways should be maintained as permanent grassed waterways.

These soils are suited to most crops grown in the Area. A suitable cropping system is corn, a small grain, and 2 years or more of hay. Less intensive cropping systems are also suitable.

Pastures need lime and fertilizer, and they should not be overgrazed. Legumes and tall grasses, which are deeper rooted than bluegrass, generally provide more forage than bluegrass if the pasture is carefully managed.

CAPABILITY UNIT IIIe-11

This unit consists of well-drained, deep and moderately deep Belmont, Calvin, and Meckesville soils. These are soils that developed in material weathered from limestone and from both calcareous and acid, red and gray shale and sandstone. The subsoil ranges from a rather dense silty clay to sandy material. Although the subsoil is clayey in some places, the movement of water through it is good because the structure is good.

The soils in this unit hold moisture well and have a moderate to moderately large supply of plant nutrients. Runoff is excessive in areas that have poor cover. Generally, the surface layer is acid, but the lower layers are less acid.

Controlling erosion and maintaining the content of organic matter are the main management problems. A moderately intensive cropping system can be used if residue from row crops is left on the surface, cover crops are grown, and all farming is on the contour or in contour strips. Natural drainageways should not be plowed but should be maintained as permanent grassed waterways.

These soils are suited to most crops commonly grown in the Area. An example of a moderately intensive cropping system is corn, a small grain, and 2 years or more of hay. The growing season at the higher elevations is too short for corn. Unless some special crop, such as cauliflower, is grown, a cropping system that includes grain and 2 years or more of hay is desirable.

These soils are excellent for pasture if they are properly limed and fertilized. Pastures of bluegrass and white clover are better than average, but tall grasses generally provide more forage over the entire grazing season. Pastures should be mowed to control weeds and excessive growth of other plants.

CAPABILITY UNIT IIIe-12

This unit consists of a Leetonia soil that is moderately steep, moderately deep or deep, somewhat excessively drained, and moderately to rapidly permeable.

Because rainfall is generally abundant at the high elevation where this soil occurs, the moisture supply is generally adequate. The supply of plant nutrients is moderately low, however, and the reaction is very strongly acid or extremely acid.

Because of moderately low fertility and a short growing season, this soil is more limited in use than most other soils of the survey Area having comparable slopes. Only a small acreage is used for crops. Hay and pasture are better suited than cultivated crops, but cool-weather crops, such as potatoes and oats, can be grown.

If this soil is used for pasture, lime and fertilizer should be applied according to the results of soil tests. Pastures should be mowed to control weeds.

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CAPABILITY UNIT IIIe-13

In this unit are soils of the Albrights, Monongahela, and Ernest series. All have a fragipan at a depth of about 18 inches. Water penetrates this layer slowly and normally accumulates during wetter periods. It may cause some delay in working the soils. Roots do not readily penetrate the pan. Local seep spots and springs are common. Many areas of the Ernest and Albrights soils are cut by ravines.

All the soils in this unit are acid, hold moisture very well, and have a moderate to moderately low supply of plant nutrients. Available moisture capacity is good throughout the growing season, and the response to lime and fertilizer is good.

Controlling erosion and maintaining the content of organic matter are the main management problems. The reduced depth of the root zone and accumulation of excess water during prolonged wet periods limit the growth of perennial deep-rooted legumes. A moderately intensive cropping system can be used if tillage is kept to a minimum, crop residue is left on the surface, cover crops are grown in winter, and all farming is on the contour or in contour strips. Natural drainageways should be maintained as grassed waterways. In some places diversion terraces are needed to intercept runoff from higher slopes.

Corn and small grain grow well. A row crop should be grown only about 1 year in 4.

These soils are good for pasture. Suitable sites for ponds are to be found in most areas of the Ernest and Albrights soils. Grazing should be delayed in spring until the soil is firm.

CAPABILITY UNIT IIIw-5

This unit consists of one Tyler soil, which is nearly level, grayish brown, and somewhat poorly drained or poorly drained. The lower part of the subsoil is slowly permeable. A fragipan is at a depth of about 20 inches. In wet periods the soil material above the pan is saturated with water. The reaction is strongly acid. The supply of plant nutrients and the content of organic matter are rather low. The depth of the root zone is limited by the pan and by the water that accumulates above the pan.

Improving drainage is the main management problem if this soil is used for crops or improved for pasture. Open-ditch drainage is generally more effective than tile drainage because the clayey subsoil is slowly permeable. Clods form if the soil is plowed when it is wet and its organic-matter content is low. Excessive traffic with farm equipment causes compaction and damage to the soil structure.

A suitable cropping system includes 2 years, or preferably more, of hay to maintain good tilth and structure. This soil is better suited to grasses than to cultivated crops; moisture-tolerant grasses and legumes are best.

Grazing should be delayed in spring until the soil is firm. Pastures improve if they are mowed to control excess growth of plants.

CAPABILITY UNIT IVe-3

This unit consists of moderately deep and deep, well-drained, moderately sloping and strongly sloping Calvin, Dekalb, and Gilpin soils. These soils have a subsoil that is rather loose and porous and permeable to water. Stone fragments 2 to 4 inches in diameter are common in most places. Rainfall is plentiful, and the supply of moisture in these soils generally is adequate for crops. Excessive amounts of water are lost through runoff in severely eroded areas. The reaction is acid, and the supply of plant nutrients is moderately low.

The soils in this unit should not be intensively farmed because of the hazard of erosion. Practices that help to control erosion and to maintain the content of organic matter are leaving crop residue on the surface, growing cover crops in winter, and farming on the contour or stripcropping on the contour.

The yield of alfalfa-grass mixtures is good. A row crop can be grown occasionally in a low-intensity cropping system. A suitable cropping system is corn, a small grain, and 3 years or more of hay. Yields of timothy, orchardgrass, alfalfa, and other grasses and legumes are good if lime and fertilizer are applied.

In most well-managed pastures, deep-rooted grasses and legumes yield more forage than shallow-rooted plants.

CAPABILITY UNIT IVe-9

This unit contains one soil, a deep soil of the Ernest series. This soil has a fragipan at a depth of about 18 inches. Above this layer the soil material is well drained, but the pan slows the movement of water downward and also somewhat limits the depth of the root zone. The reaction is acid. The supply of plant nutrients is moderate or moderately low. Available moisture capacity is good.

If row crops and small grains are grown, much soil is lost through erosion, and productivity declines unless the soil is carefully managed. Because erosion is a hazard, hay or pasture is a good long-term use. Generally, row crops should not be grown more frequently than 1 year in 4. All cultivation needs to be on the contour or in contour strips. Crop residue should be worked into the soil. Drainageways should be maintained as grassed waterways.

If this soil is properly limed and fertilized, it is excellent for permanent pasture. The supply of moisture is generally good throughout the growing season. Some areas that are cut by ravines are suited only to pasture or woods.

CAPABILITY UNIT IVe-11

In this unit are well-drained, moderately deep to deep, reddish-brown Belmont and Calvin soils, which developed in material weathered from limestone and red and gray shale and sandstone. The structure and texture of these soils favor good movement of water and the holding of moisture available to the crops grown. Natural fertility is moderate to moderately high, and the supply of available plant nutrients is rather high. Response to lime is good. Generally, the reaction is less acid with increasing depth. The Belmont soil is less acid than the Calvin soil, and it has slightly better available moisture capacity.

The long-term uses of the soils in this unit should be mainly hay or pasture. A row crop can be grown 1 year in 4 or 5, but tillage should be kept to a minimum. Farming operations should be on the contour, and stripcropping on the contour is necessary if the slope is more

than 100 feet long. Crop residue should be left on the surface or worked into the soil. Natural drainageways can be kept as grassed waterways.

These soils are good for pasture. Generally, bluegrass and white clover grow well throughout the growing season if enough lime and fertilizer are applied. Ladino clover is good in pastures that have been seeded to mixtures of tall grasses.

CAPABILITY UNIT IVw–1

This unit consists of poorly drained or very poorly drained Blago, Lickdale, and Purdy soils that are waterlogged most of the year. Generally, these soils have a subsoil of dense, plastic clay that is slowly permeable, but in some places their subsoil is sandy and in other places it contains sandy layers. The Blago and Lickdale soils have a black surface layer 3 to 10 inches thick, and the Purdy soil has a gray surface layer. The Blago soil commonly has a reddish-brown, clayey subsoil at a depth of 16 to 28 inches. The soils in this unit are acid and have a moderately low supply of plant nutrients. They are nearly level, except for some areas of the Purdy soils, and they are mostly at an elevation of more than 3,000 feet.

Poor drainage limits the use of these soils. Drainage outlets are difficult to find in many areas, particularly areas of the Blago and Lickdale soils. Water often ponds in areas of the Lickdale soils. Tile drains are of limited value in many places because the subsoil is dense, but bedding is effective if properly planned and installed. These soils become cloddy if they are worked when wet or when their organic-matter content is low. Excessive traffic with farm equipment compacts the soils and damages their structure. A large amount of lime is needed to correct acidity. Winterkilling and frost heaving can be reduced by maintaining fertility and providing a surface mulch.

These soils are better suited to grasses than to cultivated crops. They are suited to reed canarygrass, tall fescue, orchardgrass, Ladino clover, birdsfoot trefoil, and other moisture-tolerant plants. Row crops or small grains should not be grown more frequently than 1 year in 4 or 5. Grazing should be restricted to the drier months of the grazing season.

CAPABILITY UNIT IVw–5

This unit consists of moderately deep to deep, somewhat poorly drained or poorly drained Brinkerton and Nolo soils and Wet terrace land. These soils are less wet and generally steeper than the soils in unit IVw–1. In most places the subsoil is dense, clayey, and massive, but in some places it is moderately sandy, particularly in areas of the Nolo soil and Wet terrace land. Permeability is slow where the subsoil is dense. Surface drainage is poor in nearly level areas. The reaction of the soils is acid. The supply of plant nutrients is rather low.

Because these soils are slowly permeable, the effectiveness of tile drains is limited, but open ditches provide fair drainage. Diversion ditches should be used to intercept surface water from the hilly areas above these soils. The root zone is shallow. The soils become hard and cloddy if worked when they are wet. Frost heaving and winterkilling can be reduced by maintaining high fertility and providing a surface mulch.

Even if drained, limed, and fertilized, these soils are only fair for crops, and only a few acres are cultivated. The choice of crops is limited, partly because of wetness and partly because most areas of these soils are at high elevations, where the growing season is fairly short. Reed canarygrass, Ladino clover, orchardgrass, tall fescue, and birdsfoot trefoil are suitable pasture plants. Grazing should be deferred in spring until the ground is firm.

CAPABILITY UNIT Vs–2

This unit consists of well-drained to excessively drained, cobbly Barbour and Pope soils that are cut by old stream channels in many places and are frequently flooded. The moisture supply is generally adequate for deep-rooted plants because water seeps from the streams and from the adjacent hills. The reaction is acid. The supply of plant nutrients is moderately low.

These soils are limited to use as pasture, woodland, or wildlife habitats because they are cobbly and subject to flooding. It may be necessary to remove cobblestones before pastures can be mowed.

CAPABILITY UNIT VIe–1

This unit consists of one Belmont soil, which is steep, well drained, and deep or moderately deep. Normally, a few fragments of limestone and sandstone are scattered over the surface. Natural fertility is moderately high, and available moisture capacity is good. The reaction is generally acid at the surface, but the soil is less acid with increasing depth. Included with this soil are a few areas that are severely eroded.

This soil is too steep for cultivated crops, but it is good for bluegrass and white clover grown for pasture. Most areas that have been cultivated or overgrazed are severely eroded. Overgrazing damages the sod and promotes erosion. Livestock damage pastures unless they are kept out in spring until the soil is firm and the grasses have made adequate growth. The use of machinery should be kept to a minimum.

CAPABILITY UNIT VIe–2

In this unit are steep, severely eroded Calvin and Gilpin soils that are moderately permeable to water and have moderate to low available moisture capacity. Runoff is excessive in areas that are not protected with vegetation. The reaction is acid. Natural fertility is moderately low, and the content of organic matter is low.

These soils are not suited to cultivated crops, because of the erosion hazard, but they are suited to pasture. Pastures can be disked and then reseeded, in strips, to a mixture of Ladino clover and orchardgrass or some other tall grass. A topdressing of high-analysis phosphate is beneficial, since phosphate does not leach readily from these soils. Pastures need to be protected from overgrazing, which damages the sod and promotes erosion. Grazing should be deferred in spring until the soil is firm, and pastures of bluegrass and white clover should not be grazed in hot, dry weather, when these plants are practically dormant.

Areas not needed for pasture can be used as woodland. Many areas reforest naturally if they are protected from fire and grazing, but in some areas it is necessary to plant trees.

CAPABILITY UNIT VIw–1

This unit consists of poorly drained or very poorly drained Atkins and Blago soils and Alluvial land, all of which are subject to frequent flooding and are swampy most of the year, particularly in winter and in spring. They have a surface layer of grayish-brown to black silt loam and a subsoil that may be rather clayey and that is mottled with various shades of gray and brown. Generally, their subsoil is less dense than that of the soils in units IVw–1 and IVw–5. In most places the subsoil contains enough coarse soil material to permit tile drains to work satisfactorily. The reaction is acid. The supply of plant nutrients is moderate, and the organic-matter content is moderate to high.

These soils are good for pasture, but except for some areas of Alluvial land, they need drainage. After they have been drained, they are suited to grasses and legumes that can withstand flooding and waterlogging. Correcting the drainage is often difficult because the areas of Alluvial land are gravelly and have uneven surfaces and the areas of Blago soil are on flats or in depressions and abandoned stream channels. In some of these places good drainage outlets are lacking. Pastures should not be grazed in spring until the soil is firm.

Areas not needed for hay or pasture can be reforested to suitable conifers and hardwoods. In most areas these soils can provide favorable food and cover for wildlife.

CAPABILITY UNIT VIs–1

This unit consists of Belmont and Meckesville soils that are well drained and moderately deep to deep. These soils are productive, but their use is limited by stones. The available moisture capacity and the natural fertility are moderate or moderately high. The reaction is generally acid at the surface, particularly in the Belmont soil, but is less acid with increasing depth. Erosion is severe in some areas, mostly because of overgrazing.

The soils in this unit are suited to bluegrass and white clover. Surface stones make it difficult to reseed, to mow, or to spread lime and fertilizer. Reseeding is almost impossible unless some of the stones are removed, but reseeding is seldom needed. Enough lime should be applied to make the pH at least 6.0, and phosphate fertilizer should be used for topdressing. Grazing should be adjusted to the carrying capacity of the pasture. In most areas water for livestock is available, for there are good springs in the limestone.

If these soils are not needed for pasture and are to be reforested, they are suited to both conifers and hardwoods.

CAPABILITY UNIT VIIe–1

This unit consists of steep or very steep, well-drained, moderately deep to deep Calvin soils. These soils are slightly less acid than the soils in unit VIIe–2, and they have slightly higher natural fertility. A few acres are severely eroded. The available moisture capacity is moderate. Included in some areas are stony soils, mostly along drainageways.

The soils in this unit are good for timber if they are properly managed, but they are too steep for cultivation, and their use as pasture is severely limited. Open areas suitable for woodland should be planted to trees or allowed to reforest naturally. Young stands can be improved by removing undesirable trees and brush. Some open areas can be planted to shrubs that provide food and cover for wildlife. All woodland should be protected from fire and overgrazing.

CAPABILITY UNIT VIIe–2

In this capability unit are steep to very steep, moderately deep to deep Calvin, Dekalb, and Gilpin soils. These are steep channery soils that developed on uplands in acid material weathered from sandstone and shale. In some areas they are severely eroded. Drainage is good, and available moisture capacity is moderate to moderately low. Runoff is excessive in the severely eroded areas and in areas not protected by a cover of plants.

These soils make up more than a fourth of the entire survey Area. A small acreage where the slopes are less than 35 percent might be managed for pasture, but most of the acreage should be kept as woodland. Some open areas can be planted to shrubs that provide food and cover for wildlife.

CAPABILITY UNIT VIIw–1

This unit contains one mapping unit, Muck and Peat, which consists of very strongly acid or extremely acid organic material that developed from deposits of sedges and mosses. The muck is 8 to 20 inches thick, and the peat is 1 to 9 feet thick. Peat consists of organic material that is largely undecomposed, and muck of organic material that is largely decomposed.

These areas are not used for crops and pasture. The growing vegetation consists of mosses and sedges, but there are many old stumps, which indicate that the areas once supported dense stands of spruce and fir and were burned over after the timber was harvested.

CAPABILITY UNIT VIIs–1

This unit consists of steep, stony, moderately deep to deep Belmont, Calvin, and Meckesville soils, all of which have been influenced by lime. These soils have moderate or moderately high available moisture capacity and natural fertility. The Belmont soils are less acid than the Calvin and Meckesville soils, but they are slightly higher in fertility and available moisture capacity.

Most areas of these soils are good for forest but, because they are stony and steep, are not suited to crops and are difficult to manage if used for pasture. Bluegrass and white clover will grow, and plenty of water for livestock is furnished by springs in the limestone, but productivity has declined and some areas are reverting to woodland because they cannot be worked with modern equipment. Most areas of the Belmont and Meckesville soils and a smaller acreage of the Calvin soils were cleared for pasture when only handtools and horse-drawn equipment were used.

CAPABILITY UNIT VIIs–2

This unit consists of moderately deep to deep, well drained or moderately well drained Cookport, Dekalb, and Ernest soils, and a complex of Very stony land and Calvin soil. Slopes range from 2 to 75 percent. The Cookport and Ernest soils have slopes of no more than 35 percent. In many areas as much as 40 percent of the surface is covered with stones and boulders. Ledges of outcropping rock are numerous in some areas. The available moisture capacity is moderately low to moderately high. The supply of plant nutrients is moderately low.

These soils are not suitable for crops, and they are difficult to use for pasture because they are steep and stony. Some of the less stony and less sloping areas are used for pasture. Most wooded areas have never been cleared.

CAPABILITY UNIT VIIs-4

This unit consists of moderately well drained or well drained soil complexes consisting of Very stony land and Dekalb, Ernest, and Leetonia soils. The slope range is 3 to 80 percent. As much as 40 to 90 percent of the surface is covered with stones, boulders, and ledges. The soils are strongly acid to extremely acid. The available moisture capacity and the supply of plant nutrients are moderately low in the complexes that contain the Dekalb and Leetonia soils.

The soil complexes in this capability unit are suitable for timber and as wildlife habitats. After the timber was removed, about 50 years ago, most of the acreage was severely burned; the humus and duff were destroyed, for the most part; and nearly bare rock remained. Now, there is little vegetation in many areas, particularly in areas of Very stony land-Leetonia complex and Very stony land-Ernest complex, 3 to 15 percent slopes.

CAPABILITY UNIT VIIs-5

This unit consists of somewhat poorly drained or very poorly drained, very stony and extremely stony soils and land types and are gently to moderately sloping. From 3 to 90 percent of the surface is covered with stones and boulders. The supply of plant nutrients is low. The acreage in this capability unit is suitable for timber or as a habitat for wildlife.

CAPABILITY UNIT VIIIs-1

This unit consists of Sandstone rubble land, Stony alluvial land, and Made land. These land types normally do not support crops, pastures, or forests. Made land consists of garbage dumps, areas of fill, rights-of-way, and other artifically made land. These areas have been disturbed to the extent that soil characteristics are not recognizable. Trees suitable for the site can be planted in most areas.

Stony alluvial land consists of gravel and boulders freshly deposited by flash floods. These areas are eventually covered by shrubs and vines, and trees may finally become established.

Sandstone rubble land generally consists of stones and rocks, but some areas are filling in. In most areas the humus and duff have been burned, and only bare rocks remain. There has been little chance for vegetation to reestablish. Mosses, shrubs, and vines may slowly build a litter in most of these areas, and then spruce and other adapted trees may become established.

Estimated Yields [1]

Table 2 gives estimates of yields of the principal crops on the soils of the Tucker-Randolph Area. Miscellaneous land types and soils that are stony, steep, or otherwise unsuited to any of the major crops have been omitted. Two levels of management are represented.

The figures in the columns A are estimates of yields to be obtained under management practices now common in the county. They are based on data in the agricultural censuses of 1950 and 1954 and in West Virginia Experiment Station Bulletin No. 289. The estimates were formulated by adjusting these data after consideration of the characteristics of individual soils, the quality of crops actually growing, and yields obtained on experimental plots in other parts of the State.

The figures in the columns B are estimates of yields that can be obtained under improved management. They are based on yields reported by some farmers in this survey Area and some in nearby counties that have similar soils, and on knowledge of the properties of the soils. The improved level of management is considered to include the use of lime and fertilizer in the amounts currently recommended by the West Virginia Agricultural Experiment Station, and also erosion control, drainage where needed, and rotation of crops. Irrigation, which is uncommon in the survey Area, is not considered. The estimates represent an average for a 10-year period, not the maximum yields possible.

Woodland [2]

Three-fourths of the Tucker-Randolph Area is forested. Successful management of the forests requires basic information about the soils. For the purpose of discussing relative suitability for use as woodland, the soils of the Area have been placed in 12 woodland groups. All the soils in a given group are essentially equal in productivity, have similar native vegetation, and have comparable limitations when used as woodland.

Following are descriptions of the four major forest associations represented in the survey Area. Discussions of the 12 woodland groups of soils follow the descriptions of the forest associations.

Forest associations

Four major forest associations are represented in this Area: Mixed upland oak, northern hardwood, yellow-poplar or cove hardwood, and spruce or spruce-hardwood.

In the mixed upland oak association, the trees are mainly white oak, scarlet oak, chestnut oak, red oak, black oak, sassafras, hickory, and black locust. Generally, the ground cover is a patchy layer of mull-like humus. The understory consists of rhododendron, laurel, azalea, blueberry, and greenbrier. This forest association is extensive on dry south and west aspects and ridgetops of the Gilpin and Calvin soils.

In the northern hardwood association, the trees are predominantly sugar maple, American beech, yellow birch, red maple, hemlock, red oak, and black cherry. The understory consists of shrubs and herbaceous plants. The shrubs are hobblebush and other viburnums, striped maple, mountain maple, alder, and honeysuckle. The herbaceous plants are oxalis, clintonia, trillium, teaberry, lily-of-the-valley, clubmoss, and ferns. Most areas of this forest association are on the Dekalb and Leetonia soils at an elevation of more than 3,500 feet. Yellow birch is most abundant at the higher elevations. Beech is more abundant on the south and west aspects of the Dekalb soils.

[1] FRANK GLOVER, assistant State soil conservationist, Soil Conservation Service, helped prepare this section.

[2] R. F. REISKE, soil scientist, U. S. Forest Service, prepared this section.

TABLE 2.—*Estimated average yields per acre of the principal crops under two levels of management*

[Yields in columns A are obtained under common management; yields in columns B can be expected under improved management. Dashed lines indicate that the soil is not suited to the crop specified, that the crop is not commonly grown under the management level indicated, or that yields were not estimated because the acreage was too small]

Soil	Grain crops				Forage crops				Permanent pasture	
	Corn [1]		Oats		Clover and grass		Alfalfa and grass			
	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [2]	*Cow-acre-days* [2]
Albrights silt loam, 3 to 8 percent slopes	60	90	50	70	1.5	3.0	2.0	3.0	70	150
Albrights silt loam, 8 to 15 percent slopes	60	90	50	70	1.5	3.0	2.0	3.0	70	150
Allegheny silt loam, 3 to 8 percent slopes	45	80	40	70	1.5	3.0	2.0	3.0	60	140
Allegheny silt loam, 8 to 15 percent slopes	45	80	40	70	1.5	3.0	2.0	3.0	60	140
Alluvial land									60	120
Atkins silt loam		65		50	1.0	2.0			45	110
Barbour and Pope fine sandy loam	65	100	45	70	1.5	3.0	2.5	3.5	70	150
Barbour and Pope fine sandy loam, high bottom	65	100	45	70	1.5	3.0	2.5	3.5	70	150
Barbour and Pope gravelly sandy loam	65	100	45	70	1.5	3.0	2.5	3.5	70	140
Barbour and Pope gravelly sandy loam, high bottom	65	100	45	70	1.5	3.0	2.5	3.5	70	140
Barbour and Pope cobbly loamy sand									60	110
Belmont silt loam, 3 to 10 percent slopes	65	95	40	70	1.5	3.0	2.5	3.5	70	150
Belmont silt loam, 10 to 20 percent slopes	60	90	40	65	1.5	2.5	2.5	3.0	65	135
Belmont silt loam, 20 to 30 percent slopes	60	85	35	65	1.5	2.5	2.5	3.0	65	135
Belmont silt loam, 30 to 40 percent slopes									60	125
Belmont very stony silt loam, 3 to 20 percent slopes									70	145
Belmont very stony silt loam, 20 to 30 percent slopes									65	135
Belmont very stony silt loam, 30 to 40 percent slopes									60	
Belmont very stony silt loam, 40 to 70 percent slopes									50	
Blago silt loam				55	1.5	2.0			45	110
Blago silt loam, overflow				55	1.5	2.0				110
Brinkerton silt loam, 0 to 3 percent slopes				50	1.0	2.0			45	120
Brinkerton silt loam, 3 to 8 percent slopes				50	1.0	2.0			45	120
Brinkerton silt loam, 8 to 15 percent slopes				45	2.0	2.0			45	115
Calvin channery silt loam, 3 to 10 percent slopes	45	80	35	60	1.0	2.0	1.5	3.0	45	120
Calvin channery silt loam, 10 to 20 percent slopes	45	80	35	60	1.0	2.0	1.5	3.0	45	120
Calvin channery silt loam, 10 to 20 percent slopes, severely eroded	45	75	35	55	1.0	2.0	1.5	3.0	45	115
Calvin channery silt loam, 20 to 30 percent slopes	45	75	35	55	1.0	2.0	1.5	3.0	45	115
Calvin channery silt loam, 20 to 30 percent slopes, severely eroded									40	110
Calvin channery silt loam, 30 to 40 percent slopes									40	110
Calvin channery silt loam, neutral substratum, 3 to 10 percent slopes	50	85	35	65	1.5	2.5	2.0	3.5	60	140
Calvin channery silt loam, neutral substratum, 10 to 20 percent slopes	45	80	35	60	1.0	2.5	2.0	3.0	55	135
Calvin channery silt loam, neutral substratum, 20 to 30 percent slopes	45	75	30	60	1.0	2.0	2.0	3.0	55	125
Calvin channery silt loam, neutral substratum, 30 to 40 percent slopes									50	120
Calvin extremely stony silt loam, neutral substratum, 3 to 20 percent slopes									50	120
Calvin extremely stony silt loam, neutral substratum, 20 to 40 percent slopes									40	
Cookport silt loam, 2 to 10 percent slopes	40	75	35	65	1.0	2.5	1.5	2.5	50	135
Cookport very stony silt loam, 2 to 10 percent slopes									45	
Dekalb channery loam, 3 to 10 percent slopes	45	70	45	70	1.0	2.0	1.5	3.0	40	120
Dekalb channery loam, 10 to 20 percent slopes	45	65	45	65	1.0	2.0	1.5	3.0	40	115
Dekalb channery loam, 20 to 30 percent slopes	40	60	40	60	1.0	1.5	1.5	2.5	35	110
Dekalb channery loam, 30 to 40 percent slopes									35	100
Dekalb loam, 3 to 10 percent slopes	45	70	45	70	1.0	2.0	1.5	3.0	40	120
Dekalb loam, 10 to 20 percent slopes	45	65	45	65	1.0	2.0	1.5	3.0	40	115
Dekalb extremely stony loam, 3 to 20 percent slopes									35	
Ernest silt loam, 3 to 8 percent slopes	50	80	45	70	1.0	3.0	2.0	3.0	60	140
Ernest silt loam, 8 to 15 percent slopes	50	65	45	65	1.0	2.5	1.5	3.0	60	135
Ernest silt loam, 15 to 25 percent slopes	45	60	40	65	1.0	2.5	1.5	2.5	55	130
Ernest extremely stony silt loam, 3 to 15 percent slopes									55	
Ernest extremely stony silt loam, 15 to 35 percent slopes									50	
Gilpin channery silt loam, 3 to 10 percent slopes	45	80	35	60	1.0	2.0	2.0	3.0	45	120
Gilpin channery silt loam, 10 to 20 percent slopes	45	75	35	60	1.0	2.0	1.5	2.5	45	115

See footnotes at end of table.

TABLE 2.—*Estimated average yields per acre of the principal crops under two levels of management*—Continued

[Yields in columns A are obtained under common management; yields in columns B can be expected under improved management. Dashed lines indicate that the soil is not suited to the crop specified, that the crop is not commonly grown under the management level indicated, or that yields were not estimated because the acreage was too small]

Soil	Grain crops				Forage crops				Permanent pasture	
	Corn [1]		Oats		Clover and grass		Alfalfa and grass			
	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [2]	*Cow-acre-days* [2]
Gilpin channery silt loam, 10 to 20 percent slopes, severely eroded	40	70	30	55	1.0	2.0	1.5	2.0	40	110
Gilpin channery silt loam, 20 to 30 percent slopes	40	70	30	55	1.0	2.0	1.5	3.0	40	110
Gilpin channery silt loam, 20 to 30 percent slopes, severely eroded									40	105
Gilpin channery silt loam, 30 to 40 percent slopes									40	105
Leetonia channery loam, 3 to 10 percent slopes	45	70	45	70	1.0	2.0	1.5	3.0	40	115
Leetonia channery loam, 10 to 20 percent slopes	45	65	45	65	1.0	2.0	1.5	3.0	40	110
Lickdale silt loam, 0 to 5 percent slopes					1.0	1.5				90
Meckesville silt loam, 3 to 8 percent slopes	65	95	40	70	1.5	3.0	2.5	3.5	70	150
Meckesville silt loam, 8 to 15 percent slopes	60	90	40	65	1.5	2.5	2.5	3.5	65	140
Meckesville very stony silt loam, 3 to 15 percent slopes									70	150
Meckesville very stony silt loam, 15 to 30 percent slopes									65	135
Meckesville very stony silt loam, 30 to 40 percent slopes									60	
Monongahela silt loam, 0 to 3 percent slopes	40	75	35	65	1.0	2.5	1.5	3.0	50	135
Monongahela silt loam, 3 to 8 percent slopes	40	75	35	65	1.0	2.5	1.5	3.0	50	135
Monongahela silt loam, 8 to 15 percent slopes	40	70	35	60	1.0	2.5	1.5	3.0	50	130
Nolo silt loam, 0 to 5 percent slopes					1.0	2.0			45	120
Nolo silt loam, 5 to 10 percent slopes					1.0	2.0			45	120
Philo silt loam	60	85	40	70	1.5	2.5	2.0	3.0	65	140
Purdy silty clay loam		55		45	1.0	2.0			30	110
Sequatchie fine sandy loam	65	100	45	70	1.5	3.0	2.5	3.5	70	150
Tyler silt loam	45	70	35	65	1.0	2.0			40	130
Wet terrace land			30	50	1.0	2.0			45	110

[1] If the elevation is more than 3,000 feet, estimates for corn do not apply, because of the short growing season.

[2] The number of days in 1 year that 1 acre will support 1 animal unit (1 cow, 1 horse, 1 steer, 5 hogs, 7 sheep, or 7 goats) without injury to the pasture.

The yellow-poplar or cove hardwood association contains moisture-loving trees, such as yellow-poplar, sugar maple, basswood, white ash, black cherry, yellow birch, American beech, red oak, cucumbertree, and magnolia. The ground cover is generally a deep, mull-humus layer. The understory consists of shrubs and many spring-blooming herbaceous plants. The shrubs include rhododendron, ironwood, dogwood, and azalea. The most common herbaceous plants are jack-in-the-pulpit, yellow and white fawnlily, mayflower, clintonia, Solomons-seal, trillium, ladyslipper, columbine, Dutchmans-breeches, violets, starflower, snakeroot, nettle, touch-me-not, and twisted-stalk. This association is commonly on the Belmont, Meckesville, Ernest, and Calvin, neutral substratum, soils and on the lower third of slopes occupied by the Gilpin and Calvin soils.

The spruce or spruce-hardwood association consists predominantly of red spruce, hemlock, yellow birch, sugar maple, red maple, and beech. Balsam fir grows in this association only in the Canaan Valley. The understory and ground cover are similar to those in the northern hardwood association, except that there is more rhododendron, fern, clubmoss, and oxalis. At present, the spruce-hardwood association occurs in scattered areas on the Very stony land-Wet land complex on Canaan Mountain and Backbone Mountain. Magnificent stands of virgin red spruce once occupied the mountaintops near Canaan Valley, Dolly Sods, and the towns of Davis and Thomas, but poor logging practices and fires have destroyed the stands and the deep layer of humus that once protected the soil. In many of the areas where spruce and fir once grew, the plant cover is now made up of bracken, rhododendron, and other fire-associated plants, such as fire cherry, largetooth aspen, trembling aspen, and striped maple.

Woodland groups

All of the soils in the survey Area have been placed in 12 woodland groups. Four of these groups (4, 6, 8, and 11) have variations in site index related to aspect and position on slope.

The potential productivity of a soil for a species or for a forest type is expressed as site index. The site index represents the average total height of the dominant and codominant trees growing in well-stocked stands at an age of 50 years. The site index for mixed upland oak was measured on the Gilpin, Dekalb, Belmont, and Calvin soils in this survey Area and was interpolated for the other soils. Site index can be generalized into site-quality classes for which management information may be

provided on the basis of experience and forest research (*22*).[3]

Table 3 shows the site index range in each site quality class. The average yield per acre of mixed upland oak at 50 years of age was calculated from the average site index. The site quality for other important species or forest types was estimated by referring to the average number of 16-foot logs that can be obtained from crop trees at maturity. This information was based partly on Forest Service records and partly on experience in local forest management. The last four columns in table 3 provide information that is helpful in planning forest management.

The soils of each woodland group are rated for four kinds of limitations that affect management. The relative degrees of limitation are expressed as slight, moderate, and severe.

Equipment limitation indicates the relative degree to which the use of ordinary equipment is restricted. The limitation is *slight* if there is no restriction as to kind of equipment or time of year. It is *moderate* if equipment is somewhat restricted as to kind or as to time of operation. The equipment limitation is *severe* if special equipment is needed.

Erosion hazard refers to the inherent susceptibility of the soil to removal by water, without consideration of the ground cover. For certain soils, it includes susceptibility to slipping and sliding, which occurs mainly where roads and other physical improvements have been made. The hazard is *slight* if potential erosion is unimportant. It is *moderate* if some attention is needed to prevent unnecessary erosion. It is *severe* if intensive treatment, special equipment, and special methods of operation are needed. Estimates of the erosion hazard in denuded areas are based mainly on texture, structure, and slope.

Seedling mortality refers to the loss of naturally regenerated or planted tree seedlings as a result of unfavorable soil properties, such as excessive wetness, droughtiness, or steepness, when plant competition is not a factor. Mortality is *slight* if desirable trees normally regenerate naturally where seeds are available or if planted trees survive without special management. It is *moderate* if some special attention is needed to obtain adequate and immediate restocking. Mortality is *severe* if trees do not normally regenerate naturally or if there are difficulties in obtaining adequate and immediate restocking.

Windthrow hazard is generally related to soil properties that affect the depth of the root zone, such as depth to bedrock or compact layers, excessive wetness, droughtiness, or very sandy texture. The windthrow hazard is *slight* if normally no trees are blown down. It is *moderate* if some trees are likely to be blown down during periods of high winds. The hazard is *severe* if many trees are likely to be blown down during periods of moderate or high winds.

[3] Italic numbers in parentheses refer to Literature Cited, p. 76.

WOODLAND GROUP 1

In this group are nearly level and gently sloping, poorly drained and very poorly drained soils of the Atkins, Blago, Lickdale, and Purdy series. These soils have a shallow root zone. They are on uplands, stream terraces, and bottom lands. Most of them have a surface layer of silt loam and a subsoil of silt loam to silty clay. Permeability is slow. Water stands on the surface for several months each year.

The trees on the soils of this group are mainly red maple, yellow birch, red spruce, and eastern hemlock. Balsam fir grows on the Blago soils in places in Canaan Valley. Where Atkins and Purdy soils have been cut over and abandoned, the understory consists of sedges, povertygrass, and bracken. Sphagnum moss, clubmoss, cattails, alders, and willow are common on the Blago and Lickdale soils.

The quality of the site is estimated to be poor or very poor.

Equipment limitations are severe because of wetness. Only handtools can be used for planting. Stones cover 2 to 15 percent of the surface of the Lickdale soils but do not add to the difficulty of using equipment.

The hazard of erosion is slight.

Seedling mortality is severe, both in natural and in planted stands, because of the excess moisture and the boulders and stones. Seedlings on exposed slopes and in low areas are likely to be damaged by frost.

Because of the shallow root zone, the hazard of windthrow is severe.

Red spruce, balsam fir, and other moisture-tolerant trees are suitable for forest planting on these soils. Spruce and balsam fir can be harvested for Christmas trees, but their growth is slow (*20*).

TABLE 3.—*Site index, yield, and other data according to site quality class (14)*

Site quality class	Mixed upland oak			Approximate number of logs from all trees other than oaks	Priority for cultural practices [3]	Potential for—		
	Site index range	Average yield per acre				Sawlogs	Pulpwood	Special products [4]
		Cords [1]	Board feet [2]					
Excellent	75 to 84	40. 6	13, 750	3 to 5	Very high	Very high	Very high	Very high.
Good	65 to 74	33. 3	9, 750	2 to 3	High	High	High	High.
Medium	55 to 64	26. 2	6, 300	1½ to 2	Medium	Medium	Medium	Medium.
Poor	45 to 54	18. 8	2, 350	¾ to 1½	Low	----------	Low	Low.
Very poor	35 to 44	12. 5	1, 400	Less than ¾	Very low	----------	----------	Low.

[1] Merchantable material at 50 years to a 4-inch top outside bark.

[2] International rule ⅛-inch saw kerf to a 5-inch top inside bark at 50 years.

[3] Improvement cuttings and physical improvements, such as permanent roads and trails.

[4] For example, Christmas trees, fenceposts, and fuel.

WOODLAND GROUP 2

This group consists of deep, well-drained silt loams of the Belmont and Meckesville series. These soils are on uplands and in colluvial areas. Some areas are very stony. The texture of the subsoil is silt loam to silty clay loam. The soils are predominantly moderately sloping to steep (10 to 40 percent slopes), but slopes range from 3 to 70 percent. Permeability is moderate in the Belmont soils and moderately slow in the Meckesville soils.

The trees on the soils of this group are commonly yellow-poplar, sugar maple, black cherry, American basswood, and northern red oak. The understory is predominantly herbaceous and consists mostly of snakeroot, nettle, touch-me-not, columbine, and twisted-stalk.

The estimated index for oak is 80. For other trees, the quality of the site is estimated to be excellent.

Equipment limitations are slight where the slope is less than 15 percent, moderate where the slope is 15 to 30 percent, and severe where the slope is more than 30 percent. On the steepest slopes, special equipment and special methods may be needed, particularly in wet weather, to keep disturbance and compaction of the soils to a minimum and to reduce the risk of gullying. Logging equipment can generally be used in stony areas, but the use of crawler tractors is severely limited on the steepest slopes.

The erosion hazard is slight where the slope is less than 15 percent, moderate where the slope is 15 to 30 percent, and severe where the slope is more than 30 percent.

Seedling mortality is slight. Establishing trees by natural regeneration is not a problem if sources of seed are available and suitable silvicultural practices are used.

The hazard of windthrow is slight.

Hardwoods should be favored for reforesting old fields. Yellow-poplar and white ash grow well on these soils.

WOODLAND GROUP 3

In this group are somewhat poorly drained or poorly drained, nearly level to moderately sloping, slowly or very slowly permeable silt loams of the Brinkerton, Nolo, and Tyler series and one land type, Wet terrace land. These soils are on uplands and terraces and in colluvial areas. The subsoil is silty clay loam to silty clay. In some areas the surface layer is extremely stony.

The trees on the soils of this group are mainly red maple, American beech, yellow birch, eastern hemlock, red spruce, black cherry, deciduous holly, fire cherry, and rhododendron.

No estimate was made of the site index for oak. For other trees, the quality of the site is estimated to be medium for sloping soils and poor for nearly level soils.

Equipment limitations are severe because of wetness. Stoniness of the surface layer of the Brinkerton and Nolo extremely stony soils is an additional limitation.

The erosion hazard is moderate in sloping areas and slight in nearly level areas.

Seedling mortality is moderate, both in natural and in planted stands, because of wetness. The hazard of windthrow is moderate because of the limited depth of the root zone.

Red spruce, balsam fir, hemlock, and other moisture-tolerant trees are suitable for forest planting on these soils. Spruce, white pine, and balsam fir can be planted for Christmas trees.

WOODLAND GROUP 4

This group consists of well-drained, moderately deep and deep, moderately permeable silt loams of the Calvin series. These soils are on uplands. The slope range is 3 to 40 percent, and slopes of more than 20 percent predominate. Some areas are severely eroded.

The vegetation on these soils varies, depending on the aspect, which in turn governs the moisture supply. On the slopes that face northeast and those that face northwest, the vegetation is made up largely of red oak, chestnut oak, sugar maple, American basswood, black cherry, and yellow-poplar trees, and the understory consists of herbaceous plants, including Solomons-seal, false Solomons-seal, and twisted-stalk. On slopes that face southeast and southwest, the soils are drier than those on slopes that face northeast and northwest, and the vegetation is of a kind that does not need so much moisture as that on the northerly aspects. It is made up largely of chestnut oak, red oak, American beech, sweet birch, sassafras, and red maple trees. The understory includes rhododenron, laurel, blueberry, and greenbrier.

The site index for upland oaks varies (*16*) according to aspect, gradient, position on the slope, and degree of

TABLE 4.—*Average site index for upland oaks on Calvin soils*

Slope range and soil type	Location of stand on slope	Site index on—			
		Northeast aspect (0° to 90°)	Southeast aspect (90° to 180°)	Southwest aspect (180° to 270°)	Northwest aspect (270° to 360°)
Slope of 3 to 30 percent: Calvin channery silt loam (CaB, CaC, CaD).	All positions	80	70	60	70
Slope of 10 to 30 percent: Calvin channery silt loam, severely eroded (CaC3, CaD3).	All positions	60–70	50–60	40–50	50–60
Slope of 30 to 40 percent: Calvin channery silt loam (CaE).	Upper third	80	70	50	60
	Middle third	80	70	60	80
	Lower third	80	70	60	80
Slope of 40 to 65 percent: Calvin channery silt loam (CaF).	Upper third	70	60	50	60
	Middle third	80	70	60	60
	Lower third	80	70	60	70

erosion (see table 4). For other kinds of trees the quality of the site is estimated to be good to poor.

Equipment limitations are slight where the slope is less than 20 percent, moderate where the slope is between 20 and 30 percent, and severe where the slope is more than 30 percent. On the steepest slopes, special equipment and special methods may be needed, particularly in wet weather, to keep disturbance and compaction of the soils to a minimum and to reduce the risk of gullying. Crawler tractors can be used only to a limited extent on the steepest slopes.

The erosion hazard is slight where the slope is less than 20 percent, moderate where the slope is between 20 and 30 percent, and severe where the slope is more than 30 percent. It is important to so locate roads and trails that runoff will not concentrate in them and to use equipment that will cause a minimum of either disturbance or compaction.

Seedling mortality is slight. Stands are maintained through natural regeneration if there is a source of seed and if suitable silvicultural practices are applied.

The hazard of windthrow is slight. The better hardwoods should be favored in management of the native stands. White pine, red pine, Norway spruce, European larch, and Japanese larch are suitable for forest plantings. Scotch pine, white pine, Norway spruce, and Douglas-fir can be grown for Christmas trees. All trees grow better on north-facing slopes than on south-facing slopes.

WOODLAND GROUP 5

This group consists of moderately well drained soils of the Albrights, Cookport, and Ernest series. The surface layer of these soils is silt loam, and the subsoil is loam, silt loam, or silty clay loam. At a depth of 18 to 24 inches is a slowly permeable compact layer, which limits the root zone. The Cookport soils are on upland ridges and benches, and the Albrights and Ernest soils are on colluvial slopes.

The forest on the soils of this group generally consists of a mixture of cove hardwoods and northern hardwoods, mainly sugar maple, yellow birch, American beech, yellow-poplar, American basswood, black cherry, and red maple. Pure stands of black cherry are common on the Cookport soils. The understory consists mainly of hobble-bush, striped maple, partridgeberry, and oxalis.

No estimate of the site index for oak has been made. For other trees, the quality of the site is estimated to be good to excellent.

Equipment limitations are moderate where the slope is less than 15 percent but severe where the slope is more than 15 percent. Stones on the surface of the extremely stony Ernest soils are an additional limitation.

The hazard of erosion is moderate. On long steep slopes where seepage accumulates above the compact layer, the Albrights and Ernest soils may slip and slide.

Seedling mortality is slight. Establishing trees by natural regeneration is not a problem if sources of seed are available and suitable silvicultural practices are used.

In most areas the hazard of windthrow is slight, but it is moderate on exposed ridges of the Cookport soils.

Red spruce, Norway spruce, and white pine can be grown for Christmas trees, and Douglas-fir can be grown below an elevation of 3,000 feet.

WOODLAND GROUP 6

This group consists of soils of the Dekalb and Leetonia series. These soils are well drained, moderately deep to deep, gently sloping to very steep, and moderately permeable. They developed on uplands from acid sandstone materials. Generally, both the surface layer and the subsoil are loam. Stones cover as much as 40 percent of the surface of the Dekalb soils in some areas.

The vegetation on these soils varies, depending on the aspect, which in turn governs the moisture supply. On the slopes that face northeast and those that face northwest, the trees are mainly red oak, yellow birch, American beech, American basswood, black cherry, and sugar maple. On slopes that face southeast and southwest, the soils are drier than those on slopes that face northeast and northwest, and the trees are generally those that do not need so much moisture as the trees on the northerly aspects. They are mainly chestnut oak, red oak, American beech, and red maple.

The site index for upland oaks varies according to aspect, steepness of slope, and position on slope. The average site index for upland oaks on the Dekalb soils is shown in table 5. For other trees on the Dekalb soils and for oak and other trees on the Leetonia soils, the quality of the site is estimated to be medium to poor.

TABLE 5.—*Average site index for upland oaks on Dekalb soils*

Slope range and soil type	Location of stand on slope	Site index on—			
		Northeast aspect (0° to 90°)	Southeast aspect (90° to 180°)	Southwest aspect (180° to 270°)	Northwest aspect (270° to 360°)
Slope of 3 to 30 percent: Dekalb channery loam (DaB, DaC, DaD), Dekalb loam (DkB, DkC), and Dekalb extremely stony loam (DmC).	All positions	80	70	60	70
Slope of 20 to 40 percent: Dekalb channery loam (DaE) and Dekalb extremely stony loam (DmE).	Upper third	70	60	50	60
	Middle third	80	70	50	70
	Lower third	80	70	50	70
Slope of 40 to 70 percent: Dekalb channery loam (DaF) and Dekalb extremely stony loam (DmF).	Upper third	70	60	50	70
	Middle third	80	70	50	80
	Lower third	80	70	50	80

Equipment limitations are slight where the slope is less than 20 percent, moderate where the slope is 20 to 30 percent, and severe where the slope is more than 30 percent. Stoniness is an additional hazard on the extremely stony Dekalb soils.

The erosion hazard is slight where the slope is less than 20 percent, moderate where the slope is 20 to 30 percent, and severe where the slope is more than 30 percent.

Seedling mortality is slight. Establishing trees by natural regeneration is not a problem if sources of seed are available and suitable silvicultural practices are used.

The hazard of windthrow is slight.

White pine, red pine, Norway spruce, European larch, and Japanese larch are suitable for forest planting. Scotch pine, white pine, Norway spruce, and Fraser fir can be grown for Christmas trees. All trees grow better on north-facing slopes than on south-facing slopes.

WOODLAND GROUP 7

This group consists of moderately deep and deep soils of the Calvin, Dekalb, Ernest, and Leetonia series and Very stony land. Generally, these soils are well drained and moderately to rapidly permeable, but the Ernest soils are moderately well drained and slowly permeable. Slopes are predominantly moderately steep to very steep but range from 3 to 80 percent. Stones and boulders cover 40 to 90 percent of the surface of the Dekalb, Ernest, and Leetonia soils, and they cover 15 to 40 percent of the Calvin soils.

The vegetation on soils of this group generally consists of yellow birch, eastern hemlock, red spruce, sugar maple, red maple, and black birch trees and huckleberry and rhododendron. The density of vegetation is limited by the numerous stones and boulders on the surface.

No estimate of the site index for oak has been made. For other trees the quality of the site is estimated to be poor or very poor.

Equipment limitations are severe because of the steepness of the slope in most places and the numerous stones and boulders on the surface. On the Ernest soils, which have a compact layer, use of equipment is further limited by seepage and a seasonally high water table. The use of planting equipment is severely limited.

The erosion hazard is slight because of the numerous stones and boulders on the surface.

Seedling mortality is severe because of the surface stones. The hazard of windthrow is slight.

European larch, Japanese larch, red spruce, white pine, and Norway spruce are suitable for planting by hand. Scotch pine and white pine are suited to the well-drained soils and can be grown for Christmas trees. Scotch pine, white pine, balsam fir, white spruce, and Douglas-fir are suited to the moderately well drained soils, but Douglas-fir should not be planted at an elevation of more than 3,000 feet.

WOODLAND GROUP 8

In this group are well-drained, moderately deep silt loams of the Gilpin series. These soils developed on uplands in acid material weathered from shale. Permeability is moderate, and runoff is rapid to very rapid. The slope range is 3 to 70 percent.

The vegetation on these soils varies, depending on the aspect, which in turn governs the moisture supply. On the slopes that face northeast and those that face northwest, the vegetation is made up largely of red oak, American beech, chestnut oak, sugar maple, red maple, yellow-poplar, and hemlock trees. The understory includes rhododendron, greenbrier, witch-hazel, Solomons-seal, and false Solomons-seal. The soils on slopes that face southeast and southwest are drier than those on slopes that face northeast and northwest, and the vegetation is of a kind that does not need as much moisture as that on the northerly aspects. It is made up largely of chestnut oak, white oak, scarlet oak, red maple, sassafras, American beech, and red oak trees. The understory includes blueberry, mountain-laurel, and huckleberry.

The site index for upland oaks varies according to aspect, gradient, position on the slope, and degree of erosion (see table 6). For other kinds of trees the quality of the site is estimated to be poor to medium.

TABLE 6.—*Average site index for upland oaks on Gilpin soils*

Slope range and soil type	Location of stand on slope	Site index on—			
		Northeast aspect (0° to 90°)	Southeast aspect (90° to 180°)	Southwest aspect (180° to 270°)	Northwest aspect (270° to 360°)
Slope of 3 to 30 percent: Gilpin channery silt loam (GcB, GcC, GcD).	All positions	80	70	60	70
Slope of 10 to 30 percent: Gilpin channery silt loam, severely eroded (GcC3, GcD3).	All positions	60–70	50–60	40–50	50–60
Slope of 30 to 40 percent: Gilpin channery silt loam (GcE)	Upper third	70	60	50	60
	Middle third	80	70	60	70
	Lower third	80	80	70	80
Slope of 30 to 40 percent: Gilpin channery silt loam, severely eroded (GcE3).	Upper third	50–60	40–50	30–40	40–50
	Middle third	60–70	50–60	40–50	50–60
	Lower third	60–70	60–70	50–60	60–70
Slope of 40 to 70 percent: Gilpin channery silt loam (GcF)	Upper third	60	60	50	50
	Middle third	70	60	60	60
	Lower third	80	70	70	70
Slope of 40 to 70 percent: Gilpin channery silt loam, severely eroded (GcF3).	Upper third	40–50	40–50	30–40	30–40
	Middle third	50–60	40–50	40–50	40–50
	Lower third	60–70	50–60	50–60	50–60

Equipment limitations are slight where the slope is less than 20 percent, moderate where the slope is between 20 and 30 percent, and severe where the slope is more than 30 percent. On the steepest slopes, special equipment and special methods may be needed, particularly in wet weather, to keep disturbance and compaction of the soils to a minimum and to reduce the risk of gullying. Crawler tractors can be used only to a limited extent where the slope is more than 30 percent.

The erosion hazard is slight where the slope is less than 20 percent, moderate where the slope is between 20 and 30 percent, and severe where the slope is more than 30 percent. It is important to locate roads and trails where runoff will not concentrate and to use equipment and methods that will disturb or compact the soil as little as possible.

Seedling mortality is slight except on the upper part of those slopes that face southwest, where moisture is lacking during the germination period. Generally, stands are maintained through natural regeneration if there is a source of seed and if suitable silvicultural practices are applied.

The hazard of windthrow is slight except on some ridgetops.

White pine, red pine, Norway spruce, European larch, and Japanese larch are suitable for forest plantings. Scotch pine and white pine can be grown for Christmas trees. All trees grow better on north-facing slopes than on south-facing slopes.

WOODLAND GROUP 9

This group consists of well drained or moderately well drained, nearly level to moderately sloping, sandy to silty soils of the Allegheny, Barbour, Pope, Monongahela, and Sequatchie series. These soils are on bottom lands and terraces and are subject to flooding in some areas. Permeability of the Barbour, Pope, and Sequatchie soils ranges from moderate to rapid; that of the Allegheny, Monongahela, and Philo soils ranges from moderate to slow. The water table is seasonally high in the Pope and Monongahela soils.

The trees on the soils of this group are mainly red oak, white oak, red maple, sugar maple, yellow-poplar, white pine, and sycamore. Most of the acreage is used for cultivated crops or pasture rather than for forest.

No estimate was made of the site index for oak. For other trees, the quality of the site is estimated to be excellent to medium on fine sandy loam and silt loam but medium on gravelly sandy loam.

Equipment limitations are generally slight, but they are moderate on the Philo and Monongahela soils because of the seasonal high water table.

The erosion hazard is slight where the slope is less than 8 percent and moderate where the slope is between 8 and 15 percent.

Seedling mortality is slight. The hazard of windthrow is slight, but windthrow may be a problem on the Monongahela soils, which have a compact layer.

White pine, red pine, Norway spruce, European larch, and Japanese larch are suitable for forest plantings, but red pine should not be planted in areas that have excess moisture. Scotch pine and white pine may be planted for Christmas trees in many areas, but white spruce and balsam fir are more suitable in some areas. The planting of Christmas trees may be limited in areas that are subject to flooding.

WOODLAND GROUP 10

In this group are somewhat poorly drained to very poorly drained soils of the Brinkerton and Lickdale series and the land types, Very stony land and Wet land. Stones and boulders 1 to 5 feet in diameter cover 40 to 90 percent of the surface. The permeability of the Brinkerton and Lickdale soils is slow.

The vegetation consists of red spruce, red maple, yellow birch, and hemlock trees and rhododendron and mountain-laurel. In cutover areas the vegetation consists mainly of bracken, fire cherry, blueberry, huckleberry, sedge, and grass.

No estimate was made of the site index for oak. For other trees, the quality of the site is estimated to be poor or very poor.

Equipment limitations are severe because of wetness and stoniness. Only handtools can be used for planting.

The hazard of erosion is slight. Natural regeneration of desirable trees is limited by wetness and stoniness. Seedlings on exposed slopes and in low areas are likely to be damaged by frost.

Because of the shallow root zone, the hazard of windthrow is severe.

Red spruce and balsam fir are suitable for forest plantings.

WOODLAND GROUP 11

This group consists of well-drained, moderately deep and deep, moderately permeable silt loams of the Calvin series. These soils are on uplands. They are similar to the soils in group 4, except that they have a neutral substratum. Some have an extremely stony surface layer. The slope range is 3 to 65 percent.

The vegetation varies, depending on aspect, gradient, and position on the slope, but it varies less than that on the soils of groups 4, 5, and 8 and includes more of the high-quality, moisture-demanding hardwoods, such as red oak, yellow-poplar, basswood, American beech, sugar maple, and black cherry.

The site index for upland oaks varies according to aspect and steepness of slope and position on the slope (see table 7). For trees other than oak, the site quality is estimated to be medium to excellent.

Equipment limitations are slight where the slope is less than 20 percent, moderate where the slope is between 20 and 30 percent, and severe where the slope is more than 30 percent. In the extremely stony areas, surface stones make the equipment limitations more severe.

The hazard of erosion is slight where the slope is less than 20 percent, moderate where the slope is between 20 and 30 percent, and severe where the slope is more than 30 percent. In the extremely stony areas, the surface stones provide some protection against erosion.

Seedling mortality is slight, and the hazard of windthrow is slight.

Yellow-poplar and white ash are suitable species for forest plantings on the lower slopes, and white pine, Norway spruce, white spruce, red spruce, European larch, and Japanese larch are suitable for planting on the middle and upper slopes. Scotch pine, white pine, Norway spruce, and Douglas-fir can be grown for Christmas trees.

TABLE 7.—*Average site index for upland oaks on Calvin soils, neutral substratum*

Slope range and soil type	Location of stand on slope	Site index on—			
		Northeast aspect (0° to 90°)	Southeast aspect (90° to 180°)	Southwest aspect (180° to 270°)	Northwest aspect (270° to 360°)
Slope of 3 to 30 percent: Calvin channery silt loam, neutral substratum (ChB, ChC, ChD) and Calvin extremely stony silt loam, neutral substratum (CnC).	All positions	80	80	70	80
Slope of 20 to 40 percent: Calvin channery silt loam, neutral substratum (ChE) and Calvin extremely stony silt loam, neutral substratum (CnE).	Upper third	80	70	60	70
	Middle third	80	70	60	70
	Lower third	80	80	70	80
Slope of 40 to 65 percent: Calvin channery silt loam, neutral substratum (ChF) and Calvin extremely stony silt loam, neutral substratum (CnF).	Upper third	70	60	60	60
	Middle third	70	60	60	60
	Lower third	80	80	70	80

WOODLAND GROUP 12

This group consists of miscellaneous land types and organic soils on bottom lands and uplands. Drainage and permeability vary.

The vegetation varies from place to place. Hemlock and red maple grow in the more poorly drained areas; yellow-poplar, red oak, white oak, and sycamore grow in the well-drained areas. Muck and Peat support reeds and mosses; balsam grows in a few scattered areas in Canaan Valley. No vegetation grows in areas of Made land or Strip mine, except where it has been planted.

Other interpretations for this woodland group have to be made by examining specific sites.

Wildlife [4]

Wildlife is an important natural resource of the Tucker-Randolph Area. White-tailed deer and ruffed grouse are common in all parts of the Area, and mink and muskrat are fairly common. Gray squirrel, cottontail rabbit, and raccoon inhabit the lower slopes of the larger valleys and are most common west and north of the town of Parsons. Black bear and wild turkey are most common east of Shavers Fork, the Cheat River, and Horseshoe Run. In the eastern half of the Area, beaver live along the headwaters of streams in the mountains, and a few colonies live on the bottom lands along the rivers and along Clover Run. Snowshoe hare are common at the higher elevations. There are some bobwhite quail on the bottom lands along the Cheat River. Duck and woodcock nest in Canaan Valley and along Red Creek. Woodchucks live mostly in farming areas and are most common on associations 4 and 11.

Smallmouth black bass, sunfish, rock bass, and suckers are abundant in the larger warm-water streams. Suitable cold-water streams are heavily stocked with brown trout, rainbow trout, and brook trout. In many of the smaller streams, there are native brook trout. The best streams for fish are in association 4.

The distribution of wildlife by soil associations and the soil characteristics and vegetation characteristics that affect the habitat elements and kind of wildlife population (*1*) are described in the following paragraphs. The soil associations are described in the section "General Soil Map" and are shown on the colored map at the back of this report.

Soil associations 1 and 3.—The soils of these association are very steep and very strongly acid. The drainageways are narrow and V-shaped. The elevation ranges from 2,000 to 2,500 feet. Most areas are in forest, but many of the broader ridgetops and wider valleys are farmed. Much acreage that was once cleared is now reverting to forest.

The forest on association 1 consists of oak and hickory and cove hardwoods, and that on association 3 of red oak and chestnut oak and cove hardwoods. Beech, red maple, and sassafras are common in some areas. The understory on both associations consists of mountain-laurel, blueberry, huckleberry, rhododendron, greenbrier, witch-hazel, hobblebush, teaberry, Solomons-seal, false Solomons-seal, violets, and twisted-stalk. Wild grapes grow in widely scattered places. Blackberry bushes quickly cover areas that have been logged.

White-tailed deer, gray squirrel, cottontail rabbit, raccoon, and ruffed grouse are fairly common. Wild turkeys are most numerous in the areas east of Shavers Fork, the Cheat River, and Horseshoe Run, where the forest is interspersed with farmsteads. Berries and herbaceous plants that provide food for wildlife grow along the edges of the farmsteads. Acorns and other mast are common throughout both of these associations. Scarcity of water makes some of the ridgetops unsuitable as wildlife habitats.

Warm-water fish inhabit most of the streams in association 1, but native trout live in one or two streams where there is enough shade to keep the water cool. Clover Run and Horseshoe Run are stocked with trout early in spring. Native brook trout live in many streams in association 3. Elklick Run, Rattlesnake Fork, and Little Black Fork are stocked with trout and other fish. Streams managed for trout and other fish require adequate shade, and they need to be protected against channel erosion and the deposition of silt.

Association 2.—The soils of this association are on the bottom lands adjacent to the larger streams. The elevation ranges from 1,600 to 2,300 feet. Most of the acreage is farmed. Corn is the main row crop, and grass is grown for permanent cover in places.

[4] ARNOLD SCHULZ, wildlife biologist, Monongahela National Forest, assisted in the preparation of this section.

Some of the acreage is still in forest in areas that are not suitable for farming. The forest on association 2 includes red oak, tulip poplar, elm, and walnut trees.

Deer, rabbit, raccoon, grouse, squirrel, mink, and muskrat are common, but quail are not so common. Ducks rest on many of the streams. The major limitation on wildlife habitats in this association is the lack of cover.

The streams in this association are good habitats for fish. Most of the fish in Shavers Fork, Dry Fork, Horseshoe Run, and Clover Run are bass, but these streams are abundantly stocked with trout in spring. Because most of this association is on flood plains, the streambanks are constantly eroding and the material in the streambed has shifted.

Association 4.—The soils in this association are on long, steep mountain slopes and gently and moderately sloping benches. The elevation ranges from 1,700 to 4,600 feet. Large areas are unsuitable for farming because they have boulders 2 to 4 feet in diameter on the surface. Much of the acreage is now used for pasture or hay. The rest is in forest. The forest types include cove hardwoods and red oak in some areas and northern hardwoods and oak in others. Some of the shrubs and vines are wild grape, camphorvine, dogwood, serviceberry, Hercules-club, hobblebush, laurel, rhododendron, elderberry, and hawthorn. The herbaceous plants include nettle, snakeroot, jewelweed, and columbine. Hawthorn, walnut, and sugar maple are common in open areas.

This combination of open areas and forest makes for good wildlife habitats, and some of the best in the Area are in this association. Deer, bear, turkey, grouse, rabbit, woodchuck, and raccoon are common, and squirrels are common up to an elevation of 3,000 feet.

Only a few streams in this association are large enough to provide a suitable habitat for fish. In these streams the water is fertile and is almost neutral in reaction. There are native trout in many of these streams. The lower parts of Otter Creek, the Blackwater River, and Red Run are unsuitable for fish because they receive acid water from mines and from other sources. Steepness limits the construction of large impoundments in this association.

Association 5.—The soils in this association are well drained and moderately deep or deep and have long, steep or very steep slopes. The gentler slopes on the mountaintops are used for hay and pasture, but most of the steeper slopes are forested.

The vegetation on this association is highly suitable for wildlife habitats. The forest contains more cove hardwoods and more red oaks than that on association 1. It also contains northern hardwoods. The understory includes rhododendron, mountain-laurel, dogwood, viburnum, wild grape, and witch-hazel. Some of the more common herbaceous plants in open areas are blackberry, nettle, snakeroot, and blue cohosh.

The combination of forest and open areas is favorable for wildlife habitats. Deer, grouse, turkey, and squirrel are the most common game. Bear and raccoon are less common, and there are a few beaver.

The two major streams, both tributaries of Dry Fork, are Laurel Fork, which is in the eastern part of this association, and Glady Fork, which is on the western edge. Fishing is limited because Laurel Fork can be reached only by foot, except in one place where U.S. Highway No. 33 crosses it. Many of the drainageways flowing into Glady Fork support native brook trout.

Associations 6 and 8.—The soils in these associations are extremely stony and range from well drained to poorly drained. They are gently to moderately sloping in most places, but they are very steep in some places, such as the canyons of the Blackwater River, Red Creek, and Otter Creek.

The forest is poor because of heavy cutting followed by destructive forest fires. Productivity is low because of extreme stoniness or poor drainage. Red spruce and hemlock are widely scattered throughout both associations, and northern hardwoods are becoming established in the better drained areas. Native grasses, bracken, and shrubs occur in large open areas. Other common plants in the area are poverty oatgrass, rhododendron, mountain-laurel, mountain-holly, menziesia, huckleberry, blueberry, chokeberry, fire cherry, mountain-ash, azalea, deciduous holly, serviceberry, aspen, teaberry, hawthorn, and viburnum.

Deer, bear, beaver, and grouse are most common in these associations. Wild turkeys are present in some places, but they prefer areas where the trees are larger and the brush less thick. Cottontail rabbit and snowshoe hare are abundant in a few small areas. Ducks nest along many beaver ponds. Although bear are heavily hunted, their number remains stable. Many beaver habitats are inaccessible, largely because of heavy snow, and consequently, beaver are underharvested. Food, cover, and water for wildlife are generally available, but occasionally there is a shortage of mast because of a killing frost.

The streams in these associations are generally poor habitats for fish because they contain diluted acids, but there are many sites suitable for fishing impoundments.

Association 7.—The soils of this association are gently sloping and very strongly acid. They are on plateaus in the mountains in the north-central part of the survey Area, mainly north of the towns of Thomas and Davis and generally at an elevation of 3,000 to 3,200 feet. Several smaller areas are at an elevation of as much as 4,150 feet on the top of Canaan Mountain, McGowan Mountain, Green Mountain, and Bickle Knob. Approximately 2,000 acres has been strip-mined for coal. Nearly all of this association is in forest or is reverting to forest.

Northern hardwood, black cherry, red maple, and basswood are the principal forest species. In some areas the vegetation consists of native grasses, bracken, and scattered small trees, mostly fire cherry, red maple, and serviceberry. Rhododendron, mountain-laurel, witch-hazel, striped maple, and viburnum are the most common shrubs.

The wildlife population is not large. Deer, grouse, wild turkey, and beaver are the most common. Production of food for wildlife is limited by severe winters and by killing frosts late in spring and early in fall.

Acid water from strip mines and deep mine sources have polluted the streams in this association. It has eliminated fish from the Blackwater River, once widely known as a trout stream, between the town of Davis and the confluence of the Blackwater River and Dry Fork. Strip mines should be reclaimed, in order to control erosion and to prevent siltation of the streams. There are many sites for fishing impoundments.

Association 9.—The soils of this association are poorly drained in the more nearly level areas and well drained on the slopes and high ridges. They are in a large, almost flat basin at an elevation of 3,100 to 3,300 feet, where there are large areas of acid muck and peat. Only about one-fourth of this basin is now in forest. The open areas are used for grazing and for growing hay and row crops.

The forest in well-drained areas is dominantly northern hardwoods, and the understory consists mostly of fire cherry, serviceberry, witch-hazel, and deciduous holly. Along the streams the vegetation is mainly red spruce, hemlock, balsam fir, and extensive thickets of alder. Bracken, sedges, poverty oatgrass, mosses, cattail, oxalis, and partridgeberry are common throughout the association.

Deer, grouse, beaver, muskrat, rabbit, and waterfowl are most common; wild turkey and black bear are less common. Woodcock are common for a short period in fall. Both woodcock and waterfowl nest and are abundant in some places. Frosts are frequent late in spring and early in fall and often result in a shortage of food for wildlife, particularly of mast.

The Blackwater River, which is stocked with a large number of brown trout and rainbow trout each year, is widely known for trout fishing. Deep holes in the river permit some of the trout to live through the winter, and occasionally an exceptionally large one is caught. Some of the smaller streams contain native brook trout. In this association the water in streams may be acid, but there are many sites for fishing impoundments.

Suitability of soils for wildlife habitats

This subsection discusses the capacity of each soil for developing the elements of wildlife habitat—food, cover, and water. It will help landowners to determine the suitability of soils for use as wildlife habitats and to decide what kinds of wildlife an area can best be managed for.

In table 8 each of the soils in the survey Area is rated as to suitability, in general, for specified kinds of plants and for water developments, and also for three classes of wildlife. The ratings do not take into account the present use of the soils, the intermingling of soils, or the mobility of wildlife.

The ratings used in the table are *well suited*, *suited*, *poorly suited*, and *unsuited*. *Well suited* means that habitats generally are easily created, improved, or maintained, and that the soil has few or no limitations that affect habitat management. Satisfactory results can be expected. *Suited* means that the habitats can be created, improved, or maintained in most places, but the soil has moderate limitations that affect management. Moderately intensive management and fairly frequent attention may be required for satisfactory results. *Poorly suited* indicates that habitats can be created, improved, or maintained in most places, but the soil has rather severe limitations that affect management. Habitat management is difficult and expensive and requires intensive effort, and results are not always satisfactory. *Unsuited* indicates that it is impractical or impossible to create, improve, or maintain habitats. Unsatisfactory results are probable.

The ratings for kinds of wildlife were made on the basis of weighted values assigned to a selection of habitat elements appropriate to the kind of wildlife. For example, grain and seed crops, grasses and legumes, and wild herbaceous upland plants were given greater weight than hardwood plants as habitat elements for open-land wildlife.

The column heading "Grain and seed crops" refers to seed-producing annual plants, such as corn, sorghum, wheat, oats, rye, buckwheat, and millet.

"Grasses and legumes" refers to domestic perennial grasses and herbaceous legumes that have been established by planting and that furnish food and cover for wildlife. The grasses include fescue, bluegrass, orchardgrass, tall oatgrass, and reed canarygrass. The legumes include alfalfa and clover and other trefoils.

"Wild herbaceous upland plants" refers to perennial grasses, weeds, and semiwoody plants that have been established mainly through natural processes and that provide food and cover for upland wildlife. These plants are generally in open areas and include bluestem, indiangrass, wildrye, oatgrass, pokeweed, strawberry, blackberry, ragweed, lespedeza, beggarweed, and dandelion.

"Hardwood woody plants" refers to nonconiferous plants that provide fruits, nuts, buds, catkins, twigs, or foliage that are used as food by wildlife. These plants are commonly established by natural processes, but they can be planted. They include oak, beech, cherry, hickory, poplar, walnut, wild grape, honeysuckle, greenbrier, dogwood, huckleberry, blueberry, mountain-ash, witch-hazel, hazelnut, and mountain-holly.

"Coniferous woody plants" are valuable mainly as cover, but they furnish some food, such as browse and seeds. They include Virginia pine, white pine, hemlock, pitch pine, red cedar, Scotch pine, red pine, and red spruce. These trees commonly reestablish themselves and can also be planted. Some conifers that are not native will grow in this Area if planted.

"Wetland food and cover plants" grow on moist or wet sites and provide food or cover mainly for wetland wildlife. Included are smartweed, wild millet, rushes, sedges, reeds, wildrice, switchgrass, and cattails.

"Shallow water developments" are impoundments or excavations not more than 5 feet deep. They provide habitats for muskrats, resting places for migratory waterfowl, and drinking water for deer and turkey. Low dikes, shallow dugouts, level ditches, and devices that control water in marshy streams are examples of shallow water developments.

"Excavated ponds" are those deep enough for fish. They require a surface area of one-tenth of an acre or more, and the water must be at least 6 feet deep over one-quarter of the acreage.

"Open land wildlife" refers to birds and animals that normally live in cultivated areas, pastures, meadows, fence rows, and open areas overgrown with grasses and shrubs. Included are bobwhite quail, mourning dove, woodchuck, and cottontail rabbit. Cottontails also live in the forest, but they are most numerous on open land.

"Forest wildlife" includes ruffed grouse, wild turkey, white-tailed deer, bear, gray squirrel, fox squirrel, raccoon, and red fox.

"Wetland wildlife" includes ducks, wading birds, muskrat, mink, and beaver. The habitats include ponds, swamps, water-filled quarries, and slow-moving large streams.

TABLE 8.—*Suitability of soils for elements*

[Absence of rating indicates that on-site

Soil series and map symbols	Elements of wildlife habitats				
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants
Albrights:					
AbB, AbC	Suited	Well suited	Well suited	Well suited	Poorly suited
Allegheny:					
AgB, AgC	Suited	Well suited	Well suited	Well suited	Poorly suited
Alluvial land:					
Al					
Atkins:					
At	Unsuited	Poorly suited	Poorly suited	Well suited	Well suited
Barbour:					
Ba, Bc, Bd	Suited	Well suited	Well suited	Well suited	Poorly suited
Bb	Well suited	Well suited	Well suited	Well suited	Poorly suited
Bf	Unsuited	Poorly suited	Well suited	Well suited	Poorly suited
Belmont:					
BmB, BmC	Suited	Well suited	Well suited	Well suited	Poorly suited
BmD	Poorly suited	Suited	Well suited	Well suited	Poorly suited
BmE, BnC, BnD	Unsuited	Poorly suited	Well suited	Well suited	Poorly suited
BnE, BnF	Unsuited	Unsuited	Well suited	Well suited	Poorly suited
Blago:					
Bo	Unsuited	Poorly suited	Poorly suited	Well suited	Well suited
Bp	Unsuited	Poorly suited	Poorly suited	Well suited	Well suited
Brinkerton:					
BrA	Poorly suited	Poorly suited	Suited	Suited	Suited
BrB, BrC	Poorly suited	Poorly suited	Suited	Suited	Suited
BsC, Vb	Unsuited	Unsuited	Suited	Suited	Suited
Calvin:					
CaB, CaC, ChB, ChC	Suited	Suited	Suited	Suited	Suited
CaC3, CaD, ChD	Poorly suited	Suited	Suited	Suited	Suited
CaD3, CaE, ChE	Unsuited	Poorly suited	Suited	Suited	Suited
CaE3, CaF, ChF	Unsuited	Unsuited	Suited	Suited	Suited
CnC, CnE, CnF, VcF	Unsuited	Unsuited	Suited	Suited	Suited
Cookport:					
CoB	Suited	Well suited	Well suited	Well suited	Poorly suited
CsB	Unsuited	Poorly suited	Well suited	Well suited	Poorly suited
Dekalb:					
DaB, DaC, DkB, DkC	Suited	Suited	Suited	Suited	Suited
DaD	Poorly suited	Suited	Suited	Suited	Suited
DaE	Unsuited	Poorly suited	Suited	Suited	Suited
DaF	Unsuited	Unsuited	Suited	Suited	Suited
DmC, DmE, DmF, VdE, VdF	Unsuited	Unsuited	Suited	Suited	Suited
Ernest:					
EnB, EnC	Suited	Well suited	Well suited	Well suited	Poorly suited
EnD	Poorly suited	Suited	Well suited	Well suited	Poorly suited
ErC, ErD, VeC, VeD	Unsuited	Unsuited	Well suited	Well suited	Poorly suited
Gilpin:					
GcB, GcC	Suited	Well suited	Well suited	Well suited	Poorly suited
GcC3, GcD	Poorly suited	Suited	Well suited	Well suited	Poorly suited
GcD3, GcE	Unsuited	Poorly suited	Well suited	Well suited	Poorly suited
GcE3, GcF, GcF3	Unsuited	Unsuited	Well suited	Well suited	Poorly suited
Leetonia:					
LcB, LcC	Suited	Suited	Suited	Suited	Suited
VlC	Unsuited	Unsuited	Suited	Suited	Suited

of wildlife habitat and kinds of wildlife

determination of suitability is necessary]

Elements of wildlife habitats—Continued			Kinds of wildlife		
Wetland food and cover plants	Shallow water developments	Excavated ponds	Open land	Forest	Wetland
Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Well suited	Poorly suited	Unsuited	Poorly suited	Well suited	Suited.
Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Unsuited	Suited	Well suited	Unsuited.
Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Unsuited	Suited	Well suited	Unsuited.
Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Well suited	Well suited	Well suited	Poorly suited	Well suited	Well suited.
Well suited	Unsuited	Unsuited	Poorly suited	Well suited	Poorly suited.
Well suited	Well suited	Well suited	Poorly suited	Suited	Well suited.
Poorly suited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Poorly suited	Poorly suited	Unsuited.
Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Unsuited	Unsuited	Unsuited	Poorly suited	Poorly suited	Unsuited.
Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Unsuited	Unsuited	Unsuited	Poorly suited	Poorly suited	Unsuited.
Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Unsuited	Suited	Suited	Poorly suited.
Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Unsuited	Unsuited	Unsuited	Poorly suited	Poorly suited	Unsuited.

TABLE 8.—*Suitability of soils for elements of*

Soil series and map symbols	Elements of wildlife habitats				
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants
Lickdale:					
LdA	Unsuited	Poorly suited	Poorly suited	Well suited	Well suited
LsA	Unsuited	Poorly suited	Poorly suited	Well suited	Well suited
Vb					
Made land:					
Ma					
Meckesville:					
McB, McC	Suited	Well suited	Well suited	Well suited	Poorly suited
MkC, MkD	Unsuited	Poorly suited	Well suited	Well suited	Poorly suited
MkE	Unsuited	Unsuited	Well suited	Well suited	Poorly suited
Monongahela:					
MoA	Suited	Well suited	Well suited	Well suited	Poorly suited
MoB, MoC	Suited	Well suited	Well suited	Well suited	Poorly suited
Muck and Peat:					
Mp	Unsuited	Unsuited	Suited	Unsuited	Unsuited
Nolo:					
BsC	Unsuited	Unsuited	Suited	Well suited	Suited
NoA	Poorly suited	Poorly suited	Suited	Suited	Suited
NoB	Poorly suited	Poorly suited	Suited	Suited	Suited
Philo:					
Ph	Suited	Well suited	Well suited	Well suited	Poorly suited
Pope:					
Ba, Bc, Bd	Suited	Well suited	Well suited	Well suited	Poorly suited
Bb	Well suited	Well suited	Well suited	Well suited	Poorly suited
Bf	Unsuited	Poorly suited	Well suited	Well suited	Poorly suited
Purdy:					
Pu	Poorly suited	Suited	Suited	Well suited	Suited
Sandstone rubble land:					
Sa					
Sequatchie:					
Se	Well suited	Well suited	Well suited	Well suited	Poorly suited
Stony alluvial land:					
St					
Strip mine:					
Sm					
Tyler:					
Ty	Poorly suited	Poorly suited	Suited	Suited	Suited
Very stony land-Wet land complex:					
VwB	Unsuited	Unsuited	Suited	Suited	Suited
Wet terrace land:					
Wt	Poorly suited	Suited	Suited	Well suited	Suited

wildlife habitat and kinds of wildlife—Continued

Elements of wildlife habitats—Continued			Kinds of wildlife		
Wetland food and cover plants	Shallow water developments	Excavated ponds	Open land	Forest	Wetland
Well suited Well suited	Well suited Suited	Well suited Suited	Poorly suited Poorly suited	Well suited Well suited	Well suited. Well suited.
Unsuited Unsuited Unsuited	Unsuited Unsuited Unsuited	Unsuited Unsuited Unsuited	Well suited Poorly suited Poorly suited	Well suited Suited Suited	Unsuited. Unsuited. Unsuited.
Poorly suited Unsuited	Poorly suited Unsuited	Poorly suited Unsuited	Well suited Well suited	Well suited Well suited	Poorly suited. Unsuited.
Suited	Well suited	Well suited	Unsuited	Unsuited	Well suited.
Poorly suited Well suited Poorly suited	Unsuited Well suited Unsuited	Unsuited Well suited Unsuited	Poorly suited Poorly suited Poorly suited	Suited Suited Suited	Unsuited. Well suited. Unsuited.
Poorly suited	Poorly suited	Poorly suited	Well suited	Well suited	Poorly suited.
Unsuited Unsuited Unsuited	Unsuited Unsuited Unsuited	Unsuited Unsuited Unsuited	Well suited Well suited Suited	Well suited Well suited Well suited	Unsuited. Unsuited. Unsuited.
Well suited	Well suited	Well suited	Suited	Well suited	Well suited.
Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Suited	Suited	Suited	Suited	Well suited	Suited.
Poorly suited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Well suited	Well suited	Well suited	Suited	Well suited	Well suited.

Engineering Applications [5]

Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, building foundations, water storage facilities, erosion control structures, drainage systems, and sewage disposal systems.

Information in this report can be used by engineers to—

1. Make soil and land use studies that will aid in selecting and developing industrial, business, residential and recreational sites.
2. Make preliminary estimates of the engineering properties of soils in the planning of agricultural drainage systems, farm ponds, and diversion terraces.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting highway, airport, pipeline, and cable locations and in planning detailed investigations at the selected locations.
4. Locate possible sources of stone, gravel, and other construction materials.
5. Correlate the performance of engineering structures with soil mapping units to develop information for overall planning that will be useful in designing and maintaining certain engineering structures.
6. Determine the suitability of soil mapping units for cross-country movement of vehicles and construction equipment.
7. Supplement the information obtained from other published maps and reports and aerial photographs to make maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

The engineering interpretations reported here can be used for many purposes. It should be emphasized, however, that these interpretations may not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads or excavations deeper than the depths of layers here reported. Even in these situations, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

Engineering classification systems

The two systems for classification of soils that are in general use among engineers are the American Association of State Highway Officials (AASHO) system (*2*) and the Unified system (*21*).

The AASHO system is based on field performance of highways in relation to soils. Soils having the same general load-carrying capacity are grouped together, in seven basic groups, ranging from A–1, which consists of gravelly soils of high bearing capacity, to A–7, which consists of clayey soils that have low bearing capacity when wet. For road base, A–1 material is the best and A–7 is the poorest.

[5] ARTHUR B. HOLLAND, assistant State conservation engineer, Soil Conservation Service, assisted in the preparation of this section.

The Unified system is based on the identification of soils according to texture and plasticity and their grouping with respect to performance as engineering construction material. There are 15 possible classes, each identified by a two-letter symbol. The letters used, and the significance of each, are as follows: G, gravel; S, sand; C, clay; M, silt; O, organic; Pt, peat; W, well graded; P, poorly graded; L, low liquid limit; and H, high liquid limit. Thus, GP identifies a poorly graded gravel, and CL identifies clay having a low liquid limit.

Soil properties significant in engineering

Table 9 gives estimates of soil properties significant in engineering. These estimates were made by comparing the soils in this survey Area with similar soils that have been tested in this Area and in other areas, as well as by using information gained through field experience.

The column headed "Permeability" gives the estimated rate at which water moves downward through undisturbed soil. The texture and structure of the soil influence permeability.

Available water capacity is the estimated amount of water in the soil that is available for plant consumption. It represents the amount of water held between field moisture capacity and the wilting point of most plants.

The shrink-swell potential indicates the volume change to be expected when soil material is subjected to a change in moisture. It is expressed as low, moderate, or high. Generally, firm silty clay loam classed CH and A–7 has a high shrink-swell potential. Clean structureless sands and gravels (SW, SP, or GP and A–2) and those having small amounts of nonplastic or slightly plastic fines (GM, SM, or A–4) have low shrink-swell potential.

The flood hazard, which significantly affects the engineering uses of soils, is not shown in table 9. Alluvial land and the Atkins, Barbour, Blago, Philo, Pope, and Sequatchie soils are subject to frequent or occasional flooding. The effect of this on their suitability for specified engineering purposes is reflected in table 10.

Engineering interpretations

Table 10 shows engineering interpretations of the soils in this Area. The suitability rating and soil features are based on data in table 9, on actual test data, and on field experience.

The ratings as a source of topsoil are based on texture, natural fertility, and thickness of suitable layers. Unless otherwise indicated, they do not apply to stony soils. Normally, only the surface layer is used for topsoil, but the subsurface layers of soils on flood plains may be suitable. The ratings as a source of material for road fill are based on the AASHO and Unified classifications.

Soil features affecting highway location, construction of farm ponds, and agricultural drainage are also given in table 10. Susceptibility to slipping is not a major problem, except on the Ernest, Albrights, and Meckesville soils if they are disturbed and no precautions are taken. Some soils may be suitable sites for farm pond reservoirs but not for embankments; others may be suitable for embankments but not for reservoir areas. Soil features that affect embankments are based on the Unified classification as given in table 9.

Natural sources of coarse materials (sand and gravel) for road base are scarce in this survey Area. The only natural sources of gravel are the Barbour and Pope gravelly soils. Because of the nature of the Area and the characteristics of the soils, the need for terraces and diversions is limited. Diversions are needed at the base of some of the hills along the Cheat River downstream from Parsons. They help to improve drainage in poorly drained soils (mainly Atkins) on flood plains adjacent to the hills.

Engineering test data

To help evaluate the soils for engineering purposes, 12 samples of soils in the Belmont, Calvin, Dekalb, Ernest, and Gilpin series were tested according to standard procedures. Of these samples, 10 were taken in Tucker County, and 2 in Randolph County. The results are given in table 11.

Soils in Recreational Areas [6]

The Tucker–Randolph Area has many areas of scenic, geologic, and historic interest. These areas are suitable for camping, hiking, hunting, and fishing. Some areas that have been developed are Blackwater Falls, Blackwater Canyon, Canaan Valley, Dolly Sods, Allegheny Front, Fairfax Stone, and those in the Monongahela National Forest. In order to develop recreational facilities, it is necessary to know the characteristics of the soils, including texture, slope, erodibility, compaction, stoniness, permeability, and natural internal drainage.

Table 12 shows the estimated degrees and kinds of limitations of each soil in this Area for use as picnic areas and campsites, athletic fields and play areas, sanitary facilities, service building locations, and hiking trails. The ratings given do not eliminate the need for on-site investigations because of the small area needed for many of the facilities rated.

Sites for athletic fields and intensive play areas should be level, smooth, and well drained. It is assumed that many such areas will require extensive grading. Soils that have only slight limitations for use as picnic areas and campsites are generally suitable for filter fields but not for dugout ponds.

Soils that have severe limitations for use as filter fields may be suitable sites for oxidation lagoons, which can be substituted for filter fields. Soil requirements for such lagoons are similar to those for impoundments.

Service buildings are assumed to be no more than three stories high and to have an 8-foot basement. If there is no basement, limitations resulting from shallowness to bedrock are less severe than indicated in this table. The degree of limitation also applies to use as residential sites.

Generally best suited for recreational facilities are deep, well-drained, gently sloping, moderately to rapidly permeable soils, such as Dekalb channery loam. Silty clays and other fine-textured soils are less desirable than coarse-textured soils because they are more susceptible to compaction, puddling, and erosion. Extremely coarse-textured soils, such as Barbour and Pope cobbly loamy sand, are not desirable for picnic areas and campsites because they are droughty and do not readily support the grass as needed for desired plant cover in most areas that are intensively used for recreation.

The section "Engineering Applications" gives soil features and interpretations useful in developing recreational facilities, particularly impoundments.

Soils in Residential Developments

At the present time the Tucker–Randolph Area is almost entirely rural, but a significant growth in development of recreational areas and an accompanying increase in the building of homes and cottages are possible. The suitability of a site for residential development depends largely upon soil features, such as drainage, slope, stones, depth to bedrock, nature of the subsoil, and hazard of flooding.

Soils that have slow internal drainage or a high water table have severe limitations for use as building sites. Drainage fields for septic tanks do not function properly if the subsoil is slowly permeable or if bedrock is near the surface. Basements cannot be expected to remain dry in wet soils.

Construction costs are increased if the site is underlain by hard bedrock at a shallow depth. Houses should not be built on soils that are subject to flooding, such as the Barbour and Pope, Philo, Atkins, and Blago soils. These soils have severe limitations for residential use. The Albrights, Ernest, and Meckesville soils are subject to slipping, and such soils, particularly if they are steep, may not have enough stability for foundations.

The sections "Engineering Applications" and "Soils in Recreational Areas" give soil properties and interpretations useful in planning residential development. On-site investigation is also necessary.

Watershed Management

Most of this survey Area is forested. The emphasis is on management of forested watersheds, but the principles are of general application in the management of all watersheds (*9*). Watershed management has to be planned with reference to the soils, the vegetative cover, topography, geology, and climate. All of these factors have an influence on the severity of floods, the flow of water in streams during dry periods, and the quality of the water. Flooding and excessive runoff are most likely in areas where the slopes are steep or very steep, the plant cover sparse, and the water-storage capacity of the soils low. Such areas are likely to have streams of high gradient, and the quality of the water is likely to be low as a result of erosion and sedimentation during periods of high runoff.

The nature of the soils in a watershed is important because the soils are the medium that stores and transmits water. The water-storage capacity of a given soil depends on its effective depth and its pore space. Clayey soils generally have greater storage capacity than other soils of equal depth. Sandy soils have lower storage capacity. Clayey soils, however, may not release water readily, and they provide little space for temporary storage of water after storms. Nearly level and gently sloping clayey soils are likely to be flooded or saturated for long periods. The Lickdale and Brinker-

[6] R. F. REISKE, soil scientist, U.S. Forest Service, prepared this section.

TABLE 9.—*Estimates of soil*

Soil series and map symbol	Depth to bedrock	Depth to seasonal high water table	Depth from surface	Engineering classification
				USDA texture
	Feet	*Feet*	*Inches*	
Albrights (AbB, AbC)	4 to 12	1 to 2	0 to 6	Silt loam
			6 to 28	Silty clay loam
			28 to 38	Silty clay loam
Allegheny (AgB, AgC)	6+	(1)	0 to 10	Silt loam
			10 to 26	Loam
				Sandy loam
Alluvial land (Al)	3+	0 to 1	0 to 36	Silt loam and sandy loam [2]
Atkins (At)	4+	0 to 1	0 to 6	Silt loam
			6 to 25	Silty clay loam
			25 to 33	Loam
Barbour (part of Ba, Bb, Bc, Bd, and Bf)	6 to 10	3	0 to 7	Fine sandy loam
			7 to 21	Loam
			21 to 48	Sandy loam
Belmont (BmB, BmC, BmD, BmE, BnC, BnD, BnE, BnF)	2 to 4	(1)	0 to 9	Silt loam
			9 to 42	Silty clay loam
			42 to 51	Sandy clay loam
Blago (Bo, Bp)	4 to 12	0 to 1	0 to 8	Fine silt
			8 to 13	Silt loam
			13 to 28	Silty clay
			28 to 40	Clay loam
Brinkerton (BrA, BrB, BrC, part of BsC and of Vb)	3 to 10	0 to 1	0 to 5	Silt loam
			5 to 26	Silty clay loam
			26 to 88	Silty clay loam
Calvin (CaB, CaC, CaC3, CaD, CaD3, CaE, CaE3, CaF, ChB, ChC, ChD, ChE, ChF, CnC, CnE, CnF, part of VcF).	2 to 4	(1)	0 to 5	Silt loam
			5 to 19	Silty clay loam
			19 to 47	Silty clay loam
Cookport (CoB, CsB)	2 to 4	1 to 2	0 to 7	Silt loam
			7 to 21	Loam
			21 to 37	Loam
Dekalb (DaB, DaC, DaD, DaE, DaF, DkB, DkC, DmC, DmE, DmF, part of VdE and of VdF).	2 to 4	(1)	0 to 8	Loam
			8 to 14	Loam
			14 to 34	Loam
Ernest (EnB, EnC, EnD, ErC, ErD, part of VeC and of VeD).	4 to 10	1½ to 2	0 to 6	Silt loam
			6 to 23	Silty clay loam
			23 to 72	Gravelly silty clay loam
Gilpin (GcB, GcC, GcC3, GcD, GcD3, GcE, GcE3, GcF, GcF3).	2 to 4	(1)	0 to 6	Silt loam
			6 to 22	Silty clay loam
			22 to 33	Silty clay loam
Leetonia (LcB, LcC, part of VlC)	1 to 4	(1)	0 to 8	Loam
			8 to 20	Loam
			20 to 27	Fine sandy loam

See footnotes at end of table.

properties significant in engineering

Engineering classification—Continued		Percentage passing sieve—			Permeability	Available water capacity	Shrink-swell potential
Unified	AASHO	No. 4	No. 10	No. 200			
					Inches per hour	*Inches per inch of soil*	
ML	A–4	80 to 95	75 to 95	60 to 85	2.0 to 6.3	0.18+	Low.
CL	A–6 or A–7	85 to 95	80 to 95	65 to 85	0.2 to 0.63	0.15 to 0.18	Moderate or high.
SC or CL	A–6 or A–7	60 to 80	40 to 70	35 to 70	0.2 to 0.63	0.12 to 0.15	Moderate or high.
ML	A–4	75 to 90	70 to 85	60 to 70	2.0 to 6.3	0.18+	Low.
ML or SM	A–4	70 to 90	65 to 85	45 to 60	0.63 to 2.0	0.15 to 0.18	Moderate.
SM	A–2 or A–4	70 to 90	60 to 80	30 to 45	0.63 to 2.0	0.12 to 0.15	Low.
ML and SM [2]	A–6 or A–7 [2]	(3)	(3)	(3)	[2] 0.2 to 0.63	(3)	Low.
ML	A–4	90 to 100	90 to 100	70 to 90	0.63 to 2.0	0.18+	Low.
ML or CL	A–6 or A–7	95 to 100	85 to 100	75 to 90	0.2 to 0.63	0.12 to 0.15	Moderate or high.
ML or CL	A–6	70 to 100	60 to 95	60 to 75	0.2 to 0.63	0.12 to 0.15	Moderate.
SM, ML	A–4	70 to 100	60 to 100	35 to 60	2.0 to 6.3	0.15 to 0.18	Low.
SM, ML	A–4	70 to 100	60 to 100	35 to 60	2.0 to 6.3	0.12 to 0.15	Low.
SM or GM	A–2 or A–4	50 to 90	50 to 90	25 to 50	(2)	0.08 to 0.12	Low.
ML	A–7	80 to 95	80 to 95	60 to 85	2.0 to 6.3	0.18+	Moderate.
ML–CL	A–6 or A–7	80 to 95	75 to 90	50 to 80	0.63 to 2.0	0.15 to 0.18	Moderate or high.
CL–ML	A–7	70 to 95	60 to 85	50 to 80	0.63 to 2.0	0.15 to 0.18	Moderate.
ML	A–4	90 to 100	90 to 100	75 to 100	2.0 to 6.3	0.18+	Moderate.
ML	A–4	90 to 100	90 to 100	90 to 100	0.63 to 2.0	0.15 to 0.18	Moderate.
CL–CH	A–6 or A–7	90 to 100	90 to 100	90 to 100	<0.2	0.08 to 0.12	Moderate.
CL	A–6 or A–7	90 to 100	80 to 100	65 to 75	0.2 to 0.63	0.12 to 0.15	Moderate or high.
ML	A–4 or A–7	90 to 100	85 to 100	80 to 100	0.63 to 2.0	0.18+	Moderate.
ML–CL	A–6 or A–7	90 to 100	85 to 100	65 to 95	0.2 to 0.63	0.12 to 0.15	Moderate or high.
ML–CL	A–6 or A–7	80 to 100	70 to 90	60 to 90	<0.2	0.12 to 0.15	Moderate or high.
GM, SM, ML	A–4	65 to 90	55 to 85	40 to 55	2.0 to 6.3	0.15 to 0.18	Low.
GM–GC or SM–GC	A–6 or A–7	55 to 75	45 to 60	30 to 50	0.63 to 2.0	0.12 to 0.15	Moderate or high.
GM–GC	A–6 or A–7	35 to 50	25 to 40	20 to 30	0.63 to 2.0	0.12 to 0.15	Moderate or high.
ML, SM	A–4	80 to 90	70 to 90	40 to 70	2.0 to 6.3	0.18	Low.
ML	A–4	70 to 90	65 to 90	50 to 85	0.63 to 2.0	0.15 to 0.18	Low.
ML or SM	A–4	70 to 90	60 to 80	30 to 55	0.2 to 0.63	0.12 to 0.15	Low.
ML or SM	A–5 or A–2	50 to 85	40 to 75	15 to 55	2.0 to 6.3	0.15 to 0.18	Low.
ML or SM	A–6 or A–2	50 to 85	40 to 75	15 to 55	2.0 to 6.3	0.12 to 0.15	Low.
SP or SM	A–4 or A–2	40 to 85	40 to 80	15 to 45	2.0 to 6.3	0.08 to 0.12	Low.
MH or ML	A–7 or A–4	75 to 90	70 to 90	60 to 75	2.0 to 6.3	0.18+	Moderate.
MH or ML	A–6 or A–7	75 to 95	75 to 90	65 to 80	0.63 to 2.0	0.15 to 0.18	Moderate or high.
SM or ML or CL	A–4 or A–6	70 to 95	60 to 95	40 to 80	0.2 to 0.63	0.12 to 0.15	Moderate.
ML	A–4	65 to 80	55 to 70	50 to 65	2.0 to 6.3	0.18+	Low.
GM, ML or GC	A–6 or A–7	40 to 75	35 to 60	25 to 55	0.63 to 2.0	0.15 to 0.18	Moderate or high.
GM or GC	A–6 or A–7	40 to 60	30 to 40	20 to 30	0.63 to 2.0	0.08 to 0.12	Moderate or high.
SM or ML	A–2 or A–4	50 to 85	40 to 75	15 to 65	2.0 to 6.3	0.08 to 0.12	Low.
SM or ML	A–2 or A–4	50 to 85	40 to 75	15 to 65	2.0 to 6.3	0.08 to 0.12	Low.
GM or SM	A–2 or A–4	40 to 85	40 to 80	10 to 55	2.0 to 6.3	0.08 to 0.12	Low.

TABLE 9.—*Estimates of soil properties*

Soil series and map symbol	Depth to bedrock	Depth to seasonal high water table	Depth from surface	Engineering classification
				USDA texture
	Feet	*Feet*	*Inches*	
Lickdale (LdA, LsA, part of Vb)	4 to 12	0 to 1	0 to 5	Silt loam
			5 to 20	Silt loam
			20 to 24	Silty clay loam
			24 to 37	Sandy loam
Made land (Ma)	(4)	(4)	(4)	
Meckesville (McB, McC, MkC, MkD, MkE)	4 to 12	4	0 to 15	Silt loam
			15 to 34	Clay loam
			34 to 44	Sandy clay loam
Monongahela (MoA, MoB, MoC)	4 to 12	1½ to 2	0 to 8	Silt loam
			8 to 20	Clay loam
			20 to 36	Sandy clay loam
Muck and Peat (Mp)	5 to 15	0 to 2	0 to 44	(3)
Nolo (NoA, NoB, part of BsC)	2 to 3	½ to 1½	0 to 6	Silt loam
			6 to 15	Clay loam
			15 to 23	Loam
Philo (Ph)	4 to 10	1 to 2	0 to 7	Silt loam
			7 to 17	Loam
			17 to 38	Loam
Pope (part of Ba, Bb, Bc, Bd, and Bf)	6 to 10+	3	0 to 7	Fine sandy loam
			7 to 21	Loam
			21 to 48	Sandy loam
Purdy (Pu)	6 to 20+	0 to 1	0 to 8	Silty clay loam
			8 to 36	Silty clay
Sandstone rubble land (Sa)				
Sequatchie (Se)	10+	(1)	0 to 7	Fine sandy loam
			7 to 23	Fine sandy clay loam
			23 to 36	Sandy loam
Stony alluvial land (Sl)	(4)	(4)	(4)	(4)
Strip mine (Sm)	(4)	(4)	(4)	(4)
Tyler (Ty)	4 to 12	½ to 1½	0 to 7	Silt loam
			7 to 18	Silty clay loam
			18 to 36	Clay loam
Very stony land (part of Vb, VcF, VdE, VdF, VeC, VeD, VlC, and VwB)	(3)	(3)	(3)	(3)
Wet land (part of VwB)	(3)	(3)	(3)	(3)
Wet terrace land (Wt)	(3)	(3)	(3)	(3)

[1] Not applicable. [2] Variable; this describes most common condition. [3] Variable. [4] No estimates made.

significant in engineering—Continued

Engineering classification—Continued		Percentage passing sieve—			Permeability	Available water capacity	Shrink-swell potential
Unified	AASHO	No. 4	No. 10	No. 200			
					Inches per hour	*Inches per inch of soil*	
OL	A-4	80 to 95	80 to 95	65 to 85	2.0 to 6.3	0.18+	Moderate.
ML	A-4	70 to 95	70 to 90	55 to 85	0.2 to 0.63	0.12 to 0.15	Moderate.
MH or CL	A-6 or A-7	70 to 95	70 to 90	60 to 80	<0.2	0.12 to 0.15	Moderate or high.
ML or SM	A-4	65 to 95	55 to 90	40 to 85	0.2 to 0.63	0.12 to 0.16	Moderate.
(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4).
ML, SM	A-4	70 to 90	65 to 90	40 to 65	2.0 to 6.3	0.18+	Low.
CL, SM	A-6 or A-7	70 to 90	65 to 90	40 to 65	0.63 to 2.0	0.15 to 0.18	Moderate or high.
SC	A-2 or A-4	70 to 90	65 to 90	20 to 40	0.2 to 0.63	0.12 to 0.15	Low.
ML	A-4	85 to 100	85 to 100	60 to 85	0.63 to 2.0	0.18+	Low.
ML or CL	A-6 or A-7	85 to 100	85 to 100	70 to 80	0.2 to 0.63	0.15 to 0.18	Moderate or high.
ML or CL or SM	A-6	75 to 85	70 to 85	45 to 55	<0.2	0.12 to 0.15	Low.
(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3).
ML	A-4	75 to 90	70 to 80	55 to 75	0.63 to 2.0	0.15 to 0.18	Low.
ML or CL	A-6 or A-7	70 to 95	65 to 85	55 to 75	0.63 to 2.0	0.12 to 0.15	Moderate or high.
ML	A-4	70 to 95	60 to 75	50 to 70	0.2 to 0.63	0.12 to 0.15	Low.
ML	A-4	95 to 100	95 to 100	75 to 90	2.0 to 6.3	0.18+	Low.
ML	A-4	90 to 100	90 to 100	80 to 95	0.63 to 2.0	0.15 to 0.18	Low.
ML	A-4	50 to 90	50 to 95	50 to 75	0.63 to 2.0	0.12 to 0.15	Low.
SM, ML	A-4	70 to 100	60 to 100	35 to 60	2.0 to 6.3	0.15 to 0.18	Low.
SM, ML	A-4	70 to 100	60 to 100	35 to 60	2.0 to 6.3	0.12 to 0.15	Low.
SM or ML	A-2 or A-4	50 to 90	50 to 90	25 to 60	(5)	0.08 to 0.12	Low.
CL	A-6 or A-7	90 to 100	95 to 100	80 to 95	0.2 to 0.63	0.12 to 0.15	Moderate or high.
CH	A-7	95 to 100	95 to 100	80 to 95	<0.02	0.08 to 0.12	High.
(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4).
SM or ML	A-4	70 to 100	60 to 100	35 to 60	2.0 to 6.3	0.12 to 0.15	Low.
SC or CL	A-6	70 to 100	60 to 100	35 to 60	0.63 to 2.0	0.12 to 0.15	Moderate.
SM or SC, GM or GC	A-2 or A-6	50 to 90	50 to 90	25 to 50	2.0 to 6.3	0.12 to 0.15	Low.
(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4).
(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4).
ML	A-4	90 to 100	90 to 100	80 to 90	0.63 to 2.0	0.18+	Low.
ML or CL	A-6 or A-7	90 to 100	90 to 100	80 to 90	0.2 to 0.63	0.12 to 0.15	Moderate or high.
CL	A-6 or A-7	80 to 90	80 to 90	70 to 80	<0.02	0.12 to 0.15	Moderate or high.
(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3).
(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3).
(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3).

TABLE 10.— *Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting engineering practices—
	Topsoil	Road fill	Highway location
Albrights (AbB, AbC)	Fair	Fair or poor	Seasonal high water table; seepage on pan; instability; susceptibility to slipping.
Allegheny (AgB, AgC)	Good	Fair	No special problems
Alluvial land (Al)	Poor or fair	Fair or poor	Flood hazard; instability in some places
Atkins (At)	Fair	Poor	Flood hazard; high water table
Barbour (part of Ba, Bb, Bc, Bd, and Bf)	Good in nongravelly areas.	Good	Flood hazard
Belmont (BmB, BmC, BmD, BmE, BnC, BnD, BnE, BnF).	Good	Poor	Limestone bedrock near surface
Blago (Bo, Bp)	Fair	Poor	High water table; flood hazard; instability
Brinkerton (BrA, BrB, BrC, part of BsC)	Poor	Poor	High water table; seepage; frost heaving; instability.
Calvin (CaB, CaC, CaC3, CaD, CaD3, CaE, CaE3, CaF, ChB, ChC, ChD, ChE, ChF, CnC, CnE, CnF).	Fair	Good or fair	Rippable shale bedrock near surface; steep slopes.
Cookport (CoB, CsB)	Fair; poor in stony areas.	Fair	Sandstone bedrock near surface; seasonal high water table.
Dekalb (DaB, DaC, DaD, DaE, DaF, DkB, DkC, DmC, DmE, DmF).	Poor	Good	Sandstone bedrock near surface; surface stones in many areas.
Ernest (EnB, EnC, EnD, ErC, ErD)	Fair; poor in stony areas.	Fair	Seasonal high water table; seepage on pan; instability; susceptibility to slipping.
Gilpin (GcB, GcC, GcC3, GcD, GcD3, GcE, GcE3, GcF, GcF3).	Fair or poor	Good or fair	Shallowness to bedrock of rippable shale; steep slopes.
Leetonia (LcB, LcC)	Poor	Good	Sandstone bedrock near surface; surface stones in many areas.
Lickdale (LdA, LsA)	Poor	Poor	High water table; instability
Made land (Ma)	Poor	Variable	Instability of substratum in some places
Meckesville (McB, McC, MkC, MkD, MkE)	Fair	Fair	Susceptibility to slipping
Monongahela (MoA, MoB, MoC)	Fair	Fair	Seasonal high water table
Muck and Peat (Mp)	Unsuitable; good for mulch or organic material.	Unsuitable	High water table; subsidence
Nolo (NoA, NoB, part of BsC)	Poor	Poor	Bedrock near surface; high water table
Philo (Ph)	Good	Fair	Flood hazard; high water table
Pope (part of Ba, Bb, Bc, Bd, and Bf)	Good in nongravelly areas.	Good	Flood hazard
Purdy (Pu)	Poor	Poor	High water table; instability
Sandstone rubble land (Sa)	Poor	Good or fair	Sandstone outcrops in places
Sequatchie (Se)	Good	Good	Infrequent flooding
Stony alluvial land (Sl)	Poor	Good or fair	Flood hazard
Strip mine (Sm)	Poor	Good or fair	Stability; erodibility
Tyler (Ty)	Fair or poor	Poor	Seasonal high water table; instability
Very stony land-Brinkerton-Lickdale association (Vb).	Poor	Poor	High water table; seepage; frost heaving; instability.
Very stony land-Calvin complex (VcF)	Poor	Good or fair	Bedrock near surface; steep slopes
Very stony land-Dekalb complex (VdE, VdF)	Poor	Good or fair	Surface stones; shallowness to bedrock
Very stony land-Ernest complex (VeC, VeD)	Poor	Good or fair	Surface stones; seasonal high water table; seepage on pan.
Very stony land-Leetonia complex (VlC)	Poor	Good or fair	Surface stones; shallowness to bedrock
Very stony land-Wet land complex (VwB)	Poor	Fair or poor	Sandstone bedrock near surface; perched water table.
Wet terrace land (Wt)	Fair or poor	Poor	Seasonal high water table; bedrock near surface.

interpretations

Soil features affecting engineering practices—Continued		
Farm ponds		Agricultural drainage
Reservoir area	Embankment	
Small seepage losses	Instability	Slow permeability; seasonal high water table.
Sand layers; pervious substratum	Stable; pervious in foundations	Not needed.
Requires on-site investigation	Requires on-site investigation	Requires on-site investigation.
Flood hazard	Instability; erodibility; flood hazard	Flood hazard; slow permeability; high water table; outlet problems.
Flood hazard; pervious substratum	Permeability in some places; flood hazard	Not needed.
Possible sinks and solution channels in limestone bedrock.	Instability; erodibility	Not needed.
Possible porous limestone	Instability; high shrink-swell potential; erodibility.	Slow permeability; high water table.
Surface stones in places, may have pervious lenses in substratum.	Instability; surface stones in places	Slow permeability; surface stones in places; high water table.
Shallowness to bedrock; seepage	Fair stability	Not needed.
Depth to bedrock 2 to 4 feet; small seepage losses; surface stones in places.	Fair stability; surface stones in many areas.	Slow permeability; compact layer.
Rapid permeability; shallowness to sandstone bedrock.	Pervious material; surface stones in many areas.	Not needed.
Small seepage losses; stones in some areas	Instability in uppermost 2 feet of profile; stones in some areas.	Slow permeability; seasonal high water table.
Shallowness to bedrock; seepage	Fair stability	Not needed.
Rapid permeability; shallowness to sandstone bedrock.	Pervious material; surface stones in some areas.	Not needed.
Surface stones in some areas; sand lenses	Instability; surface stones in some areas	Slow permeability; high water table; stones in some areas.
Requires on-site investigation	Requires on-site investigation	Requires on-site investigation.
Small seepage losses; surface stones in places.	Instability; stones in places	Not needed.
May have sandy layers in substratum	Fair stability; seepage on top of pan	Slow permeability.
Rapid permeability; pervious layers in substratum.	Low shear strength	High water table; subsidence; outlet problems.
Sand lenses; stones in some places	Instability; surface stones in some places	Slow permeability; high water table; stones in some places.
Occasional sandy layers; flood hazard	Instability; flood hazard	Flood hazard.
Flood hazard; pervious substratum	Permeability in some places; flood hazard	Not needed.
Small seepage losses	Instability	Slow permeability; high water table.
Requires on-site investigation	Requires on-site investigation	Not needed.
Sandy layers; pervious substratum	Permeability in some places	Not needed.
Requires on-site investigation	Requires on-site investigation	Requires on-site investigation.
Requires on-site investigation	Requires on-site investigation	Requires on-site investigation.
Small seepage losses	Instability; erodibility	Seasonal high water table; slow permeability.
Surface stones; pervious layers	Instability; large stones	Drainage not practical because of stones.
Shallowness to bedrock; seepage; steep slopes; surface stones.	Surface stones; fair stability	Not needed.
Rapid permeability; shallowness to sandstone bedrock; surface stones.	Pervious material; surface stones	Not needed.
Stoniness	Requires on-site investigation	Not practical because of stones.
Rapidly permeable; shallowness to sandstone bedrock; surface stones.	Pervious material; surface stones	Not needed.
Shallowness to sandstone bedrock; pervious layers.	Pervious material; surface stones	Not practical because of stones.
Requires on-site investigation	Instability	Seasonal high water table; slow permeability.

TABLE 11.—*Engineering*

[Tests performed by Civil Engineering Department of West Virginia University in cooperation with West Virginia State Road Commission Highway Officials

Soil name and location of sample	Parent material	West Virginia University report No.	Depth	Horizon	Moisture-density data [1]	
					Maximum dry density	Optimum moisture
			Inches		*Lb. per cu. ft.*	*Percent*
Belmont very stony silt loam—						
Modal: Fernow Experimental Forest on Zero Trail from Big Springs Gap, Tucker County.	Interbedded limestone, sandstone, and shale (Greenbrier formation).	18	2 to 10	A2	96	24
		21	10 to 24	B21	112	16
		22	24 to 36	B22	105	21
Shallow: Fernow Experimental Forest, Big Springs Gap, Tucker County.	Siltstone (Greenbrier formation).	35	0 to 4	A1	88	29
		31	7 to 11	B2	99	23
		30	11 to 15	B3, C	111	15
Calvin channery silt loam—						
Modal: Fernow Experimental Forest, Wilson Hollow, Tucker County.	Sandstone and shale (Catskill formation).	25	1 to 6	A2	113	14
		24	6 to 15	B2	118	14
		16	15 to 35+	C	121	12
Shallow: 0.25 mile S. of Sugarland School, Tucker County.	Interbedded sandstone and shale (Catskill formation).	7	2 to 6	A2	109	16
		3	6 to 15	B2	*115*	*15*
		33	15 to 24+	C	130	11
Dekalb loam—						
Fine textured inclusion: 1.5 miles E. of Parsons along U.S. Highway 219.	Sandstone and siltstone (Conemaugh formation).	28	2 to 10	A3	94	23
		23	10 to 16	B	93	27
		4	16 to 22	C	*106*	*20*
Dekalb extremely stony loam—						
Modal: 4 miles E. of Parsons along U.S. Highway 219 near Canyon Rim road, Tucker County.	Sandstone and shale (Pottsville formation).	19	4 to 11	A3	93	25
		17	14 to 29	B21, B22	108	16
		6	40 to 50+	C	*116*	*14*
Coarse textured: Bickle Knob picnic area, Randolph County.	Sandstone (Pottsville formation).	2	4 to 11	A2	105	19
		10	11 to 29	B, C	*99*	*22*
Ernest silt loam—						
Modal: 1.9 miles N. of Roosevelt Park on U.S. Highway 33 and 30 feet S. of Otter Creek road, Randolph County.	Colluvium	20	2 to 6	A2	89	27
		27	6 to 16	B21	94	23
		1	37 to 57	B32m	*116*	*16*
Channery: 0.5 mile E. of U.S. Highway 219 on Route 90, 500 feet SE. of Thomas Reservoir, Tucker County.	Colluvium	32	2 to 5	A2	79	37
		8	5 to 14	B21	95	24
		13	31 to 46	B32m	107	20
Ernest extremely stony silt loam—						
Channery: 2 miles from U.S. Highway 219 on Canyon Rim road at entrance to game plot, Tucker County.	Colluvium	14	2 to 8	B1	84	33
		34	8 to 17	B21	101	23
		15	23 to 36+	B3mg	108	17
Gilpin channery silt loam—						
Modal: 1 mile W. of Parsons on Clover Run road, Tucker County.	Sandstone and shale (Chemung formation).	29	1 to 5	A2	115	15
		26	5 to 21	B2	117	11
		12	21 to 43	C	*118*	*13*
Shallow: 1 mile W. of Parsons, Tucker County.	Sandstone and shale (Chemung formation).	11	1 to 7	A3, B1	106	16
		9	7 to 15	B2	117	14
		5	15 to 28	C	*114*	*15*

[1] Based on the Moisture-density Relations of Soils Using 5.5-lb. Rammer and 12-in. Drop, AASHO Designation: T 99–57, Methods A and C (*2*). Values obtained by using Method A are italicized.

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

test data

and U.S. Department of Commerce, Bureau of Public Roads, in accordance with standard procedures of the American Association of State (AASHO)]

Mechanical analysis [2]											Liquid limit	Plasticity index	Classification	
Fragments 3 to 10 inches in diameter discarded in field sampling (estimate)	Percentage passing sieve [3]—						Percentage smaller than [3]—						AASHO	Unified [4]
	3-in.	¾-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
Percent														
	100	90	88	84	79	71	68	54	26	7	44	12	A-7-5(9)	ML.
	100	89	82	76	69	57	54	44	28	17	31	10	A-4(4)	ML-CL.
		100	95	82	78	68	64	52	35	27	44	20	A-7-6(11)	CL.
	100	97	94	91	88	80	78	66	34	21	60	17	A-7-5(15)	MH.
	100	98	91	88	86	77	74	60	28	15	45	12	A-7-5(10)	ML.
	100	80	49	40	30	26	25	24	11	5	34	9	A-2-4(0)	GM-GC.
5	95	83	67	59	55	45	39	22	12	7	34	7	A-4(2)	GM.
10	90	76	56	48	44	41	40	27	15	8	29	8	A-4(2)	GM-GC.
15	85	57	41	35	31	26	25	17	10	5	31	7	A-2-4(0)	GM-GC.
	100	96	85	80	62	48	44	30	13	5	34	6	A-4(3)	SM.
	100	87	68	55	39	31	29	24	18	13	27	5	A-2-4(0)	SM-SC.
10	90	69	39	28	23	21	19	14	9	6	29	7	A-2-4(0)	GM-GC.
	100	92	80	73	65	63	57	41	21	15	56	13	A-7-5(9)	MH.
	100	86	80	73	70	66	63	42	23	14	51	11	A-7-5(8)	MH.
5	95	91	83	76	64	54	49	28	11	5	33	7	A-4(5)	ML.
	100	83	78	72	66	55	53	29	13	7	51	8	A-5(5)	MH.
10	90	71	61	54	51	49	48	32	14	7	40	12	A-6(5)	ML.
	100	89	72	60	53	41	36	21	10	4	27	4	A-4(1)	SM.
15	85	65	53	47	38	11	8	3	1	0	51	13	A-2-7(0)	SM.
[5] 30	40	35	24	17	12	3	2	1	0	0	60	15	A-2-7(0)	SW-SM.
5	95	93	86	81	79	71	67	55	32	22	60	14	A-7-5(14)	MH.
	100	94	88	82	80	71	68	56	33	20	56	11	A-7-5(10)	MH.
5	95	86	70	56	41	30	28	18	10	7	29	7	A-2-4(0)	SM-SC.
15	85	82	75	70	68	61	60	51	34	21	90	26	A-7-5(18)	MH.
15	85	77	74	71	70	65	61	52	29	14	72	28	A-7-5(19)	MH.
		100	94	87	78	68	65	52	32	4	35	7	A-4(7)	ML.
5	95	95	95	92	90	76	69	48	28	12	56	8	A-5(11)	MH.
5	95	91	86	84	82	68	66	56	37	26	51	17	A-7-5(12)	MH.
		100	98	91	83	76	74	65	42	29	38	13	A-6(9)	ML-CL.
	100	86	67	57	54	51	46	31	14	6	43	8	A-5(3)	ML.
	100	71	44	38	30	28	27	26	16	8	34	9	A-2-4(0)	GM-GC.
10	90	81	59	40	30	26	24	20	10	4	32	8	A-2-4(0)	SM-SC.
	100	89	76	70	66	62	60	46	19	9	40	10	A-4(5)	ML.
	100	92	73	60	51	48	45	35	18	10	36	11	A-6(3)	GM-GC.
15	85	57	48	38	30	26	25	17	7	3	32	5	A-2-4(0)	GM.

[2] Based on total material. Laboratory test data corrected for amount discarded in field sampling.

[4] SCS and BPR have agreed that all soils having plasticity indexes within 2 points of A-line are to be given a borderline classification. Examples of borderline classification obtained by this use are ML–CL and GM–GC.

[5] An additional 30 percent of this sample consisted of fragments larger than 10 inches and was also discarded before the sample was analyzed.

TABLE 12.—*Estimated degrees and kinds of limitation for development of recreational facilities*

["Slight" indicates few or no limitations; "moderate" indicates some limitations; and "severe" indicates serious limitations]

Soil series and map symbols	Picnic areas and campsites (tents)	Athletic fields and play areas (intensive use)	Sanitary facilities (filter fields)	Service building location (with basement)	Hiking trails
Albrights:					
AbB	Moderate: slow permeability in subsoil.	Moderate: slow permeability in subsoil.	Severe: slow permeability in subsoil.	Moderate: slow permeability in subsoil; seeps.	Moderate: slow permeability in subsoil; seeps.
AbC	Moderate: slow permeability in subsoil; slopes.	Severe: slow permeability in subsoil; slopes.	Severe: slow permeability in subsoil; slopes.	Moderate: slow permeability in subsoil; seeps.	Moderate: slow permeability in subsoil; seeps.
Allegheny:					
AgB	Slight	Moderate: slopes	Slight	Slight	Slight.
AgC	Moderate: slopes	Severe: slopes	Moderate: slopes	Moderate: slopes	Slight or moderate: slopes.
Alluvial land: [1]					
Al	([1])	([1])	([1])	([1])	([1]).
Atkins:					
At	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table.
Barbour:					
Ba	Moderate: flood hazard.	Moderate: flood hazard.	Severe: flood hazard.	Severe: flood hazard.	Slight.
Bb	Slight	Slight	Slight [2]	Slight	Slight.
Bc	Severe: flood hazard.	Moderate: gravelly surface.	Severe: flood hazard.	Severe: flood hazard.	Slight.
Bd	Slight	Moderate: gravelly surface.	Slight [2]	Slight	Slight.
Bf	Severe: flood hazard.	Severe: cobbly surface; flood hazard.	Severe: flood hazard.	Severe: flood hazard.	Moderate: cobbly surface.
Belmont:					
BmB	Slight	Moderate: slopes	Moderate: depth to bedrock; slopes.	Moderate: depth to bedrock.	Slight.
BmC	Moderate: slopes	Severe: slopes	Severe: slopes	Slight to moderate: slopes.	Slight to moderate: slopes.
BmD, BmE	Severe: slopes	Severe: slopes	Severe: slopes	Severe: slopes	Severe: slopes.
BnC	Moderate: slopes; stones.	Severe: slopes; stones.	Severe: slopes; stones.	Slight to moderate: slopes; stones.	Slight to moderate: slopes; stones.
BnD, BnE, BnF	Severe: slopes; stones.	Severe: slopes; stones.	Severe: slopes; stones.	Severe: slopes; stones.	Severe: slopes; stones.
Biago:					
Bo, Bp	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Brinkerton:					
BrA, BrB, BrC	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
BsC	Severe: high water table; stones.	Severe: high water table; stones.	Severe: high water table; stones.	Severe: high water table; stones.	Severe: high water table; stones.
Calvin:					
CaB, ChB	Slight	Moderate: slopes	Moderate: depth to bedrock; slopes.	Moderate: depth to bedrock.	Slight.
CaC, CaC3, ChC	Moderate: slopes	Severe: slopes	Severe: slopes; depth to bedrock.	Moderate: depth to bedrock.	Slight to moderate: slopes.
CaD, CaD3, ChD	Severe: slopes	Severe: slopes	Severe: slopes	Moderate: depth to bedrock; slopes.	Moderate: slopes.
CaE, CaE3, CaF, ChE, ChF	Severe: slopes	Severe: slopes	Severe: slopes	Severe: depth to bedrock; slopes.	Severe: slopes.
CnC, CnE, CnF	Severe: slopes; stones.	Severe: slopes; stones.	Severe: slopes; stones.	Severe: slopes; stones.	Moderate to severe: slopes; stones.
Cookport:					
CoB, CsB	Moderate: slow permeability in subsoil.	Moderate: slow permeability in subsoil; stones; slopes.	Severe: slow permeability in subsoil.	Moderate: slow permeability in subsoil; seeps.	Moderate: slow permeability in subsoil; seeps.
Dekalb:					
DaB, DkB	Slight	Moderate: slopes; depth to bedrock and coarse fragments.	Severe: depth to bedrock.	Severe: depth to bedrock.	Slight.
DaC, DkC	Moderate: slopes	Severe: slopes; depth to bedrock.	Severe: slopes; depth to bedrock.	Severe: depth to bedrock.	Slight to moderate: slopes.

See footnotes at end of table.

TABLE 12.—*Estimated degrees and kinds of limitation for development of recreational facilities*—Continued

["Slight" indicates few or no limitations; "moderate" indicates some limitations; and "severe" indicates serious limitations]

Soil series and map symbols	Picnic areas and campsites (tents)	Athletic fields and play areas (intensive use)	Sanitary facilities (filter fields)	Service building location (with basement)	Hiking trails
DaD, DaE, DaF	Severe: slopes	Severe: slopes	Severe: slopes	Severe: slopes; depth to bedrock.	Moderate to severe: slopes.
DmC	Severe: stones	Severe: stones; slopes.	Severe: slopes; depth to bedrock.	Severe: depth to bedrock; stones.	Moderate: slopes; stones.
DmE, DmF	Severe: slopes; stones.	Severe: slopes; stones.	Severe: slopes; stones.	Severe: slopes; stones.	Severe: slopes; stones.
Ernest:					
EnB	Moderate: slow permeability in subsoil.	Moderate: slow permeability in subsoil; slopes.	Severe: slow permeability in subsoil.	Moderate: slow permeability in subsoil; seeps.	Moderate: slow permeability in subsoil; seeps.
EnC, EnD	Moderate: slow permeability in subsoil.	Severe: slow permeability in subsoil; slopes.	Severe: slow permeability in subsoil.	Moderate: slow permeability in subsoil; seeps.	Moderate: slow permeability in subsoil; seeps.
ErC, ErD	Severe: slow permeability in subsoil; stones.	Severe: slopes; slow permeability in subsoil; stones.	Severe: slow permeability in subsoil; stones.	Moderate: slow permeability in subsoil; stones; seeps.	Moderate: slow permeability in subsoil; slopes; stones; seeps.
Gilpin:					
GcB	Slight	Moderate: slopes; coarse fragments.	Severe: depth to bedrock.	Moderate: depth to bedrock.	Slight.
GcC, GcC3	Moderate: slopes	Severe: slopes	Severe: slopes; depth to bedrock.	Moderate: depth to bedrock.	Slight to moderate: slopes.
GcD, GcD3	Severe: slopes	Severe: slopes	Severe: slopes; depth to bedrock.	Moderate to severe: slopes; depth to bedrock.	Moderate to severe: slopes.
GcE, GcE3, GcF, GcF3.	Severe: slopes	Severe: slopes	Severe: slopes; depth to bedrock.	Severe: slopes; depth to bedrock.	Severe: slopes.
Leetonia:					
LcB	Slight	Moderate: slopes; stone fragments.	Severe: depth to bedrock.	Severe: depth to bedrock.	Slight.
LcC	Moderate: slopes	Severe: slopes	Severe: slopes; depth to bedrock.	Severe: depth to bedrock.	Slight to moderate: slopes.
Lickdale:					
LdA, LsA	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Made land:					
Ma	(3)	(3)	(3)	(3)	(3).
Meckesville:					
McB	Moderate: slow permeability in subsoil.	Moderate: slopes	Severe: slow permeability in subsoil.	Moderate: slow permeability in subsoil; seeps.	Moderate: slow permeability in subsoil; seeps.
McC	Moderate: slopes	Severe: slopes	Severe: slopes; slow permeability subsoil.	Moderate: slopes; seeps.	Moderate: slopes; seeps.
MkC	Moderate: slopes; stones.	Severe: slopes; stones.	Moderate to severe: slopes; stones.	Moderate: slopes; stones; seeps.	Moderate: slopes; stones; seeps.
MkD, MkE	Severe: slopes; stones.	Severe: slopes; stones.	Severe: slopes; stones.	Severe: slopes; stones.	Severe: slopes; stones.
Monongahela:					
MoA	Moderate: slow permeability in subsoil.	Moderate: slow permeability in subsoil.	Severe: slow permeability in subsoil.	Moderate: slow permeability in subsoil; seeps.	Moderate: slow permeability in subsoil; seeps.
MoB	Moderate: slow permeability in subsoil.	Moderate: slopes; slow permeability in subsoil.	Severe: slow permeability in subsoil.	Moderate: slow permeability in subsoil; seeps.	Moderate: slow permeability in subsoil; seeps.
MoC	Moderate: slow permeability in subsoil.	Severe: slopes; slow permeability in subsoil.	Severe: slow permeability in subsoil.	Moderate: slow permeability in subsoil; seeps.	Moderate: slow permeability in subsoil; seeps.
Muck and Peat:					
Mp	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Nolo:					
BsC	Severe: high water table; stones.	Severe: high water table; stones.	Severe: high water table; stones.	Severe: high water table; stones.	Severe: high water table; stones.
NoA, NoB	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.

See footnotes at end of table.

TABLE 12.—*Estimated degrees and kinds of limitation for development of recreational facilities*—Continued

["Slight" indicates few or no limitations; "moderate" indicates some limitations; and "severe" indicates serious limitations]

Soil series and map symbols	Picnic areas and campsites (tents)	Athletic fields and play areas (intensive use)	Sanitary facilities (filter fields)	Service building location (with basement)	Hiking trails
Philo:					
Ph	Severe: flood hazard; seasonal high water table.	Moderate: seasonal high water table.	Severe: flood hazard; seasonal high water table.	Severe: flood hazard; seasonal high water table.	Moderate: seasonal high water table.
Pope:					
Ba	Moderate: flood—hazard.	Moderate: flood—hazard.	Severe: flood hazard.	Severe: flood hazard.	Slight.
Bb	Slight	Slight	Slight [1]	Slight	Slight.
Bc	Severe: flood hazard.	Moderate: gravelly surface.	Severe: flood hazard.	Severe: flood hazard.	Slight.
Bd	Slight	Moderate: gravelly surface.	Slight [1]	Slight	Slight.
Bf	Severe: flood hazard.	Severe: cobbly surface; flood hazard.	Severe: flood hazard.	Severe: flood hazard.	Moderate: cobbly surface.
Purdy:					
Pu	Severe: high water table; slow permeability.	Severe: high water table; slow permeability.	Severe: high water table; slow permeability.	Severe: high water table; slow permeability.	Severe: high water table; slow permeability.
Sandstone rubble land:					
Sa	Severe: rubble material.	Severe: rubble material.	Severe: rubble material.	Severe: rubble material.	Severe: rubble material.
Sequatchie:					
Se	Slight	Slight	Slight to moderate; infrequent flooding.	Slight to moderate; infrequent flooding.	Slight.
Stony alluvial land:					
Sl	Severe: flood hazard; stones.	Severe: flood hazard; stones.	Severe: flood hazard.	Severe: flood hazard; stones.	Severe: flood hazard; stones.
Strip mine:					
Sm	[3]	[3]	[3]	[3]	[3].
Tyler:					
Ty	Severe: high water table; slow permeability.	Severe: high water table; slow permeability.	Severe: high water table; slow permeability.	Severe: high water table; slow permeability.	Severe: high water table; slow permeability.
Very stony land:					
Vb	Severe: high water table; slow permeability; many stones and boulders.	Severe: high water table; slow permeability; many stones and boulders.	Severe: high water table; slow permeability; many stones and boulders.	Severe: high water table; slow permeability; many stones and boulders.	Severe: high water table; slow permeability; many stones and boulders.
VcF	Severe: slopes; many stones.	Severe: slopes; many stones.	Severe: slopes; many stones.	Severe: slopes; many stones.	Severe: slopes; many stones.
VdE, VdF	Severe: slopes; many stones and boulders.	Severe: slopes; many stones and boulders.	Severe: slopes; many stones and boulders.	Severe: slopes; many stones and boulders.	Severe: slopes; many stones and boulders.
VeC, VeD	Severe: slow permeability in subsoil; many stones and boulders.	Severe: slow permeability in subsoil; many stones and boulders.	Severe: slow permeability in subsoil; many stones and boulders.	Severe: slow permeability in subsoil; many stones and boulders.	Severe: slow permeability in subsoil; many stones and boulders.
VlC	Severe: many stones and boulders.	Severe: many stones and boulders.	Severe: many stones and boulders.	Severe: many stones and boulders.	Severe: many stones and boulders.
VwB	Severe: slow permeability; many stones and boulders.	Severe: slow permeability; many stones and boulders.	Severe: slow permeability; many stones and boulders.	Severe: slow permeability; many stones and boulders.	Severe: slow permeability; many stones and boulders.
Wet terrace land:					
Wt	Severe: high water table; slow permeability in subsoil.	Severe: high water table; slow permeability in subsoil.	Severe: high water table; slow permeability in subsoil.	Severe: high water table; slow permeability in subsoil.	Severe: high water table; slow permeability in subsoil.

[1] Variable texture; flood hazard; on-site investigation needed.
[2] Possible pollution hazard to nearby streams, springs on shallow wells.
[3] On-site investigation required.

ton soils are examples of poorly drained soils that have little space for water storage.

The Gilpin soils, which are moderately deep and are underlain by dense, platy shale, are examples of well-drained soils that have only low or moderate capacity for water storage. Soils underlain by shale generally have many drainageways and are subject to excessively rapid runoff. The Cookport and Ernest soils are deep or very deep, but they have only low or moderate capacity for water storage because a dense pan 18 to 24 inches below the surface limits the storage space. Flash floods resulting from overflow of streams that drain the Gilpin, Cookport, and Ernest soils are common.

Soils of the Belmont and Meckesville series and the Calvin soils, neutral substratum, have high or very high capacity for water storage. The Calvin soils other than those that have a neutral substratum are shallower, coarser textured, and more stony, and their capacity for water storage is medium.

The number of springs in an area is an indication of how well water moves through the soils. Springs are not abundant anywhere in the Tucker-Randolph Area, but they are more common in soils derived from a mixture of sandstone and shale than in soils derived mainly from shale. They are most numerous in soils that have high or very high capacity for water storage.

A study of the watersheds of the Fernow Experimental Forest (*13*) provides a basis for some general interpretations pertinent to watershed management, by soil associations. The soils in the watersheds studied are mainly of the Calvin series, which make up association 3.

Following are the nine associations that are shown on the general soil map and a discussion of their significance to watershed management.

Association 1 (Gilpin).—This is a steep or very steep upland area. The water storage capacity of the soils is low to medium, and surface runoff is rapid. The lowlands are flooded in wet periods, and streamflow is low most of the summer. The slopes are steeper and the soils somewhat shallower than those in association 3. Erosion resulting from logging operations has more adverse effect on the quality of water in this association than in association 3.

Association 2 (Barbour-Pope-Sequatchie).—This association is on bottom lands and terraces. The water storage capacity of the soils ranges from high to low, and surface runoff is medium or slow. About half the acreage is saturated for 6 to 8 months of the year. Some parts are flooded frequently in spring and in fall. The quality of the water in the streams is adversely affected by erosion resulting from logging activities on the adjacent Gilpin and Calvin soils of associations 1 and 3.

Associations 3 (Calvin) and 5 (Dekalb-Gilpin).—In these associations, water-control structures are needed to reduce the hazard of erosion after logging and to prevent the formation of a partial erosion pavement. Skidroads and trails should be so located that they will not add to the erosion hazard. Sedimentation is also likely to cause deterioration of the quality of the water. Water-control structures, particularly those that contribute to cross drainage, help to reduce this hazard.

Association 4 (Dekalb-Calvin-Belmont).—This is a steep upland area. The water-storage capacity of the soils is high in two-thirds of the acreage and medium in the rest. The capacity is higher than that of the soils of associations 1 and 3, and runoff is less rapid than in associations 1 and 3. The Belmont and Calvin soils are more susceptible to compaction and erosion than the Calvin soils of association 3. They need more care to control erosion during logging operations and to reduce sedimentation in streams. Because of the lower content of coarse fragments, erosion continues for a longer period after logging on Belmont soils than on the soils of association 3. The Dekalb soils have a higher content of coarse fragments; therefore, the period of erosion after logging is somewhat shorter.

Association 6 (Very stony land-Dekalb).—In this association the slopes are steep, and 40 to 90 percent of the surface is covered with stones and boulders. The water-storage capacity of the soils is medium or high. The soils are generally moderately deep or deep and are rapidly permeable. Runoff is very rapid unless the forest cover is well managed. The hazard of erosion and sedimentation after logging is moderate or slight.

Association 7 (Dekalb-Brinkerton).—The water-storage capacity of the soils of this association is medium or low. The Dekalb soils have a more permeable subsoil than the Calvin soils and are less likely to be damaged by erosion after logging. Erosion is a serious hazard on the Brinkerton soils, and contributes directly to sedimentation in adjacent streams.

Association 8 (Very stony land-Ernest-Brinkerton-Leetonia).—The water-storage capacity of the soils in this association ranges from medium to very low but is generally low. The Ernest soils have medium or rapid surface runoff because of steep slopes, an extremely stony surface, and an impeding layer at a depth of 18 to 24 inches. The Brinkerton soils are stony and poorly drained. Although the Leetonia soils are extremely stony at the surface, they have medium surface runoff because the subsoil is rapidly permeable.

In the Red Creek watershed, the water content of the soils is near field capacity most of the year, and consequently any significant amount of precipitation is likely to cause a flash flood.

Association 9 (Wet terrace land-Blago-Dekalb).—Approximately 45 percent of this association consists of soils that have a high water table and are saturated for long periods each year, have rapid or very rapid surface runoff, and consequently low or very low additional water storage capacity (*13*). The rest of the association consists mainly of the Dekalb and Calvin soils that have medium to high storage capacity and medium surface runoff.

The Blago soils and Wet terrace land recover more slowly after logging than the Calvin soils because they erode more readily and have a lower content of coarse fragments. They also have a higher potential for sedimentation damage to adjacent streams.

Formation and Classification of the Soils

Soil is a natural body on the earth's surface. It contains mineral and organic matter that supports plants

or is capable of supporting them. It is physically and chemically different from the underlying bedrock or unconsolidated material. As a result of the active forces of the environment, distinct layers, or horizons, form from weathered parent material. Each horizon acquires physical and chemical characteristics, including texture, structure, color, consistence, and reaction, that differentiate it from the horizons above and below. Collectively, these horizons are called a soil profile.

A typical soil profile in the Tucker-Randolph Area has O, A, B, and C horizons. The O horizon is at the surface and consists of organic matter in various stages of decomposition. As the organic matter in the form of original tissue decomposes, it mixes with underlying mineral matter and thus forms the A1 horizon. As soluble material is removed from the upper part of the A1 horizon, a lighter colored, or A2, horizon forms. Below the A2 horizon a stronger (brighter) colored subsoil, or B horizon, develops. This horizon may or may not be finer textured than the A horizon. Its stronger color results from the alteration of minerals in place and the accumulation of material leached from the A horizon. The B horizon blends with the underlying unconsolidated material, or C horizon, which may be either like or unlike the material from which the A and B horizons developed. The C horizon is only slightly affected by soil-forming processes and is not a part of the true soil, or solum.

Formation of the Soils

The environmental factors mainly responsible for soil formation are climate, the biological complex, parent material, relief or topography, and time. Each of these factors is discussed and some of its relationships to the kinds of soils in the survey Area are presented in the following paragraphs.

Climate

The climate varies somewhat from one part of the survey Area to another part, but it is generally cool and humid. The amount of precipitation is fairly large, and enough moisture percolates through the soils to leach out the soluble bases and make the soils acid. Some bases are returned to the surface layer by the litter from the plant cover but not enough to affect the tendency toward acidity. Even in soils derived from limestone and calcareous shale, the surface layer is medium acid.

Differences in precipitation and temperature account for some differences among the soils. For example, the climate on northeastern aspects differs from that on southwestern aspects. The orientation of an area toward the sun affects precipitation and temperature, which in turn govern plant growth and thus influence soil-forming processes. The effect is most noticeable in the thickness of the A1 horizon. The A1 horizon of a Gilpin soil on a north-facing slope is commonly 2 to 3 inches thick, but that of a Gilpin soil on a south-facing slope is commonly only ½ inch to 2 inches thick. Because other environmental factors are generally similar, this difference in thickness is attributed to climate as influenced by aspect.

Biologic complex

The biologic complex includes all physical and chemical interactions of living and dead organisms, both plants and animals. The nature of the complex depends to a considerable degree on climate.

The relationship of vegetation to the formation of soil is complex and has many interactions with other factors of the environment. Important in soil formation are the products released during the decomposition of litter. The litter of conifers differs from that of hardwoods. Generally, hardwood litter contains more bases. The organic acids released from conifer litter are more effective in mineral weathering. The bases from the hardwood litter tend to neutralize these organic acids and to diminish their effectiveness in weathering.

An example of the effect of vegetation on the formation of soil and its interaction with parent material is the A2 horizon that has formed in the Leetonia soils of the Canaan Mountain area. This horizon is light gray. The light color results from a concentration of quartz, which is highly resistant to weathering, and the loss of dark-colored minerals through weathering. Organic acids released by the litter from conifers and beech trees were probably important in weathering the dark-colored minerals.

The Dekalb soils in this same general area have a thin, discontinuous, light-colored A2 horizon, particularly under pure stands of conifers and stands of conifers and ericaceous plants.

The organic-matter content of most soils of this survey Area is less than 1 percent, except in the surface layer, but in marshy areas of Canaan Valley, deep deposits of organic matter have accumulated. The water table is high, and the water has prevented the decomposition of the organic matter; consequently, muck and peat have formed.

Parent material

The parent material of the soils in this survey Area weathered from local acid shale and sandstone, calcareous shale, or limestone. Some of the soils developed in material weathered from underlying bedrock (residual material); others developed in material that had been deposited on the lower slopes (colluvial material) and on flood plains and stream terraces (alluvial material). These local materials have been modified in places by deposition of windblown material (see Laboratory Data, page 68).

The texture of a soil is closely related to the characteristics of the underlying bedrock or of the source material from which the colluvial or alluvial material was derived. Shale bedrock or colluvium that was derived from shale tends to weather to fine-textured parent material. The gently sloping, fine-textured Nolo and Brinkerton soils developed in fine-textured parent material. As a result of their fine texture, internal drainage is restricted and drainage is generally poor. The gently sloping Leetonia soils developed in medium-textured to moderately coarse textured parent material and are excessively drained.

Mineral composition is another characteristic of parent material that affects soil formation. Most of the soils of the Area developed in material weathered from highly

siliceous shale and sandstone. Quartz and other forms of silica are the dominant minerals. Also included are some iron-bearing minerals, but only a small amount of the minerals, such as calcium and magnesium, that supply plant nutrients. The Gilpin and Dekalb soils developed in material that is dominantly silica, and they are well drained and yellowish brown and are moderately low in natural fertility. In contrast, the Belmont soils developed in material weathered from calcareous shale and limestone, and they are brown to reddish brown and are moderately high in natural fertility. Their surface layer is medium acid, and the lower subsoil is nearly neutral. Because of the higher natural fertility, micro-organisms are more numerous in the Belmont soils than in the Gilpin or the Dekalb soils, and the forest on the Belmont soils is more vigorous and of different composition than that in the other soils. The Belmont soils typically have a layer of granular mull humus; the Gilpin and Dekalb soils typically have a thin layer of duff mull (mull-mor transition), which suggests less micro-organism activity and a different kind of leaf litter.

The soils of the flood plains and stream terraces developed in alluvium that washed from all parts of the watershed. This alluvial material includes a mixture of acid material and calcareous material derived from sedimentary rocks along small streams. In the large valleys, such as the valley of the Cheat River, the material is well sorted into layers, in each of which the particles are fairly uniform in size.

On the flood plains, material of different textures has been deposited according to a general pattern. Typically there is, next to the river, a low natural ridge (levee) of fine sandy loam. The flood-plain deposits farther from the river consist of finer textured material (silt loam or silty clay loam). Fine-textured material (clay) is deposited in the quiet water of natural impoundments on the flood plains. The properties of the soils in various positions on the flood plains are different because of the differences in the texture of the alluvial material.

Relief

The shape of the land surface and the position of the parent material have influenced soil development in this survey Area. In mountainous areas the aspect of slopes modifies the effect of climate. Natural erosion is more rapid in mountainous areas than in nearly level areas. It removes soil material, which is then redeposited on the surface of soils that developed in colluvial or alluvial material. This process results in truncated soils in eroded areas and built-up soils in areas of deposition (*11*). Also, the gradual downhill movement of all unconsolidated materials in mountainous areas tends to mix the materials in the soil profile. As a result, the characteristics of soils in mountainous areas are not so clearly expressed as those of soils in gently sloping areas. For example, horizon characteristics are weakly expressed in Gilpin soils that have slopes of 40 to 65 percent, but horizon characteristics are evident in Gilpin soils that have slopes of 3 to 10 percent.

The position of the parent material in relation to ground water is important in soil development. Soils that form in material that is saturated for extended periods become mottled. Examples of soils that have mottling are the Cookport, Ernest, Nolo, and Brinkerton.

A group of soils that developed in similar parent material but that are different in characteristics because of differences in relief and drainage is called a catena. An example in this survey Area is the Dekalb-Cookport-Nolo catena. The Dekalb soils are on the higher part of the slope and are well drained. The Cookport soils are on the lower part of the slope where the gradient is less; they are moderately well drained and are mottled at a depth of about 20 inches. The Nolo soils are in nearly level or slightly concave areas on uplands; they are poorly drained and are mottled to the surface.

Time

The rate at which soil profiles develop in the various soils of the survey Area is not constant. It varies with differences in relief and parent material in limited areas where both the climate and the biologic complex are fairly uniform. Soil characteristics develop more rapidly in coarse-textured, highly siliceous parent material than in fine-textured parent material that contains a wider variety of minerals.

The relative age of a soil may be measured by the thickness of the solum, and the degree of horizonation. For example, the Belmont soils are mature, and they have a well-developed profile, distinct horizons, and a thick solum. In steep areas near the town of Benbush, the mixing of materials caused by relief keeps the soils in a youthful stage of development, compared with mature soils in gently sloping areas. Parent material, climate, and the biologic complex are essentially uniform within this limited area, but relief has altered the effect of time on development of the profile.

Related to the age of soils are the stages through which soil material passes as it is transformed from parent material to a well-developed soil profile. The soils of the Barbour, Pope, Sequatchie, and Allegheny series are examples of the sequence of these stages. The first stage in the formation of these soils is represented by freshly deposited alluvial material in which no profile development has taken place. In the second stage the profile has begun to develop, and an A1 horizon is present. This stage is represented by the Barbour and Pope soils. Progress between these two stages is very rapid; it takes 1 or 2 percent of the time required for full development of a profile, or the amount of time required for the establishment of vegetation. In the third stage, the soil shows, by differences in color, structure, and texture in the uppermost 30 inches, evidence of development of a B horizon. This stage is represented by the Sequatchie soils. Progress from the second to the third stage requires more time than progress from the first to the second stage. In the final stage, the profile is well developed and the A and B horizons are well defined. This stage is represented by the Allegheny soils.

Classification of the Soils

In the soil classification system currently used in the United States, the categories most commonly used are soil types, soil series, and great soil groups.

Soil types are made up of individual soils whose characteristics vary slightly within a predetermined range. They are classified according to both physical and chemi-

cal properties, such as the texture of the individual horizon, especially the A horizon; the structure, arrangement, and thickness of horizons; the reaction; and the mineralogy. The type is identified by adding the soil textural class, such as silt loam, to a proper name, such as Gilpin.

A soil series consists of a group of soil types that have similar profiles and that developed in similar parent material. The Pope series, for example, includes Pope fine sandy loam, Pope gravelly sandy loam, and Pope cobbly loamy sand. All of these soils developed in recently deposited alluvial material and have only an A1 horizon.

A great soil group is made up of a number of soil series. The soils in a group have the same number and the same kind of definitive horizons, but the horizons may not be of the same thickness or degree of development. Most series can be placed in one of the great soil groups. A few have some features of one great soil group and some features of another and are classified as intergrades between these groups. The name of the group that the series most nearly fits is listed first.

A classification system now being put into use defines classes in terms of observable or measurable properties of soils. This system is designed to accommodate all soils. It has six categories, like the earlier system, but the categories are slightly different. Beginning with the most inclusive, they are the order, the suborder, the great soil group, the subgroup, the family, and the series.

Table 13 shows the classification of the soil series of the Tucker-Randolph Area according to the 1938 system (*17*) and the tentative classification according to the Comprehensive System (*19*). Table 14 is a key to the soil series by physiographic position, parent material, and drainage class.

In the following pages the classification of the soils is discussed in terms of the system used before 1965.

Gray-Brown Podzolic soils

The Gray-Brown Podzolic great soil group is represented in this survey Area by the Belmont and Sequatchie soils. These soils developed under mixed stands of native mesophytic hardwoods. The humus in undisturbed areas is typically a medium mull.

The O1 and O2 horizons are made up of undecomposed and decomposed litter. The A1 horizon is dark brown and about 2 to 3 inches thick, and the A2 horizon is slightly lighter colored. The B horizon is brighter colored (brown or reddish brown) than the A horizon, and it is finer textured (more clayey) and has weak to moderate subangular blocky structure.

The soils in this group have a relatively high base status, but the subsoil is typically medium acid or slightly acid. The Sequatchie soils, which developed in alluvium on low terraces, have the minimum profile characteristics required for classification as Gray-Brown Podzolic soils.

Red-Yellow Podzolic soils

Red-Yellow Podzolic soils have a thin surface layer of litter and acid humus. They developed under deciduous, coniferous, or mixed forest. No soils in this survey Area fit the central concept of this group.

Red-Yellow Podzolic soils intergrading toward Gray-Brown Podzolic soils.—The Gilpin, Allegheny, Ernest, Albrights, Cookport, Meckesville, and Monongahela soils are Red-Yellow Podzolic soils that have some characteristics of Gray-Brown Podzolic soils. These soils developed on dry sites under an oak-chestnut forest and on moist sites under mixed stands of mesophytic trees. The humus on dry sites consists of thin duff mull and that on moist sites of fine mull.

The O1 and O2 horizons are 1 to 3 inches thick, depending upon the season and the site. On dry sites, the A1 horizon is dark brown and 1 inch thick and the A2 horizon is brown to yellowish brown. On moist sites, the A1 horizon is 1 to 2 inches thick and the A2 horizon is brown to dark brown. The B horizon is yellowish brown and has weak to moderate subangular blocky structure. It is fined textured (more clayey) than the A horizon.

These soils are strongly acid or very strongly acid throughout the profile. The colors are those typical of Gray-Brown Podzolic soils.

Red-Yellow Podzolic soils intergrading toward Low-Humic Gley soils.—The Tyler soils are Red-Yellow Podzolic soils that have some characteristics of Low-Humic Gley soils. These soils are on terraces. They are nearly level, somewhat poorly drained, and strongly acid. The A horizon is dark grayish brown. The B horizon is strongly mottled and has a fragipan.

Sols Bruns Acides

The Sols Bruns Acides (*4*) are represented in this survey Area by the Dekalb and Calvin soils. These soils developed under oak-chestnut and northern hardwood forests. The humus is a thin duff mull.

The O1 and O2 horizons are 1 to 3 inches thick, depending upon the season and the site. The A1 horizon is very dark brown and 1 to 2 inches thick, and the A2 horizon is yellowish-brown and 6 to 8 inches thick. The B horizon is yellowish brown to strong brown and has weak subangular blocky structure.

The soils in this group have uniform texture throughout the solum and are strongly acid to extremely acid.

Podzols

The Podzol great soil group is represented in this survey Area by the Leetonia soils. These soils developed under northern hardwood and spruce-northern hardwood forests. The humus is a thin mor.

The O1 and O2 horizons are 1 to 2 inches thick and are made up of mosses and litter from trees. The A2 horizon is pinkish-gray and about 6 to 8 inches thick. The B horizon is strong brown. At the boundary between the A2 and B horizons there is typically an irregular horizon (B2h horizon) that is 1 to 2 inches thick and dark reddish brown or black. In some areas this irregular horizon is very firm and forms an ortstein.

Alluvial soils

The Alluvial great soil group is represented in this survey Area by the Barbour, Pope, and Philo soils. These soils developed in alluvium recently deposited along the streams. Only an A1 horizon has developed over stratified silt, sand, and gravel. The Philo soils are mottled below a depth of 17 inches.

TABLE 13.—*Soil series in the Tucker-Randolph Area classified according to two systems*

Soil series	Classification according to 1938 system		Probable classification according to Comprehensive System				
	Great group	Order	Family	Subgroup	Great group	Suborder	Order
Albrights	Red-Yellow Podzolic intergrading to Gray-Brown Podzolic.	Zonal.	Fine loamy, mixed, mesic.	Aquic Fragiudalfs.	Fragiudalfs	Udalfs	Alfisols.
Allegheny	Red-Yellow Podzolic intergrading to Gray-Brown Podzolic.	Zonal.	Fine loamy, mixed, mesic.	Alfic Normudults.	Normudults	Udults	Ultisols.
Atkins	Low-Humic Gley	Intrazonal.	Fine loamy, mixed, acid, mesic.	Fluventic Normaquepts.	Normaquepts	Aquepts	Inceptisols.
Barbour	Alluvial	Azonal.	Coarse loamy, mixed, acid, mesic.	Fluventic Dystrochrepts.	Dystrochrepts	Ochrepts	Inceptisols.
Belmont	Gray-Brown Podzolic.	Zonal.	Fine loamy, mixed, mesic.	Typic Normudalfs.	Normudalfs	Udalfs	Alfisols.
Blago	Humic Gley	Intrazonal.	Clayey, mixed, mesic.	Typic Umbraquults.	Umbraquults	Aquults	Ultisols.
Brinkerton	Low-Humic Gley	Intrazonal.	Fine loamy, mixed, mesic.	Typic Fragiaqualfs.	Fragiaqualfs	Aqualfs	Alfisols.
Calvin	Sols Bruns Acides.	Zonal.	Fine loamy over loamy skeletal, mixed, mesic.	Typic Dystrochrepts.	Dystrochrepts.	Ochrepts	Inceptisols.
Cookport	Red-Yellow Podzolic intergrading to Gray-Brown Podzolic.	Zonal.	Fine loamy, mixed, mesic.	Aquic Fragiudults.	Fragiudults	Udults	Ultisols.
Dekalb	Sols Bruns Acides.	Zonal.	Coarse loamy, mixed, mesic.	Typic Dystrochrepts.	Dystrochrepts.	Ochrepts	Inceptisols.
Ernest	Red-Yellow Podzolic intergrading to Gray-Brown Podzolic.	Zonal.	Fine loamy, mixed, mesic.	Aquic Fragiudults.	Fragiudults	Udults	Ultisols.
Gilpin	Red-Yellow Podzolic intergrading to Gray-Brown Podzolic.	Zonal.	Fine loamy, mixed, mesic.	Alfic Normudults.	Normudults	Udults	Ultisols.
Leetonia	Podzols	Zonal.	Coarse loamy, siliceous, mesic.	Entic Normorthods.	Normorthods	Orthods	Spodosols.
Lickdale	Humic Gley	Intrazonal.	Fine loamy, mixed, mesic.	Typic Umbraquults.	Umbraquults	Aquults	Ultisols.
Meckesville	Red-Yellow Podzolic intergrading to Gray-Brown Podzolic.	Zonal.	Fine loamy, mixed, mesic.	Typic Fragiudults.	Fragiudults	Udults	Ultisols.
Monongahela	Red-Yellow Podzolic intergrading to Gray-Brown Podzolic.	Zonal.	Fine silty, mixed, mesic.	Typic Fragiudults.	Fragiudults	Udults	Ultisols.
Muck and Peat	Bog	Intrazonal.	Unclassified	Unclassified	Unclassified	Unclassified.	Histosols.
Nolo	Low-Humic Gley	Intrazonal.	Fine loamy, mixed, mesic.	Aquic Fragiudults.	Fragiudults	Udults	Ultisols.
Philo	Alluvial	Azonal.	Coarse loamy, mixed, acid, mesic.	Aquic Udifluvents.	Udifluvents	Fluvents	Entisols.
Pope	Alluvial	Azonal.	Coarse loamy, mixed, acid, mesic.	Typic Udifluvents.	Udifluvents	Fluvents	Entisols.
Purdy	Low-Humic Gley	Intrazonal.	Unclassified	Typic Udifluvents.	Fragiaquults	Aquults	Ultisols.
Sequatchie	Gray-Brown Podzolic.	Zonal.	Unclassified	Alfic Normudults.	Normudults	Udults	Ultisols.
Tyler	Red-Yellow Podzolic intergrading to Low-Humic Gley.	Intrazonal.	Unclassified	Typic Udifluvents.	Fragiaquults	Aquults	Ultisols.

TABLE 14.—*Key to soil series—physiographic position, parent material, and drainage class*

Physiographic position and parent material	Excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
Uplands:						
Acid gray coarse sandstone and conglomerate	Leetonia					
Acid gray sandstone and siltstone		Dekalb	Cookport		Nolo	Lickdale.
Acid gray siltstone and shale		Gilpin				
Acid red shale and sandstone		Calvin				
Calcareous shale, sandstone, and limestone		Belmont				
Lower slopes:						
Colluvial material derived from acid gray and red shale, sandstone, and calcareous shale, sandstone, and limestone.		Meckesville	Albrights			
Colluvial material derived from acid shale and sandstone.			Ernest		Brinkerton	Lickdale.
Flood plains and stream terraces:						
Recent alluvium		Barbour and Pope.	Philo		Atkins	Atkins.
Older alluvium on second bottoms and low stream terraces.		Sequatchie				
Medium-textured alluvium on stream terraces		Allegheny	Monongahela.			
Fine-textured alluvium on stream terraces				Tyler	Purdy	Blago.
Swamps:						
Organic material						Muck and peat.

Low-Humic Gley soils

The Low-Humic Gley great soil group is represented in this survey Area by the Atkins, Brinkerton, Nolo, and Purdy soils. These soils are poorly drained or somewhat poorly drained. They have a thin dark-brown or black A1 horizon over gray soil material that is prominently mottled with yellowish brown or strong brown. The Atkins soils developed in alluvium, the Nolo soils in upland flats or depressions, the Brinkerton soils in colluvium at the base of slopes and at the head of streams, and the Purdy soils in material deposited by slack water.

Humic Gley soils

The Humic Gley great soil group is represented in this Area by the Lickdale and Blago soils. These soils are very poorly drained. They consist of an accumulation of organic matter, as much as 12 inches thick, over the B horizon in swampy areas and over a gray parent material in other areas.

Bog soils

The Bog great soil group is represented in this survey Area by Muck and Peat, which consists of an accumulation of organic matter, more than 12 inches thick, in swampy areas.

Laboratory Data

This section includes laboratory data and profile descriptions for selected soils. The physical and chemical properties of these soils are shown in tables 15 and 16. The data are helpful in determining the characteristics and classification of these soils and in understanding their genesis. They are also useful for making interpretations for use and management as well as for verifying field determinations.

The soils from which samples were taken are representative of their series. Samples were collected from each horizon in the soil profile. All material less than 3 inches in diameter was air-dried, crushed, and sieved in the laboratory. The data in table 16 under the heading "Coarse fragments" shows the percentage (by weight) of air-dry material that is between 3 inches and 2 millimeters in diameter. All other data, including bulk density, in tables 15 and 16 are based on the fine earth (less than 2 millimeters in diameter) fraction.

Particle-size distribution was determined by the pipette method (*7*, *8*). Organic carbon was determined by wet combustion (*12*). Total nitrogen was determined by the Kjeldahl method (*3*) and free iron by a modification of Deb's method (*6*). Exchangeable cations and exchange capacity were determined by a method developed by Peech, Alexander, Dean, and Reed (*10*). Extractable aluminum was determined by a method developed by Yuon (*24*).

Bulk density and moisture held at a tension of ⅓ atmosphere were determined by using natural soil clods coated with plastic. Moisture held at a tension of 15 atmospheres was determined by using a pressure membrane apparatus on sieved samples. The mineral content of the clay fraction was determined by X-ray diffraction and differential thermal analysis (*6*).

Three of the profiles from which the samples were taken are described in the section "Descriptions of the Soils." These three are Brinkerton, S60WVa–47–1(1–7); Ernest, S61WVa–42–6(1–7); and Nolo, S61WVa–47–1 (1–9).

The other two profiles from which samples were taken are described here.

Brinkerton silt loam, S60WVa-47-2(1-7). This profile is under young planted spruce, povertygrass, moss, and bracken, at the entrance to Blackwater Falls State Park, about 1.8 miles SSW. of Thomas water tower, 1.8 miles WSW. of State Route No. 32:

A1—0 to 2 inches, black (10YR 2/1) silt loam; moderate, medium, granular structure; very friable; extremely acid (pH 4.4); abrupt, smooth boundary.
A2—2 to 3 inches, grayish-brown (10YR 5/2) silty clay loam; weak, fine and medium, platy structure; friable; extremely acid (pH 4.4); abrupt, wavy boundary.
B21—3 to 11 inches, light grayish-brown (10YR 6/2) and brownish-yellow (10YR 6/8) silty clay; strong, coarse, prismatic structure; firm; gray (10YR 5/1) on surface of prisms; extremely acid (pH 4.3); abrupt, wavy boundary.
B22t—11 to 14 inches, mottled strong-brown (7.5YR 5/8) and yellowish-brown (10YR 5/4) very fine sandy clay loam; moderate, medium, prismatic structure; firm; surfaces of prisms are light grayish brown (10YR 6/2); very strongly acid (pH 4.5); abrupt, irregular boundary.
Bx1—14 to 24 inches, brown (7.5YR 5/4) silty clay loam; many, coarse, prominent, yellowish-brown (10YR 5/6) and brown (10YR 5/3) mottles; strong, very coarse, prismatic structure, 7-inch polygons; very firm when moist; surfaces of prisms are light grayish brown (10YR 6/2); high (10 to 20 percent) concentration of manganese concretions; very strongly acid (pH 4.6); gradual, smooth boundary.
Bx2—24 to 33 inches, brown (7.5YR 5/4) silty clay loam mottled with brown (10YR 5/3); strong, very coarse, prismatic structure, 12-inch polygons; very firm when moist; surfaces of prisms are light grayish-brown (10YR 6/5); high (10 to 20 percent) concentration of manganese concretions; very strongly acid (pH 4.5); clear boundary.
C—33 to 39 inches, mottled strong-brown (7.5YR 5/8), gray (5Y 6/1), and olive (5Y 5/3) silty clay loam; massive; very firm; high (10 to 20 percent) concentration of manganese concretions; 60 percent weathered siltstone; very strongly acid (pH 4.8); gradual boundary.

Ernest silt loam, S61WVa-47-3(1-6). This profile is under a forest of black cherry, beech, and maple, along State Route No. 90, ½ mile E. of U.S. Highway 219, about 20 feet W. of gasline and about 500 feet SE. of Thomas Reservoir:

O1—3 inches to 1 inch, leaves.
O2—1 inch to 0, decayed leaves.
A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; loose; very strongly acid (pH 4.6); clear boundary.
A2—2 to 5 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, subangular blocky structure; very friable; 15 percent channery fragments; very strongly acid (pH 4.6); clear, wavy boundary.
B21—5 to 14 inches, yellowish-brown (10YR 5/6) channery silt loam; weak, fine, subangular blocky structure; friable; very strongly acid (pH 4.6); clear, wavy boundary.
B22—14 to 24 inches, yellowish-brown (10YR 5/4) heavy silt loam; dark-brown (7.5YR 5/6) and gray (10YR 5/1) mottles, faint and few in upper part of horizon becoming more common and distinct with depth; weak, fine and medium, subangular blocky structure; friable; 10 to 15 percent channery fragments; very strongly acid (pH 4.6); clear, irregular boundary.
Bx1—24 to 31 inches, dark yellowish-brown (10YR 4/4) gravelly clay loam; common, medium, distinct; gray (10YR 5/1) mottles; massive, breaking to weak, coarse, angular blocky structure; firm; iron concretions are common; few fine roots; very strongly acid (pH 4.6); diffuse boundary.
Bx2—31 to 46 inches, dark yellowish-brown (10YR 4/4) gravelly clay loam; common, medium, distinct, gray (10YR 5/1) mottles; massive, breaking under pressure into very weak, coarse, blocky structure; very firm; iron concretions common; medium pores common; very strongly acid (pH 4.6); clear boundary.
D1—46 to 48 inches, weathered siltstone.
D2—48 inches +, hard siltstone.

General Nature of the Area

This section describes physiography, relief, drainage, geology, and climate in the Tucker-Randolph Area. It also discusses industry and population and agriculture. The agricultural statistics used are for Tucker County and do not include Randolph County because the part of Randolph County included in the survey Area is mostly forested.

Industries in the Area include a woolen mill, a charcoal plant, and a leather tannery at Parsons and coal mines near Davis. The products from numerous sawmills scattered throughout the Area are sold locally as sawlogs and charcoal wood. Pulpwood is collected at Parsons and shipped by rail to processing plants outside the Area. The number of tourists visiting this Area is increasing each year because snowfall in winter is adequate for skiing, the climate in summer is cool, and there are many scenic attractions. Blackwater Falls State Park and Canaan Valley are among the leading tourist attractions in West Virginia.

In 1960 the population of Tucker County was 7,750. The three towns in the County are Parsons (population 1,798), Thomas (population 830), and Davis (population 898).

Relief and Drainage

The survey Area is characterized by steep-sided ridges, a gently sloping mountain valley, and several gently sloping plains that are surrounded by long, steep mountain slopes. The elevation ranges from 4,420 feet at Weiss Knob to 1,450 feet on the Cheat River at the Preston County line. The Area drains northward to the Ohio River drainage system, except for approximately 1 square mile that drains eastward to the Potomac River drainage system.

Geology

The geologic formations exposed in the survey Area are of sedimentary origin. Subsequent periods of compaction, uplift, folding, and erosion have produced the present bedrock and topography.

The surface rocks belong to the Pennsylvanian, Mississippian, and Devonian systems. They were laid down in nearly horizontal beds and later were folded.

The oldest rocks in the Area are Devonian. All the rocks in the western third of the Area, except those in a small area near the top of Laurel Ridge and in another on Limestone Mountain, are of this system. Two formations are represented in this part of the Area: the Chemung, which consists of strongly folded, greenish-gray siltstone and shale, and the Catskill, which consists of alternate beds of red shale and fine sandstone. Other Devonian rocks occur on and near Middle Mountain.

TABLE 15.—*Chemical and*

[Analyses by Soil Survey Laboratory, Beltsville, Md.

Soil type, sample number and horizon	Depth	Reaction		Organic matter			Free iron oxide (Fe_2O_3)	Extractable cations (Meq. per 100 grams of soil)				
		H_2O (1:1)	KCl (1:1)	Organic carbon	Nitrogen	C/N ratio		Ca	Mg	H	Na	K
Brinkerton silt loam: S60WVa–47–1(1–7).	*Inches*			*Percent*	*Percent*		*Percent*					
A1	0 to 2	4.1	3.2	13.6	0.469	29	1.2	2.2	0.8	42.3	<0.1	0.4
A2	2 to 5	4.3	3.1	3.09	.153	20	1.5	.7	.2	26.0	<.1	.1
B21t	5 to 17	4.5	3.5	.37	.060	6	4.6	.7	.3	38.3	<.1	.3
B22t	17 to 26	4.8	3.6	.23	------	------	3.4	.8	.6	13.5	<.1	.3
Bx1	26 to 38	4.9	3.5	.17	------	------	3.4	1.7	1.5	10.4	<.1	.3
Bx2	38 to 53	5.1	3.7	.14	------	------	3.9	3.8	3.3	6.4	<.1	.2
C	53 to 88	5.6	4.2	.13	------	------	4.2	4.3	3.2	4.8	<.1	.2
Brinkerton silt loam: S60WVa–47–2(1–7).												
A1	0 to 2	4.0	3.2	7.79	.419	19	.9	1.0	.3	36.6	<.1	.2
A2	2 to 3	4.0	3.2	5.18	.237	22	1.2	.6	<.1	29.1	<.1	.1
B21	3 to 11	4.1	3.0	.62	.059	10	4.0	.6	.1	22.1	<.1	.1
B22t	11 to 14	4.3	3.5	.16	------	-----	4.3	.3	.1	9.9	<.1	.1
Bx1	14 to 24	4.6	3.5	.13	------	------	4.0	.7	.5	11.9	<.1	.2
Bx2	24 to 33	4.6	3.5	.10	------	------	4.0	1.5	1.0	10.6	<.1	.2
C	33 to 39	4.6	3.5	.07	------	------	4.2	2.4	1.4	9.6	<.1	.3
Ernest silt loam: S61W–42–6(1–7).												
A1	0 to 2	4.5	3.3	6.42	.390	16	3.0	.9	.5	31.3	<.1	.3
A2	2 to 6	3.8	3.1	4.44	.275	16	3.3	.3	.3	28.6	<.1	.2
B21	6 to 16	4.4	3.8	2.11	.152	14	3.3	<.1	.2	24.0	<.1	.3
B22t	16 to 23	4.8	4.0	.91	.078	12	3.3	<.1	.2	13.8	<.1	.3
Bx	23 to 37	4.8	3.9	.47	.050	9	3.5	<.1	.1	10.3	<.1	.2
Cx1	37 to 57	4.8	3.9	.44	.038	12	3.8	<.1	.2	9.1	<.1	.1
Cx2	57 to 72	5.0	3.8	.56	.038	15	3.6	<.1	.2	9.3	.1	.1
Ernest silt loam: S61WVa–47–3(1–6).												
A1	0 to 2	4.4	3.4	11.6	.736	16	------	2.5	.5	37.9	<.1	.2
A2	2 to 5	4.1	3.3	5.70	.354	16	5.1	1.0	.4	29.2	<.1	.3
B21	5 to 14	4.5	3.6	1.74	.165	10	5.3	.2	.1	24.3	<.1	.3
B22	14 to 24	4.6	3.8	1.58	1.01	16	5.4	.1	<.1	20.7	<.1	.2
Bx1	24 to 31	4.7	3.8	2.07	.084	25	5.1	.1	.2	20.4	<.1	.3
Bx2	31 to 46	4.9	3.7	1.42	.060	24	5.1	.2	.3	19.3	<.1	.2
Nolo silt loam: S61WVa–47–1(1–9).												
O2	1 to 0	------	------	41.7	2.054	20	------	9.0	2.6	42.0	<.1	1.0
A21	0 to 3	3.9	3.2	4.66	.276	17	.1	.7	.4	19.2	<.1	.4
A22 (interior ped)	3 to 6	4.1	3.1	.51	.060	8	.1	.4	.2	10.3	<.1	.1
A22 (exterior ped)	3 to 6	------	------	4.96	.261	19	------	.2	.2	21.9	<.1	<.1
A22 (bulk sample)	3 to 6	4.1	3.1	2.18	.105	21	.2	.3	.2	14.3	<.1	.2
A23	6 to 9	4.2	3.4	.64	.038	17	.4	.1	.2	9.0	<.1	.1
B21	9 to 15	4.3	3.5	.31	.028	11	2.0	<.1	.2	8.4	<.1	.1
B22	15 to 21	4.4	3.7	.38	.027	14	1.7	<.1	.2	9.3	<.1	.1
Bx	21 to 23	4.2	3.7	.59	.042	14	1.5	<.1	.1	11.7	<.1	.1

mineral data for selected soils

Dashes in columns indicate that no determination was made]

Base saturation (sum)	Cation exchange capacity (sum)	Extractable Al	Mineral content of clay fraction				
			Montmorillonite	Vermiculite	Mica	Intergrade vermiculite-mica	Kaolinite
Percent		*Meq. per 100 gm. of soil*					
7	45.7	11.3					
4	27.0	11.9					
3	39.6	9.0					
11	15.2	6.6					
25	13.9	4.2					
53	13.7	1.2					
62	12.5	.3					
4	38.1	8.9	Not detected	Abundant	Small	Moderate	28 percent.
2	29.8	10.2	Not detected	Not detected	Not detected	Not detected	Not detected.
3	22.9	12.3	Not detected	Abundant	Small	Moderate	20 percent.
5	10.4	5.0	Not detected	Not detected	Not detected	Not detected	Not detected.
10	13.3	6.5	Not detected	Small	Small	Moderate	30 percent.
20	13.3	5.3	Not detected	Not detected	Not detected	Not detected	Not detected.
30	13.7	4.6		Small	Small	Moderate	30 percent.
5	33.0	6.0	Trace	Moderate	Trace	Small	22 percent.
3	29.4	12.1	Not detected	Not detected	Not detected	Not detected	Not detected.
2	24.5	7.3	Not detected	Dominant	Trace	Not detected	22 percent.
3	14.3	4.6	Not detected	Not detected	Not detected	Not detected	Not detected.
3	10.6	4.4	Not detected	Moderate	Small	Small	28 percent.
3	9.4	3.9	Not detected	Not detected	Not detected	Not detected	Not detected.
3	9.6	3.8	Not detected	Not detected	Not detected	Not detected	Not detected.
8	41.1	5.2					
6	30.9	10.1					
2	24.9	7.8					
1	21.0	6.2					
3	21.0	5.9					
4	20.0	7.4					
23	54.7						
8	20.8	4.7					
6	11.0	5.5					
2	22.3	6.7					
5	15.0	5.7					
4	9.4	5.2					
3	8.7	4.1					
3	9.6	4.4					
2	12.0	5.4					

TABLE 16.—*Particle-size distribution*

[Analyses by Soil Survey Laboratory, Beltsville,

Soil type, sample number and horizon	Depth	Size class and diameter of particles							
		Very coarse sand (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.10 mm.)	Very fine sand (0.10–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (less than 0.002 mm.)	Coarse fragments greater than (2 mm.)
Brinkerton silt loam: S60WVa–47–1(1–7).	*Inches*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
A1	0 to 2	0.3	0.7	0.4	1.2	2.1	64.6	30.7	2
A2	2 to 5	.1	.2	.2	.7	1.9	62.8	34.2	<1
B21t	5 to 17	.8	.7	.6	2.3	5.3	51.9	38.4	<1
B22t	17 to 26	3.0	2.1	1.0	2.1	4.5	59.6	27.7	4
Bx1	26 to 38	3.6	2.8	1.2	2.3	5.0	58.9	26.2	7
Bx2	38 to 53	4.5	3.1	1.3	2.8	6.7	55.0	26.6	11
C	53 to 88	6.4	3.8	1.5	3.2	7.2	51.7	26.2	13
Brinkerton silt loam: S60WVa–47–2(1–7).									
A1	0 to 2	3.0	1.7	1.1	2.8	3.0	66.5	21.9	<1
A2	2 to 3	.7	.9	.9	2.2	3.6	66.0	25.7	<1
B21	3 to 11	.3	.1	.2	1.0	2.1	60.7	35.6	<1
B22t	11 to 14	3.0	2.3	2.3	7.2	12.7	52.6	19.9	3
Bx1	14 to 24	5.0	3.4	1.8	4.1	5.9	49.4	30.4	3
Bx2	24 to 33	5.2	4.3	2.4	4.5	6.7	46.3	30.6	20
C	33 to 39	3.1	3.7	1.8	3.2	6.1	47.7	34.4	32
Ernest silt loam: S61W–42–6(1–7).									
A1	0 to 2	3.5	3.6	3.7	7.7	6.5	45.3	29.7	11
A2	2 to 6	2.6	2.0	2.4	6.0	5.7	47.5	33.8	7
B21	6 to 16	3.3	2.5	2.2	4.9	6.0	47.7	33.4	12
B22t	16 to 23	7.1	5.3	3.6	6.8	8.3	41.4	27.4	33
Bx	23 to 37	8.6	6.9	4.4	7.3	8.2	37.9	26.7	34
Cx1	37 to 57	9.7	7.8	4.9	8.4	9.4	34.3	25.5	39
Cx2	57 to 72	6.8	5.4	3.1	5.3	10.0	48.4	21.0	34
Ernest silt loam: S61WVa–47–3(1–6).									
A1	0 to 2	4.1	3.1	1.9	5.7	6.0	48.6	30.6	27
A2	2 to 5	3.6	2.3	1.4	3.8	4.8	49.4	34.7	8
B21	5 to 14	2.5	2.1	1.2	3.2	5.6	50.3	35.1	27
B22	14 to 24	5.4	3.4	1.8	4.3	7.2	52.0	25.9	15
Bx1	24 to 31	5.9	5.0	2.2	4.0	5.9	52.7	24.3	11
Bx2	31 to 46	5.2	3.8	1.7	3.4	5.4	51.5	29.0	10
Nolo silt loam: S61WVa–47–1(1–9).									
O2	1 to 0								<1
A21	0 to 3	.4	.8	1.7	13.5	19.8	43.0	20.8	<1
A22 (interior ped)	3 to 6	1.0	1.3	1.3	10.7	18.1	47.8	19.8	2
A22 (exterior ped)	3 to 6	.6	.6	1.1	11.8	19.9	43.6	22.4	0
A22 (bulk sample)	3 to 6	.7	.7	1.2	11.2	17.9	48.0	20.3	3
A23	6 to 9	.4	1.0	2.6	25.0	31.6	26.9	12.5	<1
B21	9 to 15	1.2	2.9	4.2	20.5	24.6	35.0	11.6	<1
B22	15 to 21	1.1	2.2	2.5	15.3	24.4	39.7	14.8	2
Bx	21 to 23	1.5	1.5	1.7	10.5	22.4	42.8	19.6	5

and moisture data for selected soils

Md. Dashes in columns indicate that no determination was made]

Textural class	Moisture held at tension of—		Bulk density	
	⅓ atmosphere	15 atmospheres	Ovendry	⅓ atmosphere
	Percent	*Percent*	*Gm/cc.*	*Gm/cc.*
Silty clay loam		30.0		
Silty clay loam		19.9		
Silty clay loam		16.9		
Silty clay loam or silt loam		12.0		
Silt loam or silty clay loam		10.4		
Silt loam or silty clay loam		9.8		
Silt loam or silty clay loam		9.9		
Silt loam		18.0		
Silt loam		15.7		
Silty clay loam		17.2		
Silt loam		9.1		
Clay loam or silty clay loam		10.7		
Clay loam		10.8		
Silty clay loam		11.5		
Clay loam		17.2		
Silty clay loam	42.3	16.6	1.34	1.13
Silty clay loam	41.3	15.7	1.24	1.09
Clay loam or loam	24.0	11.4	1.60	1.53
Loam or clay loam	20.8	10.6	1.78	1.70
Loam	20.4	9.1	1.74	1.67
Loam		9.6		
Clay loam or silty clay loam				
Silty clay loam	49.5	18.5	1.12	.94
Silty clay loam	36.2	15.4	1.33	1.23
Silt loam	27.6	11.8	1.52	1.43
Silt loam	19.0	10.7	1.77	1.72
Silty clay loam or clay loam	18.9	11.5	1.86	1.76
Loam	38.6	12.2	1.45	1.36
Loam				
Loam				
Loam	23.9	8.0	1.63	1.57
Very fine sandy loam	18.8	5.4	1.65	1.60
Very fine sandy loam	16.3	6.0	1.86	1.79
Loam	19.0	6.9	1.81	1.72
Loam	22.0	8.7	1.82	1.67

Rocks of the Mississippian and Pennsylvanian system occupy most of the eastern two-thirds of the survey Area. The Mauch Chunk, Greenbrier, and Pocono formations are of the Mississippian system. The Mauch Chunk formation consists mainly of red and greenish shale and fine-grained sandstone, the Greenbrier of beds of marine limestone separated by red and gray shale and sandstone, and the Pocono of acid, gray and brown sandstone (*11, 12*). The Pennsylvanian rocks are the youngest in the survey Area. All the coal mined in the Area is of this system. The Conemaugh, Allegheny, and Pottsville formations of this system are all common. Near Fairfax Stone are some outcrops of the Monongahela formation. The Conemaugh formation consists of massive, gray sandstone, gray and brown shale, and coal. The Allegheny consists of alternate beds of conglomeratic sandstone, coarse and fine sandstone, shale, and coal. The Pottsville consists of conglomeratic sandstone, shale, and coal. The coarse sandstone boulders and stones that are common in the survey Area are mainly of the Pottsville formation.

Climate [7]

Data from one weather station cannot represent the entire Tucker-Randolph Area, because there is a wide range in elevation and, consequently, marked differences in temperature and precipitation. The data used in this report were taken principally from the records of the Parsons station (see table 17), which is at an elevation of about 1,700 feet in a narrow valley, and the Canaan Valley station (see table 18), which is at an elevation of about 3,200 feet on a basinlike plateau. Data from stations at Davis, Thomas, and Cortland were considered also.

Winters are long in this survey Area, and the growing season is short. At the lower elevations, the average length of the freeze-free period is 150 days, and on the plateau it is 90 days (*23*). Table 19 shows the probability of the occurrence of temperatures of 32° F., 24°F., and 16° F. in Canaan Valley and at Elkins, which is at an elevation of 1,970 feet. At Canaan Valley, a temperature of 32° has occurred as late as June 23 and as early as July 7. Cold waves during which the temperature falls to zero or below occur about three times each winter, but each lasts only a few days. The lowest temperature recorded at Canaan Valley is —26° (20-year record), and the lowest at Parsons is —28° (50-year record). In summer the temperature is usually cool and comfortable, at least at the higher elevations. The highest temperature recorded at Canaan Valley is 95° and the highest at Parsons is 102°. Temperature data based on records at the Parsons and Canaan Valley weather stations are given in tables 17 and 18.

[7] This section prepared by H. C. DWELLE, U.S. Weather Bureau, Parkersburg, W. Va., R. O. WEEDFALL, U.S. Weather Bureau, Morgantown, W. Va., and W. H. DICKERSON, W. Va. Agricultural Experiment Station, Morgantown, W. Va.

TABLE 17.—*Temperature and precipitation data—Parsons station*

[Data cover the periods indicated before 1960]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with—		Average total	One year in 10 will have—		Days with snow cover	Average depth of snow on days with snow cover
			Maximum temperature equal to or higher than	Minimum temperature equal to or lower than		Less than	More than		
Years of record	50	50	20	20	62	62	62	10	10
	°F.	°F.	°F.	°F.	In.	In.	In.	No.	In.
January	43	22	65	2	4.4	3.2	5.9	9	2
February	43	21	61	−1	3.6	2.2	5.3	6	3
March	53	28	69	9	4.3	3.9	5.4	7	2
April	63	36	81	25	3.9	3.0	4.8	2	2
May	74	45	87	34	4.6	3.5	6.5	----------	----------
June	81	54	92	44	5.2	3.3	6.8	----------	----------
July	84	58	92	50	5.5	3.7	8.9	----------	----------
August	83	57	92	49	4.5	1.8	8.3	----------	----------
September	77	50	90	38	3.2	1.5	4.0	----------	----------
October	68	39	82	28	3.3	1.3	5.3	----------	----------
November	54	30	70	16	2.9	1.8	3.6	3	4
December	43	23	61	4	3.8	2.1	4.0	10	3
Year	64	39	[1] 94	[2] −4	49.2	43.9	55.0	37	3

[1] Average annual highest maximum.
[2] Average annual lowest minimum.

TABLE 18.—*Temperature and precipitation data for Canaan Valley station*

[Data for 20 years cover the period 1945 to 1964; data for less than 20 years are from the period 1949 to 1960]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with—		Average total	One year in 10 will have—		Days with snow cover	Average depth of snow on days with snow cover
			Maximum temperature equal to or higher than	Minimum temperature equal to or lower than		Less than	More than		
Years of record	20	20	12	12	20	20	20	10	10
	°F.	°F.	°F.	°F.	In.	In.	In.	No.	In.
January	37	18	57	−1	4.6	2.5	6.4	17	4
February	39	19	56	3	4.8	2.8	7.0	11	7
March	46	25	65	10	5.4	3.2	7.2	14	8
April	60	35	74	19	4.4	2.8	6.1	3	3
May	68	43	79	27	5.0	2.8	7.0		
June	75	49	86	37	5.5	3.8	7.8		
July	78	52	86	39	5.0	2.7	7.0		
August	77	51	86	33	4.6	1.9	9.8		
September	71	45	84	28	3.3	1.5	5.3		
October	62	36	77	22	3.1	1.3	5.5		
November	49	28	64	13	3.7	2.0	5.8	7	4
December	38	19	58	−3	4.3	2.0	6.4	18	8
Year	58	35	[1] 89	[2] −10	53.5	47.3	61.0	70	6

[1] Average annual highest maximum.
[2] Average annual lowest minimum.

Rainfall in the survey Area is adequate for the needs of most crops. Computations made by Thornthwaite's method (*18*) indicate that rainfall during the period May through September exceeds potential evapotranspiration. Periods of dry weather do occur, but drought is not a problem. Data on monthly and annual rainfall, based on records at the Parsons and Canaan Valley stations, are given in tables 17 and 18.

Rainfall heavy enough to cause a local flood occurs occasionally, usually accompanying a thunderstorm. Totals of more than 5 inches in a 24-hour period have been recorded. Damaging hailstorms are infrequent.

On many days in a normal winter there is no snow on the ground, but in some years the ground is snow covered all winter. A snow depth of 21 inches has been recorded at Parsons, and a depth of 48 inches at Canaan Valley. Since most of the Area is thickly forested, considerable moisture derived from snow is retained.

Westerly winds prevail at the higher elevations in all months of the year except August, when southwesterly winds prevail. During storms, the strongest winds are from the southwest, the west, or the northwest. Persistent strong windflow is from the west. Violent winds from any direction may accompany intense summer thunderstorms. The number of thunderstorms in a year at any given location is about fifty.

Damaging windstorms are rare. Five tornadoes that caused property damage or loss of life were recorded between 1925 and 1954. Hurricanes occasionally bring heavy rains, but the wind velocity has diminished by the time the storm has moved this far inland.

No records of evaporation have been kept in the Area, but an analysis of data from nearby points suggests that average evaporation from a Class A 4-foot pan would amount to about 38 inches a year, and about 27 inches during the growing season (May through October). Evaporation from ponds and reservoirs would be about 75 percent of this amount.

Cloudiness is more common than clear skies. About 81 days a year have clear skies, 160 days are cloudy, and the rest are partly cloudy. Fog is prevalent in the valleys in summer and fall, and the mountain ridges are often shrouded with low clouds in winter and spring.

The average relative humidity is high. At Elkins, the humidity about daybreak during the period June through October is ordinarily between 90 and 96 percent. At 1:30 p.m. during that period, it is between 53 and 61 percent. In January and February, the humidity at 7:30 a.m. averages 82 percent, and at 1:30 p.m. it averages 65 percent. Conditions at Elkins are probably representative of those at Parsons and the lower valleys in the Area.

Agriculture

Most of the farms in this survey Area are in Canaan Valley, in mountainous areas underlain by limestone, and on bottom lands and stream terraces along the Cheat River and its tributaries, particularly below Parsons. Grassland farming predominates. Cattle and sheep are raised. Row crops are grown mostly on bottom lands and stream terraces. About 23.1 percent of the acreage

TABLE 19.—*Probability of freezing temperatures in spring and fall*

[Canaan Valley—record, 20 years; elevation, 3,250 feet. Elkins—record, 30 years; elevation, 1,970 feet]

Location and probability	Dates for given probability and temperature		
	32° F. or lower	24° F. or lower	16° F. or lower
Canaan Valley [1]—			
Spring			
1 year in 10 later than	June 18	May 11	April 22
1 year in 4 later than	June 9	May 3	April 13
1 year in 3 later than	June 6	April 30	April 10
2 years in 3 later than	May 26	April 19	March 28
3 years in 4 later than	May 22	April 16	March 25
9 years in 10 later than	May 14	April 8	March 16
Average date	May 31	April 24	April 13
Fall			
1 year in 10 earlier than	August 12	September 15	October 12
1 year in 4 earlier than	August 21	September 23	October 21
1 year in 3 earlier than	August 25	September 26	October 25
2 years in 3 earlier than	September 8	October 7	November 7
3 years in 4 earlier than	September 12	October 10	November 10
9 years in 10 earlier than	September 21	October 18	November 20
Average date	September 1	October 1	October 31
Elkins [2]—			
Spring			
1 year in 10 later than	May 24	April 29	April 2
1 year in 4 later than	May 17	April 21	March 25
1 year in 3 later than	May 14	April 17	March 21
2 years in 3 later than	May 4	April 5	March 8
3 years in 4 later than	May 1	April 2	March 5
9 years in 10 later than	April 24	March 24	February 23
Average date	May 9	April 11	March 15
Fall			
1 year in 10 earlier than	September 22	October 15	November 6
1 year in 4 earlier than	September 28	October 22	November 14
1 year in 3 earlier than	September 30	October 25	November 17
2 years in 3 earlier than	October 9	November 4	November 29
3 years in 4 earlier than	October 12	November 7	December 2
9 years in 10 earlier than	October 18	November 14	December 9
Average date	October 5	October 30	November 23

[1] Dates applicable at higher elevations in the survey Area (*15*).
[2] Dates applicable at elevations from about 1,500 to 2,500 feet (*5*).

in Tucker County is in farms. Of the part of the Area that is in Randolph County, much is forested. Table 20 shows the acreage of principal crops, and table 21 shows the number of livestock in 1954 and 1959.

TABLE 20.—*Acreage of principal crops in Tucker County in 1954 and 1959*

Crops	1954	1959
	Acres	*Acres*
Pasture	20, 813	15, 002
Harvested crops	10, 539	8, 940
Corn for grain	1, 232	749
Corn for silage	152	81
Wheat	101	42
Oats	932	558
All hay	7, 167	6, 949
Alfalfa hay	713	484

TABLE 21.—*Number of livestock on farms in Tucker County in 1954 and 1959*

Livestock	1954	1959
	Number	*Number*
Cattle and calves	5, 302	5, 109
Milk cows	1, 832	1, 250
Hogs and pigs	1, 514	1, 109
Sheep and lambs	2, 370	2, 728
Chickens	19, 566	11, 875

The number of farms is decreasing, and the size is increasing. There were 542 farms in Tucker County in 1954 and 383 in 1959. The average size was 137.5 acres in 1954 and 162.3 acres in 1959. There were 75 farms in the surveyed part of Randolph County.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster, such as a clod, crumb, block, or prism.

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

Bedding. Plowing, grading, or otherwise elevating the surface of a flat field into a series of broad beds, or "lands," so as to leave shallow surface drains between the beds.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

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

Clay film. A thin coating of clay on the surface of a soil aggregate.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

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

Loose.—Noncoherent; will not hold together in a mass.

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

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

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

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

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

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

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

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants when other growth factors, such as light, moisture, temperature, and the physical condition (or tilth) of the soil, are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has been allowed to drain away; the field moisture content 2 or 3 days after a soaking rain.

Flood plain. Nearly level land, consisting of stream sediment, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic matter and clay but is rich in silt or very fine sand. The layer is seemingly cemented when dry, has a hard or very hard consistence, and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Orstein. The B horizon of Podzols that are cemented by the accumulated sesquioxides, by organic matter, or by both.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability, soil. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Plowpan. A compacted layer formed in the soil immediately below the plowed layer.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values and in words as follows:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Residual material. Unconsolidated, partly weathered mineral material that accumulates over disintegrating solid rock. Residual material is not soil but is frequently the material in which a soil forms.

Root zone. The part of the soil that is penetrated, or can be penetrated, by plant roots.

Sand. As a soil separate, individual rock or mineral fragments ranging from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz, but sand may be of any mineral composition. As a textural class, soil that is 85 percent or more sand and not more than 10 percent clay.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a textural class, a soil that is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting upon parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless soils* are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

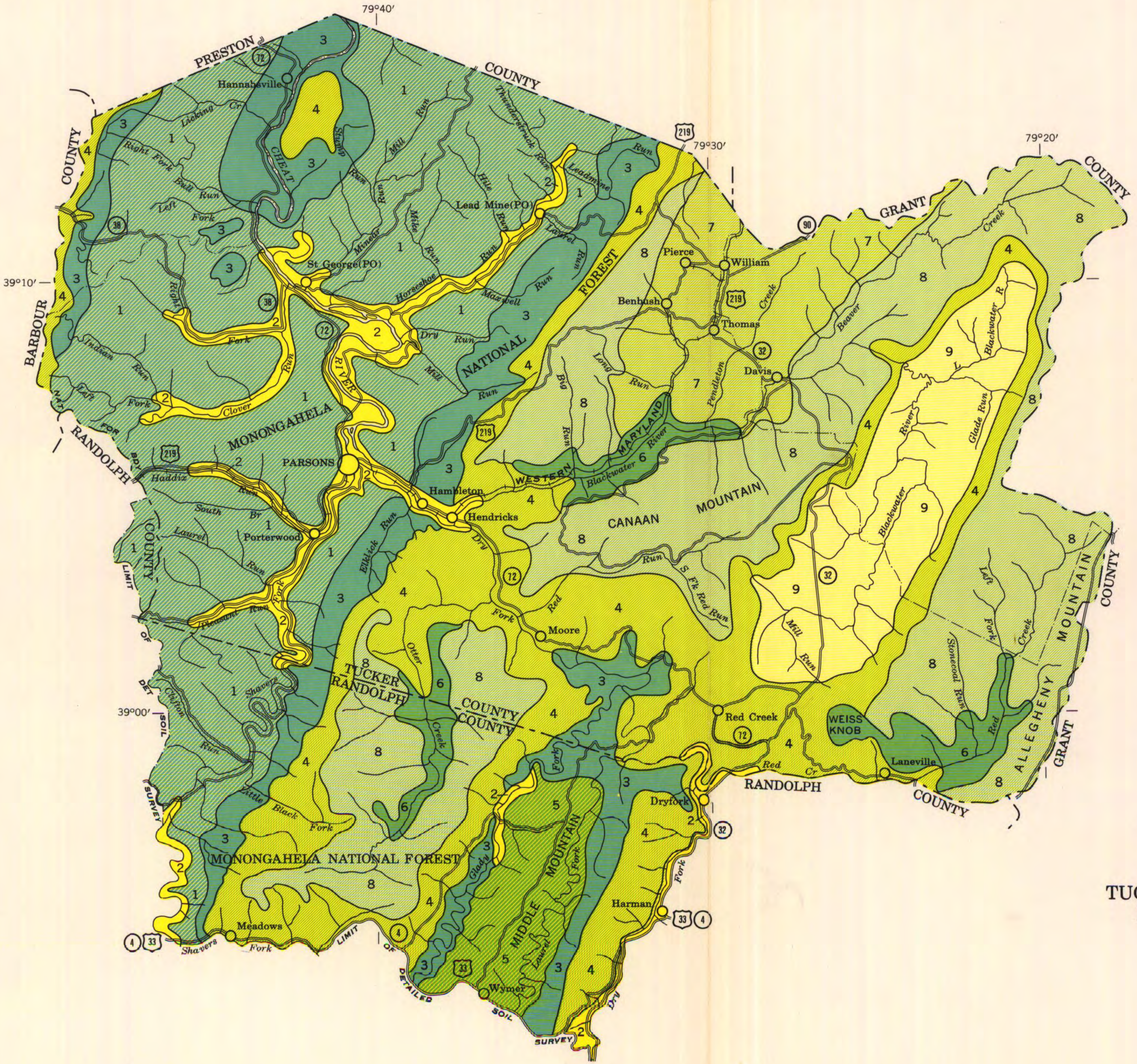
Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which plants (specifically sunflower) wilt so much that they do not recover when placed in a dark, humid atmosphere.

GUIDE TO MAPPING UNITS

[See table 1, p. 6, for approximate acreage and proportionate extent of soils; table 2, p. 36, for estimated yields of principal crops; table 8, p. 46, for suitability of soils as wildlife habitats; tables 9, 10, and 11, pp. 52, 56, and 58 for engineering data; and table 12, p. 60, for suitability of the soils as recreation sites]

Map symbol	Mapping unit	Described on page	Capability unit		Woodland group	
			Symbol	Page	Number	Page
AbB	Albrights silt loam, 3 to 8 percent slopes	5	IIe-13	29	5	40
AbC	Albrights silt loam, 8 to 15 percent slopes	5	IIIe-13	32	5	40
AgB	Allegheny silt loam, 3 to 8 percent slopes	8	IIe-4	29	9	42
AgC	Allegheny silt loam, 8 to 15 percent slopes	8	IIIe-4	31	9	42
Al	Alluvial land	8	VIw-1	34	12	43
At	Atkins silt loam	8	VIw-1	34	1	38
Be	Barbour and Pope fine sandy loam	9	IIw-6	30	9	42
Bb	Barbour and Pope fine sandy loam, high bottom	9	I-6	28	9	42
Bc	Barbour and Pope gravelly sandy loam	9	IIs-6	30	9	42
Bd	Barbour and Pope gravelly sandy loam, high bottom	9	IIs-6	30	9	42
Bf	Barbour and Pope cobbly loamy sand	9	Vs-2	33	9	42
BmB	Belmont silt loam, 3 to 10 percent slopes	10	IIe-11	29	2	39
BmC	Belmont silt loam, 10 to 20 percent slopes	10	IIIe-11	31	2	39
BmD	Belmont silt loam, 20 to 30 percent slopes	10	IVe-11	32	2	39
BmE	Belmont silt loam, 30 to 40 percent slopes	10	VIe-1	33	2	39
BnC	Belmont very stony silt loam, 3 to 20 percent slopes	10	VIs-1	34	2	39
BnD	Belmont very stony silt loam, 20 to 30 percent slopes	10	VIs-1	34	2	39
BnE	Belmont very stony silt loam, 30 to 40 percent slopes	11	VIIs-1	34	2	39
BnF	Belmont very stony silt loam, 40 to 70 percent slopes	11	VIIs-1	34	2	39
Bo	Biago silt loam	11	IVw-1	33	1	38
Bp	Biago silt loam, overflow	11	VIw-1	34	1	38
BrA	Brinkerton silt loam, 0 to 3 percent slopes	12	IVw-5	33	3	39
BrB	Brinkerton silt loam, 3 to 8 percent slopes	12	IVw-5	33	3	39
BrC	Brinkerton silt loam, 8 to 15 percent slopes	12	IVw-5	33	3	39
BsC	Brinkerton and Nolo extremely stony soils, 3 to 15 percent slopes	12	VIIs-5	35	3	39
CaB	Calvin channery silt loam, 3 to 10 percent slopes	13	IIe-10	29	4	39
CaC	Calvin channery silt loam, 10 to 20 percent slopes	13	IIIe-10	31	4	39
CaC3	Calvin channery silt loam, 10 to 20 percent slopes, severely eroded	13	IVe-3	32	4	39
CaD	Calvin channery silt loam, 20 to 30 percent slopes	13	IVe-3	32	4	39
CaD3	Calvin channery silt loam, 20 to 30 percent slopes, severely eroded	13	VIe-2	33	4	39
CaE	Calvin channery silt loam, 30 to 40 percent slopes	13	VIIe-2	34	4	39
CaE3	Calvin channery silt loam, 30 to 40 percent slopes, severely eroded	13	VIIe-2	34	4	39
CaF	Calvin channery silt loam, 40 to 65 percent slopes	13	VIIe-2	34	4	39
ChB	Calvin channery silt loam, neutral substratum, 3 to 10 percent slopes	14	IIe-11	29	11	42
ChC	Calvin channery silt loam, neutral substratum, 10 to 20 percent slopes	14	IIIe-11	31	11	42
ChD	Calvin channery silt loam, neutral substratum, 20 to 30 percent slopes	14	IVe-11	32	11	42
ChE	Calvin channery silt loam, neutral substratum, 30 to 40 percent slopes	14	VIIe-1	34	11	42
ChF	Calvin channery silt loam, neutral substratum, 40 to 65 percent slopes	14	VIIe-1	34	11	42
CnC	Calvin extremely stony silt loam, neutral substratum, 3 to 20 percent slopes	14	VIIs-1	34	11	42
CnE	Calvin extremely stony silt loam, neutral substratum, 20 to 40 percent slopes	14	VIIs-1	34	11	42
CnF	Calvin extremely stony silt loam, neutral substratum, 40 to 65 percent slopes	14	VIIs-1	34	11	42
CoB	Cookport silt loam, 2 to 10 percent slopes	15	IIe-13	29	5	40
CsB	Cookport very stony silt loam, 2 to 10 percent slopes	15	VIIs-2	34	5	40
DaB	Dekalb channery loam, 3 to 10 percent slopes	16	IIe-10	29	6	40

Map symbol	Mapping unit	Described on page	Capability unit		Woodland group	
			Symbol	Page	Number	Page
DaC	Dekalb channery loam, 10 to 20 percent slopes	16	IIIe-10	31	6	40
DaD	Dekalb channery loam, 20 to 30 percent slopes	16	IVe-3	32	6	40
DaE	Dekalb channery loam, 30 to 40 percent slopes	16	VIIe-2	34	6	40
DaF	Dekalb channery loam, 40 to 65 percent slopes	16	VIIe-2	34	6	40
DkB	Dekalb loam, 3 to 10 percent slopes	16	IIe-10	29	6	40
DkC	Dekalb loam, 10 to 20 percent slopes	16	IIIe-10	31	6	40
DmC	Dekalb extremely stony loam, 3 to 20 percent slopes	17	VIIs-2	34	6	40
DmE	Dekalb extremely stony loam, 20 to 40 percent slopes	17	VIIs-2	34	6	40
DmF	Dekalb extremely stony loam, 40 to 70 percent slopes	17	VIIs-2	34	6	40
EnB	Ernest silt loam, 3 to 8 percent slopes	17	IIe-13	29	5	40
EnC	Ernest silt loam, 8 to 15 percent slopes	18	IIIe-13	32	5	40
EnD	Ernest silt loam, 15 to 25 percent slopes	18	IVe-9	32	5	40
ErC	Ernest extremely stony silt loam, 3 to 15 percent slopes	18	VIIs-2	34	5	40
ErD	Ernest extremely stony silt loam, 15 to 35 percent slopes	18	VIIs-2	34	5	40
GcB	Gilpin channery silt loam, 3 to 10 percent slopes	19	IIe-10	29	8	41
GcC	Gilpin channery silt loam, 10 to 20 percent slopes	19	IIIe-10	31	8	41
GcC3	Gilpin channery silt loam, 10 to 20 percent slopes, severely eroded	19	IVe-3	32	8	41
GcD	Gilpin channery silt loam, 20 to 30 percent slopes	19	IVe-3	32	8	41
GcD3	Gilpin channery silt loam, 20 to 30 percent slopes, severely eroded	19	VIe-2	33	8	41
GcE	Gilpin channery silt loam, 30 to 40 percent slopes	19	VIIe-2	34	8	41
GcE3	Gilpin channery silt loam, 30 to 40 percent slopes, severely eroded	19	VIIe-2	34	8	41
GcF	Gilpin channery silt loam, 40 to 70 percent slopes	20	VIIe-2	34	8	41
GcF3	Gilpin channery silt loam, 40 to 70 percent slopes, severely eroded	20	VIIe-2	34	8	41
LcB	Leetonia channery loam, 3 to 10 percent slopes	20	IIe-12	29	6	40
LcC	Leetonia channery loam, 10 to 20 percent slopes	20	IIIe-12	31	6	40
LdA	Lickdale silt loam, 0 to 5 percent slopes	21	IVw-1	33	1	38
LsA	Lickdale very stony silt loam, 0 to 5 percent slopes	21	VIIs-5	35	1	38
Ma	Made land	21	VIIIs-1	35	12	43
McB	Meckesville silt loam, 3 to 8 percent slopes	21	IIe-11	29	2	39
McC	Meckesville silt loam, 8 to 15 percent slopes	21	IIIe-11	31	2	39
MkC	Meckesville very stony silt loam, 3 to 15 percent slopes	21	VIs-1	34	2	39
MkD	Meckesville very stony silt loam, 15 to 30 percent slopes	22	VIs-1	34	2	39
MkE	Meckesville very stony silt loam, 30 to 40 percent slopes	22	VIIs-1	34	2	39
MoA	Monongahela silt loam, 0 to 3 percent slopes	22	IIw-1	30	9	42
MoB	Monongahela silt loam, 3 to 8 percent slopes	22	IIe-13	29	9	42
MoC	Monongahela silt loam, 8 to 15 percent slopes	22	IIIe-13	32	9	42
Mp	Muck and Peat	23	VIIw-1	34	12	43
NoA	Nolo silt loam, 0 to 5 percent slopes	23	IVw-5	33	3	39
NoB	Nolo silt loam, 5 to 10 percent slopes	23	IVw-5	33	3	39
Ph	Philo silt loam	24	IIw-7	30	9	42
Pu	Purdy silty clay loam	24	IVw-1	33	1	38
Sa	Sandstone rubble land	25	VIIIs-1	35	12	43
Se	Sequatchie fine sandy loam	25	I-6	28	9	42
Sl	Stony alluvial land	25	VIIIs-1	35	12	43
Sm	Strip mine	25	-------	--	12	43
Ty	Tyler silt loam	26	IIIw-5	32	3	39
Vb	Very stony land-Brinkerton-Lickdale association	26	VIIs-5	35	10	42
VcF	Very stony land-Calvin complex, 40 to 75 percent slopes	26	VIIs-2	34	7	41
VdE	Very stony land-Dekalb complex, 20 to 40 percent slopes	26	VIIs-4	35	7	41
VdF	Very stony land-Dekalb complex, 40 to 80 percent slopes	26	VIIs-4	35	7	41
VeC	Very stony land-Ernest complex, 3 to 15 percent slopes	26	VIIs-4	35	7	41
VeD	Very stony land-Ernest complex, 15 to 35 percent slopes	27	VIIs-4	35	7	41
VlC	Very stony land-Leetonia complex, 3 to 20 percent slopes	27	VIIs-4	35	7	41
VwB	Very stony land-Wet land complex, 3 to 10 percent slopes	27	VIIs-5	35	10	42
Wt	Wet terrace land	27	IVw-5	33	3	39



SOIL ASSOCIATIONS

1 Gilpin association: Moderately deep, yellowish-brown soils on steep side slopes and narrow ridgetops

2 Barbour-Pope-Sequatchie association: Nearly level or gently sloping soils on bottom lands and terraces along the larger streams

3 Calvin association: Moderately deep, reddish-brown soils, mainly on steep slopes

4 Dekalb-Calvin-Belmont association: Moderately deep or deep soils on long, steep mountain slopes

5 Dekalb-Gilpin association: Moderately deep or deep, well-drained, steep soils that developed in material weathered from sandstone and shale

6 Very stony land-Dekalb association: Moderately deep or deep, very stony, steep soils on side slopes in mountainous areas

7 Dekalb-Brinkerton association: Gently sloping to moderately steep, well-drained to poorly drained soils of the mountain plain

8 Very stony land-Ernest-Brinkerton-Leetonia association: Nearly level to moderately sloping, very stony soils

9 Wet terrace land-Blago-Dekalb association: Nearly level to moderately steep, very poorly drained to well-drained soils of the Canaan Valley

March 1966

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
WEST VIRGINIA AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA

Scale 1:190,080

1 0 1 2 3 4 Miles

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA

WEST VIRGINIA AGRICULTURAL EXPERIMENT STATION
U. S. FOREST SERVICE

SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter A, B, C, D, E, and F indicate the slope. Symbols of nearly level soils, such as Atkins silt loam, do not contain a slope letter. A final number, 3, in the symbol indicates that the soil is severely eroded.

SYMBOL	NAME
AbB	Albrights silt loam, 3 to 8 percent slopes
AbC	Albrights silt loam, 8 to 15 percent slopes
AgB	Allegheny silt loam, 3 to 8 percent slopes
AgC	Allegheny silt loam, 8 to 15 percent slopes
Al	Alluvial land
At	Atkins silt loam
Ba	Barbour and Pope fine sandy loam
Bb	Barbour and Pope fine sandy loam, high bottom
Bc	Barbour and Pope gravelly sandy loam
Bd	Barbour and Pope gravelly sandy loam, high bottom
Bf	Barbour and Pope cobbly loamy sand
BmB	Belmont silt loam, 3 to 10 percent slopes
BmC	Belmont silt loam, 10 to 20 percent slopes
BmD	Belmont silt loam, 20 to 30 percent slopes
BmE	Belmont silt loam, 30 to 40 percent slopes
BnC	Belmont very stony silt loam, 3 to 20 percent slopes
BnD	Belmont very stony silt loam, 20 to 30 percent slopes
BnE	Belmont very stony silt loam, 30 to 40 percent slopes
BnF	Belmont very stony silt loam, 40 to 70 percent slopes
Bo	Blago silt loam
Bp	Blago silt loam, overflow
BrA	Brinkerton silt loam, 0 to 3 percent slopes
BrB	Brinkerton silt loam, 3 to 8 percent slopes
BrC	Brinkerton silt loam, 8 to 15 percent slopes
BsC	Brinkerton and Nolo extremely stony soils, 3 to 15 percent slopes
CaB	Calvin channery silt loam, 3 to 10 percent slopes
CaC	Calvin channery silt loam, 10 to 20 percent slopes
CaC3	Calvin channery silt loam, 10 to 20 percent slopes, severely eroded
CaD	Calvin channery silt loam, 20 to 30 percent slopes
CaD3	Calvin channery silt loam, 20 to 30 percent slopes, severely eroded
CaE	Calvin channery silt loam, 30 to 40 percent slopes
CaE3	Calvin channery silt loam, 30 to 40 percent slopes, severely eroded
CaF	Calvin channery silt loam, 40 to 65 percent slopes
ChB	Calvin channery silt loam, neutral substratum, 3 to 10 percent slopes
ChC	Calvin channery silt loam, neutral substratum, 10 to 20 percent slopes
ChD	Calvin channery silt loam, neutral substratum, 20 to 30 percent slopes
ChE	Calvin channery silt loam, neutral substratum, 30 to 40 percent slopes
ChF	Calvin channery silt loam, neutral substratum, 40 to 65 percent slopes
CnC	Calvin extremely stony silt loam, neutral substratum, 3 to 20 percent slopes
CnE	Calvin extremely stony silt loam, neutral substratum, 20 to 40 percent slopes
CnF	Calvin extremely stony silt loam, neutral substratum, 40 to 65 percent slopes
CoB	Cookport silt loam, 2 to 10 percent slopes
CsB	Cookport very stony silt loam, 2 to 10 percent slopes
DaB	Dekalb channery loam, 3 to 10 percent slopes
DaC	Dekalb channery loam, 10 to 20 percent slopes
DaD	Dekalb channery loam, 20 to 30 percent slopes
DaE	Dekalb channery loam, 30 to 40 percent slopes
DaF	Dekalb channery loam, 40 to 65 percent slopes
DkB	Dekalb loam, 3 to 10 percent slopes
DkC	Dekalb loam, 10 to 20 percent slopes
DmC	Dekalb extremely stony loam, 3 to 20 percent slopes
DmE	Dekalb extremely stony loam, 20 to 40 percent slopes
DmF	Dekalb extremely stony loam, 40 to 70 percent slopes
EnB	Ernest silt loam, 3 to 8 percent slopes
EnC	Ernest silt loam, 8 to 15 percent slopes
EnD	Ernest silt loam, 15 to 25 percent slopes
ErC	Ernest extremely stony silt loam, 3 to 15 percent slopes
ErD	Ernest extremely stony silt loam, 15 to 35 percent slopes
GcB	Gilpin channery silt loam, 3 to 10 percent slopes
GcC	Gilpin channery silt loam, 10 to 20 percent slopes
GcC3	Gilpin channery silt loam, 10 to 20 percent slopes, severely eroded
GcD	Gilpin channery silt loam, 20 to 30 percent slopes
GcD3	Gilpin channery silt loam, 20 to 30 percent slopes, severely eroded
GcE	Gilpin channery silt loam, 30 to 40 percent slopes
GcE3	Gilpin channery silt loam, 30 to 40 percent slopes, severely eroded
GcF	Gilpin channery silt loam, 40 to 70 percent slopes
GcF3	Gilpin channery silt loam, 40 to 70 percent slopes, severely eroded
LcB	Leetonia channery loam, 3 to 10 percent slopes
LcC	Leetonia channery loam, 10 to 20 percent slopes
LdA	Lickdale silt loam, 0 to 5 percent slopes
LsA	Lickdale very stony silt loam, 0 to 5 percent slopes
Ma	Made land
McB	Meckesville silt loam, 3 to 8 percent slopes
McC	Meckesville silt loam, 8 to 15 percent slopes
MkC	Meckesville very stony silt loam, 3 to 15 percent slopes
MkD	Meckesville very stony silt loam, 15 to 30 percent slopes
MkE	Meckesville very stony silt loam, 30 to 40 percent slopes
MoA	Monongahela silt loam, 0 to 3 percent slopes
MoB	Monongahela silt loam, 3 to 8 percent slopes
MoC	Monongahela silt loam, 8 to 15 percent slopes
Mp	Muck and Peat
NoA	Nolo silt loam, 0 to 5 percent slopes
NoB	Nolo silt loam, 5 to 10 percent slopes
Ph	Philo silt loam
Pu	Purdy silty clay loam
Sa	Sandstone rubble land
Se	Sequatchie fine sandy loam
Sl	Stony alluvial land
Sm	Strip mine
Ty	Tyler silt loam
Vb	Very stony land–Brinkerton–Lickdale association
VcF	Very stony land–Calvin complex, 40 to 75 percent slopes
VdE	Very stony land–Dekalb complex, 20 to 40 percent slopes
VdF	Very stony land–Dekalb complex, 40 to 80 percent slopes
VeC	Very stony land–Ernest complex, 3 to 15 percent slopes
VeD	Very stony land–Ernest complex, 15 to 35 percent slopes
VlC	Very stony land–Leetonia complex, 3 to 20 percent slopes
VwB	Very stony land–Wet land complex, 3 to 10 percent slopes
Wt	Wet terrace land

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Dual
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail, foot
- Railroad
- Ferries
- Ford
- Grade
- R. R. over
- R. R. under
- Tunnel

Buildings
- School
- Church
- Station
- Sawmill

Mines and Quarries

Pits, gravel or other

Power lines

Pipe lines

Cemeteries

Dams

Levees

Station, forest fire or lookout

Oil or gas well

BOUNDARIES

- National or state
- County
- Reservation
- Land grant

DRAINAGE

Streams
- Perennial
- Intermittent, unclass.

Canals and ditches — CANAL / DITCH

Lakes and ponds
- Perennial
- Intermittent

Wells — flowing

Springs

Marsh

Wet spot

Alluvial fan

Drainage ends

RELIEF

Escarpments
- Bedrock
- Other

Prominent peaks

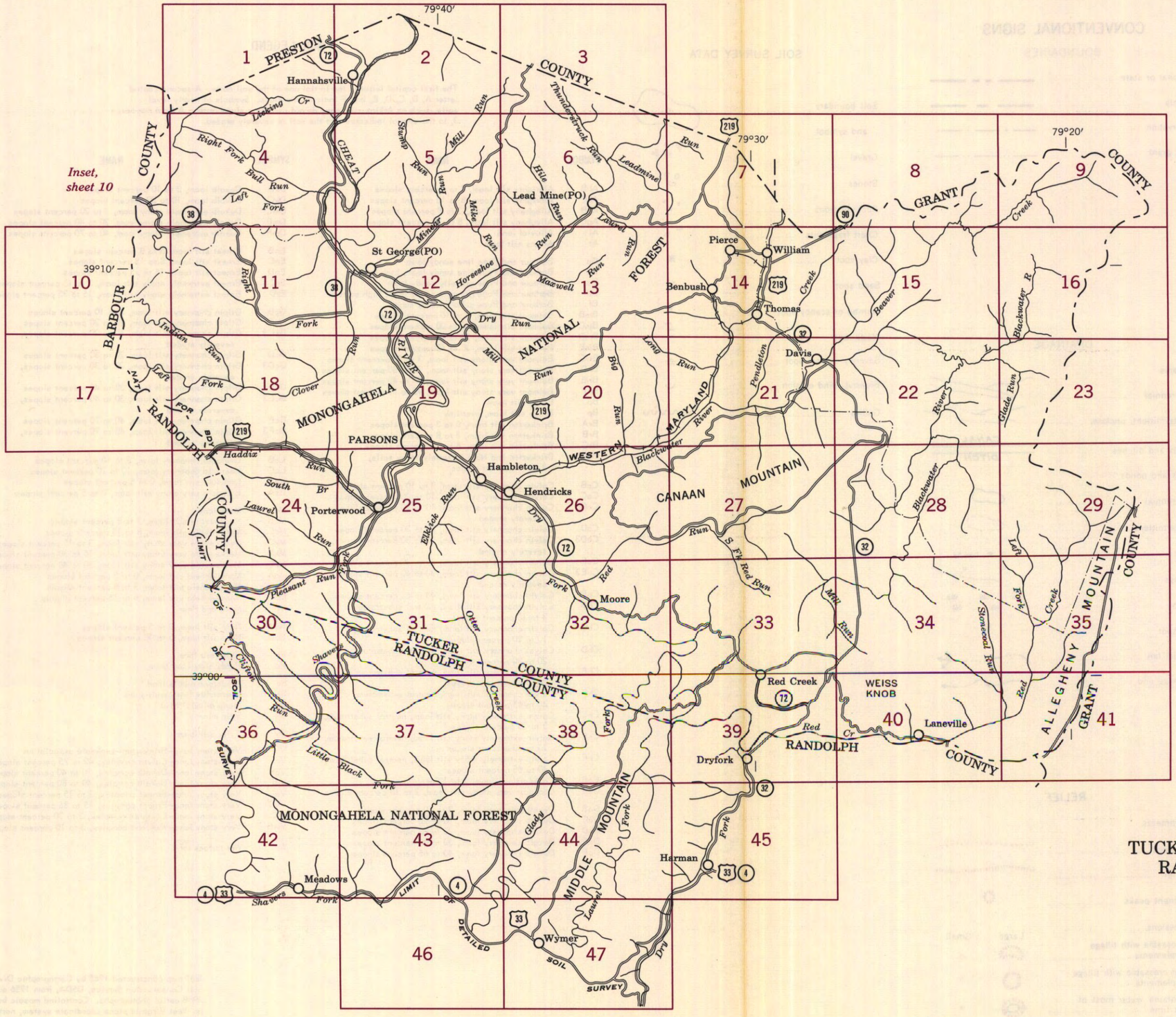
Depressions

	Large	Small
Crossable with tillage implements		
Not crossable with tillage implements		
Contains water most of the time		

SOIL SURVEY DATA

- Soil boundary and symbol — Dx
- Gravel
- Stones
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gullies

Soil map constructed 1965 by Cartographic Division, Soil Conservation Service, USDA, from 1956 and 1958 aerial photographs. Controlled mosaic based on West Virginia plane coordinate system, north zone, Lambert conformal conic projection, 1927 North American datum.



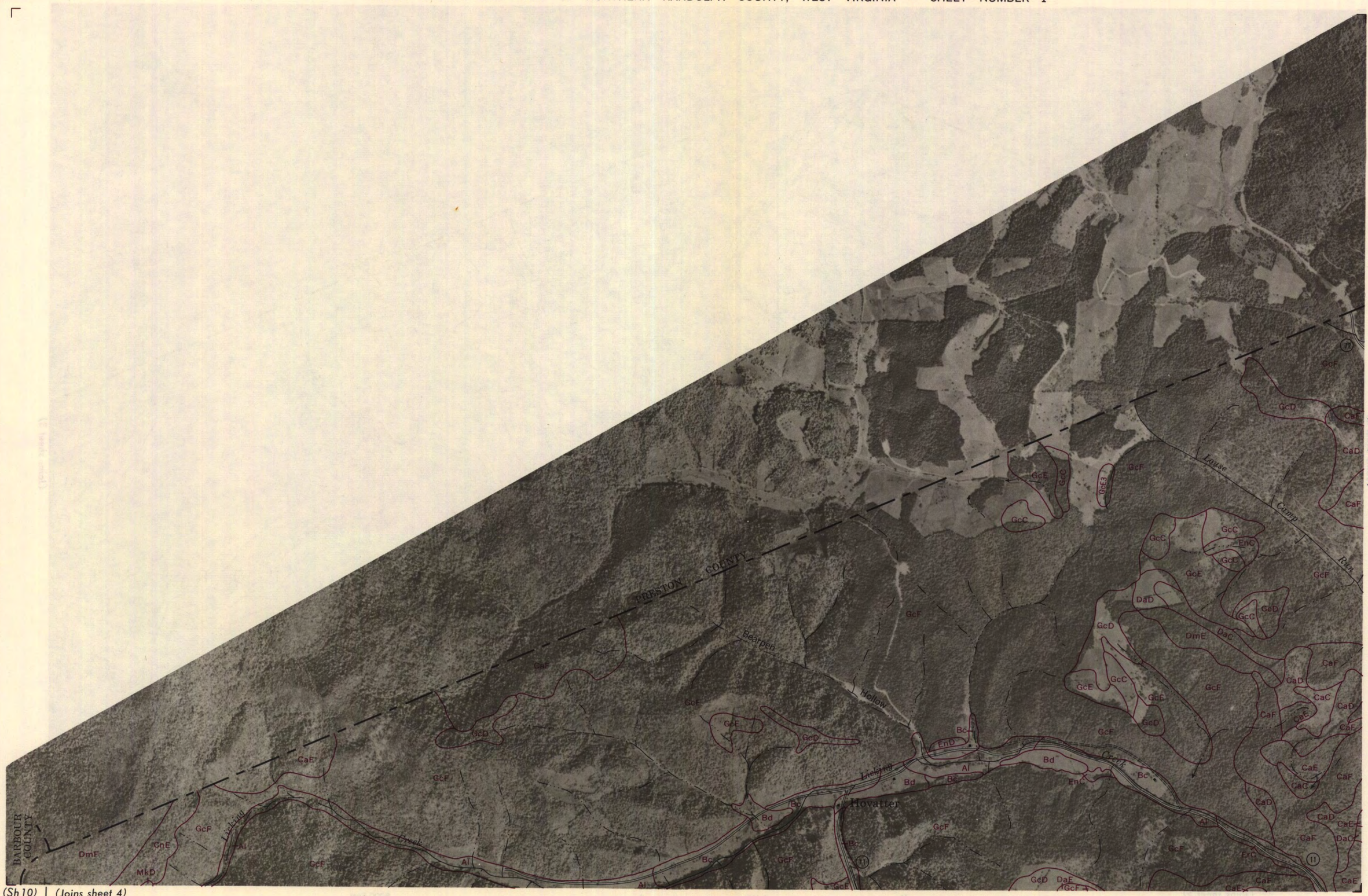
INDEX TO MAP SHEETS

TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA

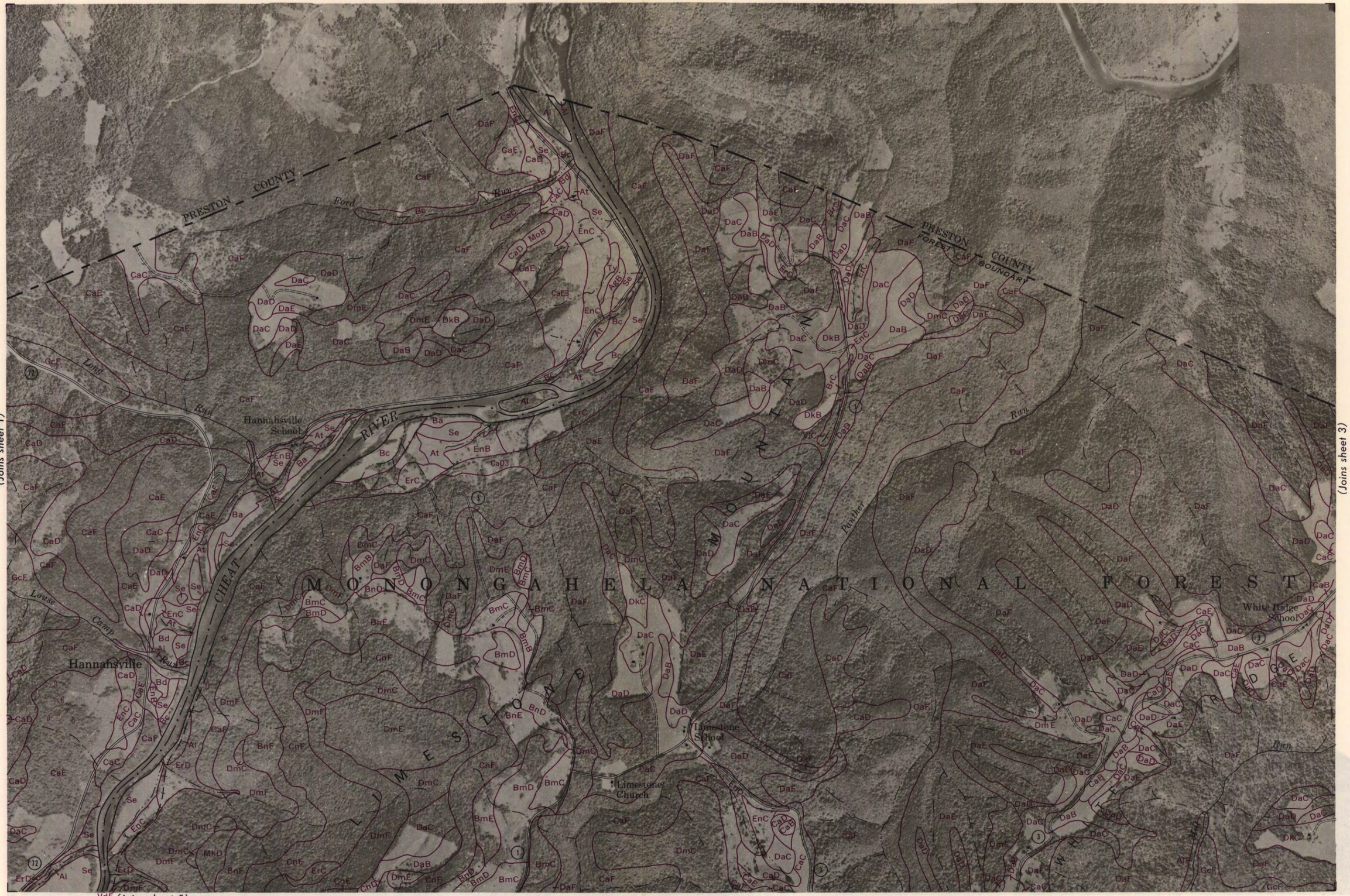
Scale 1:190,080

1 0 1 2 3 4 Miles

TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA — SHEET NUMBER 1



This map is one of a set compiled in 1965 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the West Virginia Agricultural Experiment Station, and the U. S. Forest Service.


2
N
(Joins sheet 1)
(Joins sheet 3)
PRESTON COUNTY
PRESTON COUNTY
FOREST BOUNDARY
Ford Run
Long Run
Louse Camp Run
Panther Run
CHEAT RIVER
Hannahsville School
Hannahsville
Limestone School
Limestone Church
White Ridge School
MONONGAHELA NATIONAL FOREST
LIMESTONE MOUNTAIN
WHITE GRADE
CaF
DaF
DaC
DaD
DaE
DaB
DmE
DmF
DmC
DkB
DkC
EnC
CaC
CaD
CaE
BmC
BmD
BmE
BmF
BnD
BnE
BnF
Se
At
Al
Bc
Ba
Bd
Bg
EnB
ErC
ErD
GcF
MkD
MoB
Tl
AtB
VdF
(Joins sheet 5)

3

N

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TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA — SHEET NUMBER 4

(Joins sheet 1)

N

(Joins inset, sheet 10)

(Joins sheet 5)

(Joins sheet 11)

TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA — SHEET NUMBER 5

This map is one of a set compiled in 1965 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the West Virginia Agricultural Experiment Station, and the U. S. Forest Service.

6

DaE DaC

(Joins sheet 3)

N

(Joins sheet 5)

(Joins sheet 7)

(Joins sheet 13)

AgC

This map is one of a set compiled in 1965 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the West Virginia Agricultural Experiment Station, and the U. S. Forest Service.

(Joins sheet 6)

(Joins sheet 14)

TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA — SHEET NUMBER 8

(Joins sheet 15)

(Joins sheet 9)

TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA — SHEET NUMBER 9

N

(Joins sheet 8)

(Joins sheet 16)

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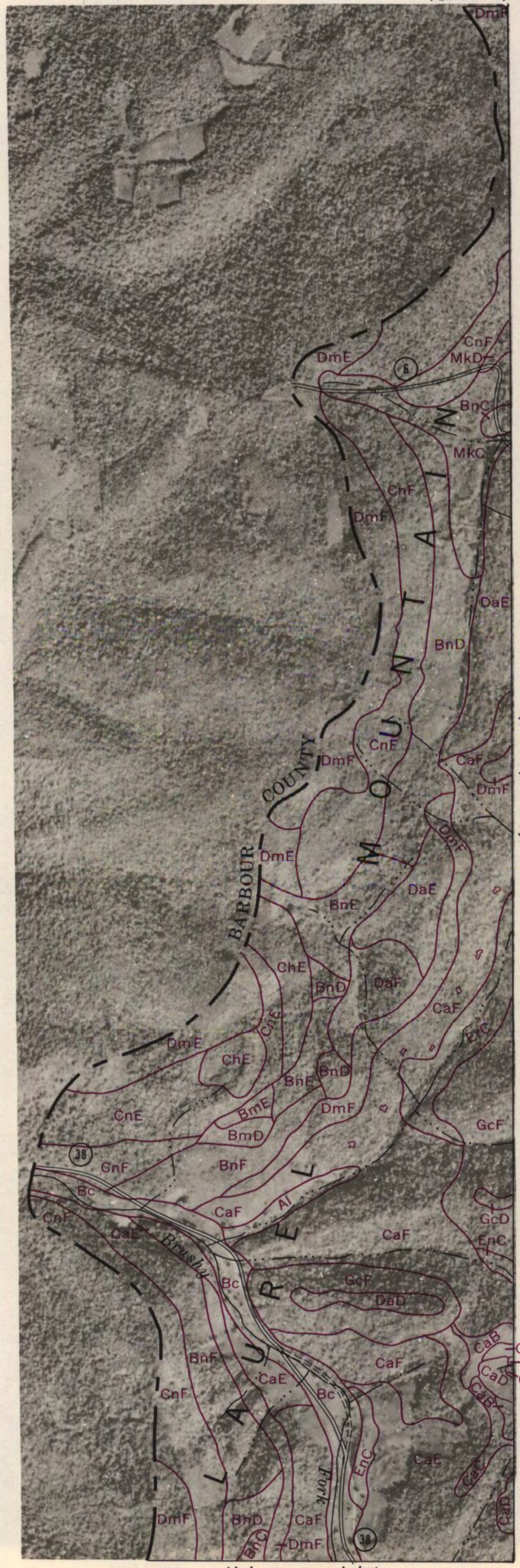
10

N

(Sheet 1)



(Joins upper right)

(Joins lower left)

(Joins sheet 17)

(Joins sheet 4)

(Joins sheet 10)

(Joins sheet 12)

(Joins sheet 18)

This map is one of a set compiled in 1965 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the West Virginia Agricultural Experiment Station, and the U. S. Forest Service.


12
(Joins sheet 5)
(Joins sheet 11)
(Joins sheet 13)
(Joins sheet 19)
N
St George
M O N O N G A H E L A
N A T I O N A L
F O R E S T
CHEAT
RIVER
CLOVER
RUN
HORSESHOE
RUN
Horseshoe Bend
CAMP KIDD
Meadows
BONIFIELD CEMETERY
Coon
Hollow
Mike
Lick
Run
Sailor
Dry
Mill
Holly
RIGHT
FORK
LEFT
FORK

(Joins sheet 6)

N

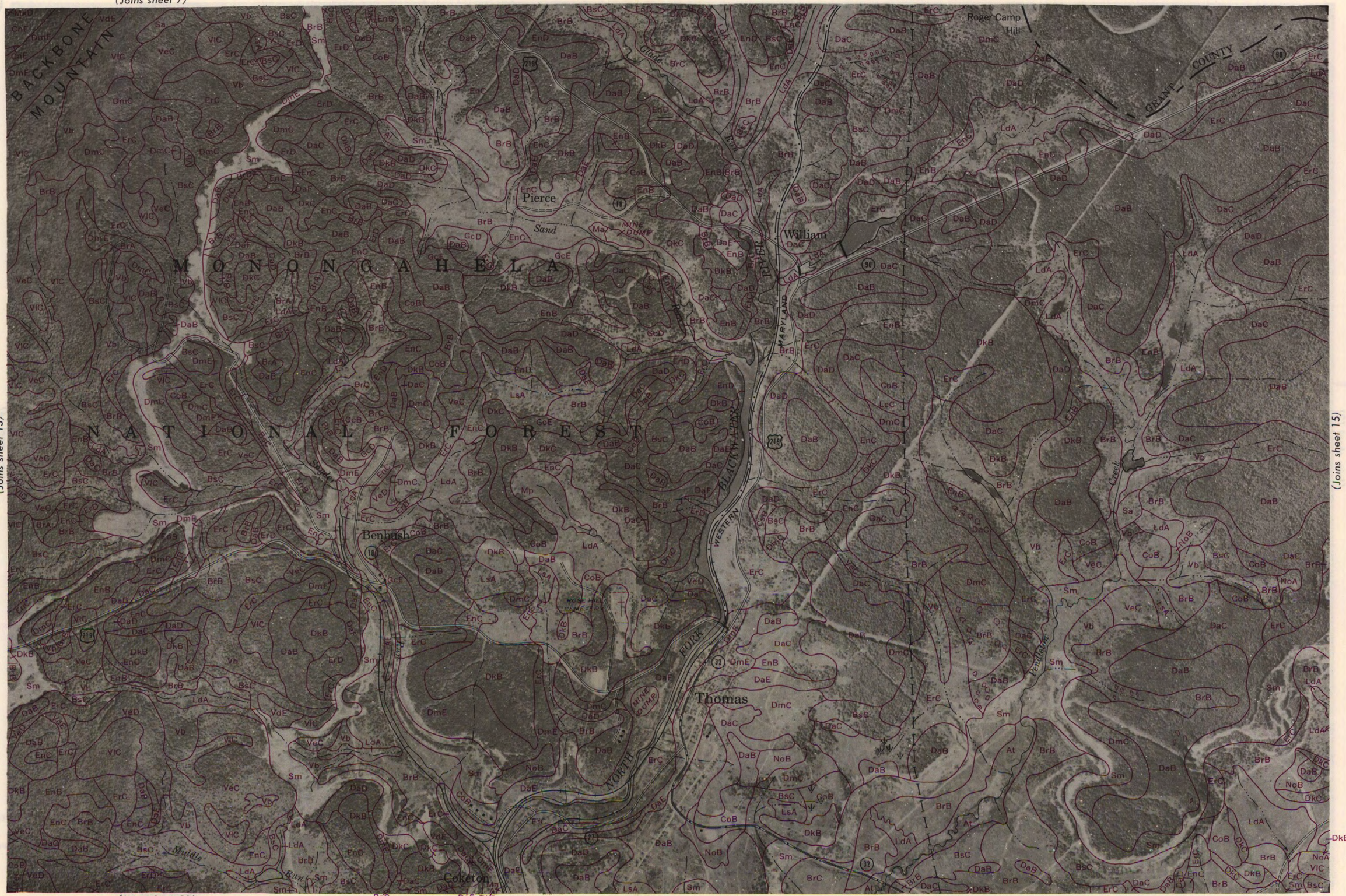
This map is one of a set compiled in 1965 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the West Virginia Agricultural Experiment Station, and the U. S. Forest Service.

(Joins sheet 7)

(Joins sheet 13)

(Joins sheet 15)

(Joins sheet 21)



TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA — SHEET NUMBER 15

(Joins sheet 8)

15

N

(Joins sheet 14)

(Joins sheet 16)

(Joins sheet 22)

This map is one of a set compiled in 1965 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the West Virginia Agricultural Experiment Station, and the U. S. Forest Service.

TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA — SHEET NUMBER 16

(Joins sheet 9)

N

(Joins sheet 15)

(Joins sheet 23)

(Joins sheet 10)

(Joins sheet 18)

17

N

This map is one of a set compiled in 1965 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the West Virginia Agricultural Experiment Station, and the U. S. Forest Service.

(Joins sheet 11)

(Joins sheet 17)

(Joins sheet 19)

(Joins sheet 24)

(Joins sheet 12)

(Joins sheet 18)

(Joins sheet 20)

(Joins sheet 23)

This map is one of a set compiled in 1965 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the West Virginia Agricultural Experiment Station, and the U. S. Forest Service.

20

(Joins sheet 13)

N

(Joins sheet 19)

(Joins sheet 21)

(Joins sheet 26)

TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA — SHEET NUMBER 21

(Joins sheet 14)

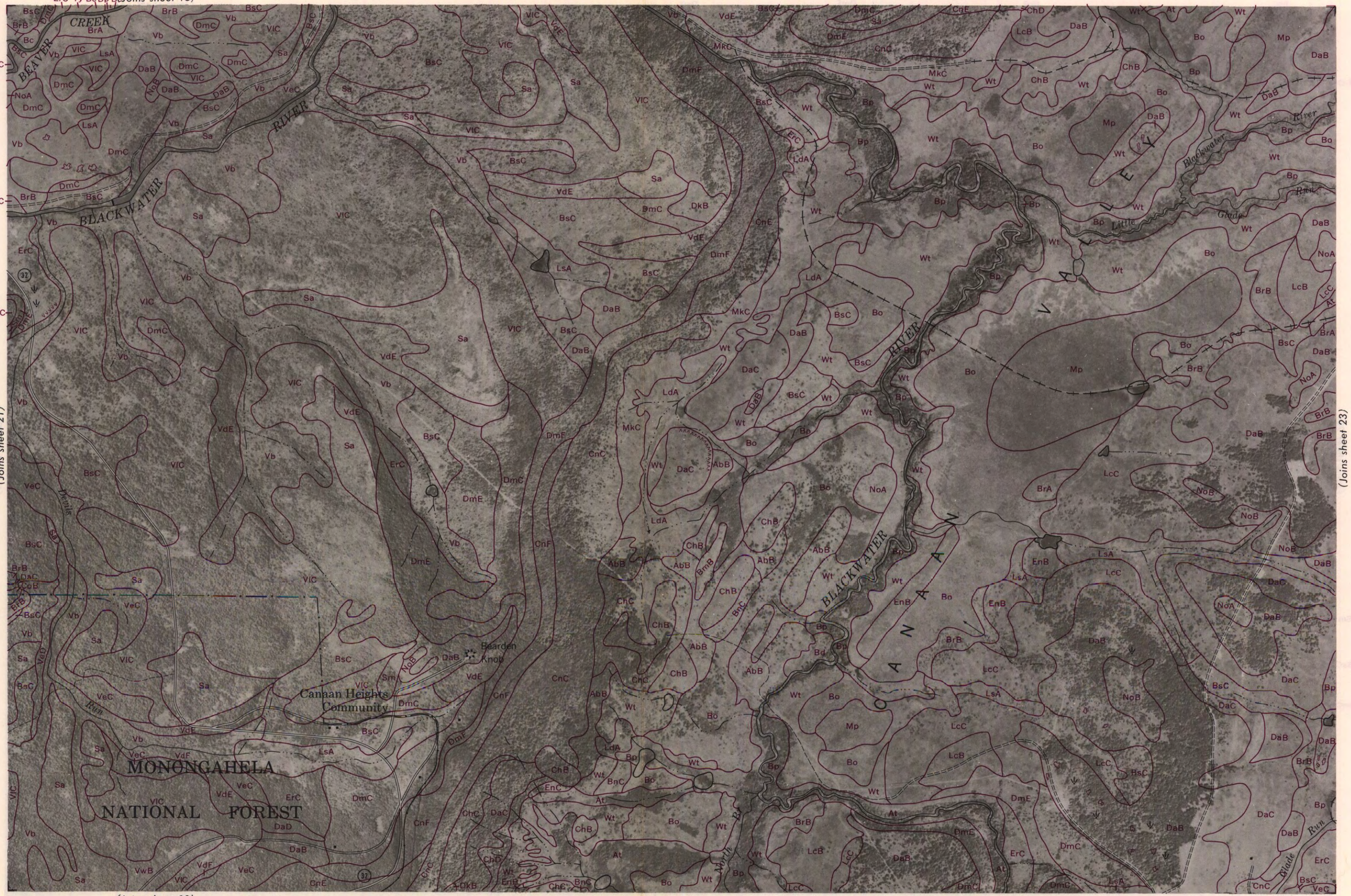
(Joins sheet 20)

(Joins sheet 22)

(Joins sheet 27)

This map is one of a set compiled in 1965 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the West Virginia Agricultural Experiment Station, and the U. S. Forest Service.

(Joins sheet 15)



TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA — SHEET NUMBER 23

(Joins sheet 16)

(Joins sheet 22)

(Joins sheet 29)

This map is one of a set compiled in 1965 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the West Virginia Agricultural Experiment Station, and the U. S. Forest Service.

(24)

N

(Joins sheet 18)

(Joins sheet 25)

(Joins sheet 30)

TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA — SHEET NUMBER 25

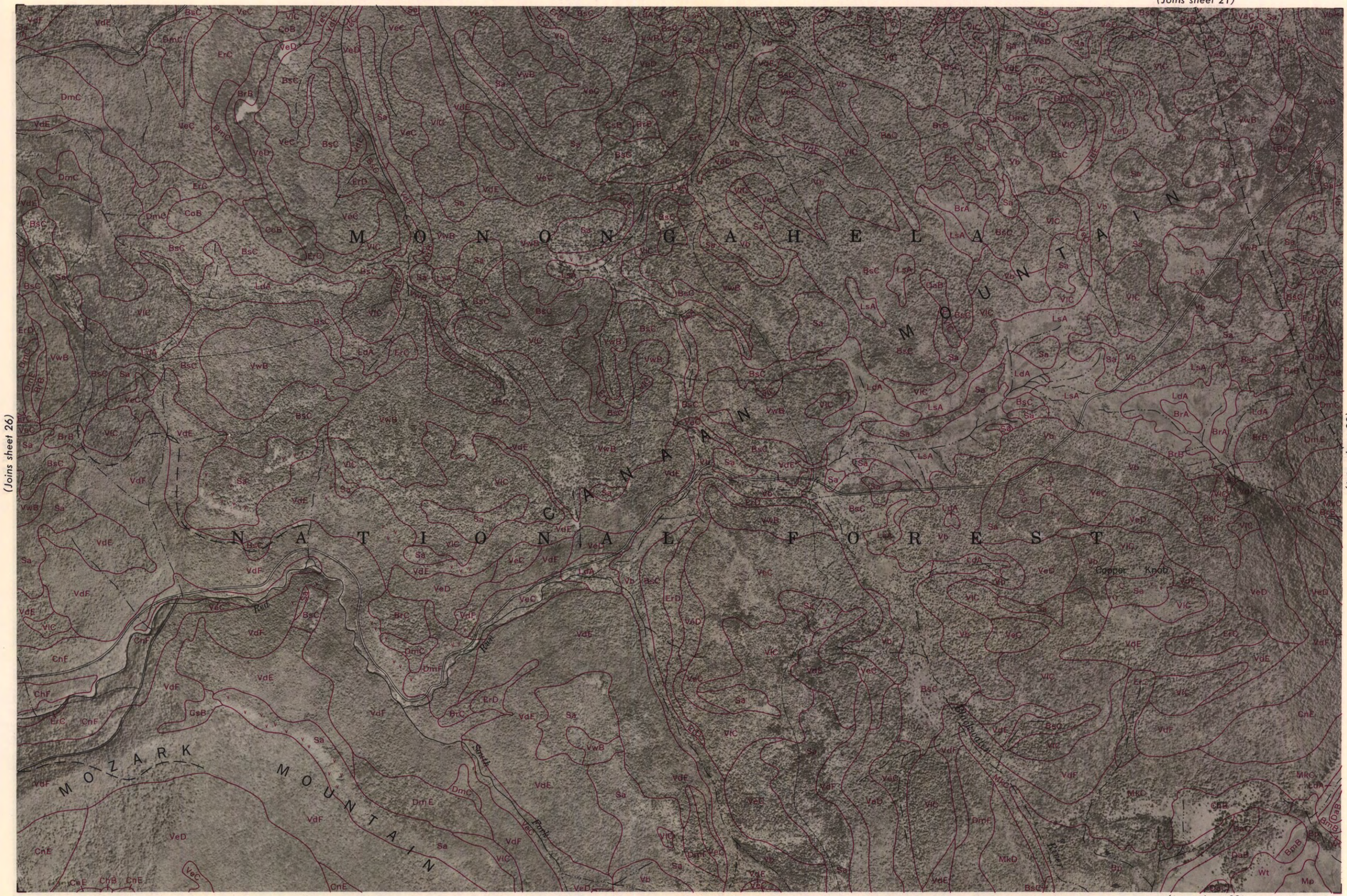
This map is one of a set compiled in 1965 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the West Virginia Agricultural Experiment Station, and the U. S. Forest Service.

TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA — SHEET NUMBER 26

(Joins sheet 20)

(Joins sheet 21)

27



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(Joins sheet 28)

(Joins sheet 33)

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28

N

(Joins sheet 22)

(Joins sheet 23)

(Joins sheet 28)

(Joins sheet 35)

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TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA — SHEET NUMBER 30

(30)

N

(Joins sheet 24)

(Joins sheet 31)

(Joins sheet 36)

TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA — SHEET NUMBER 31

(Joins sheet 25)

31

N

(Joins sheet 30)

(Joins sheet 32)

(Joins sheet 37)

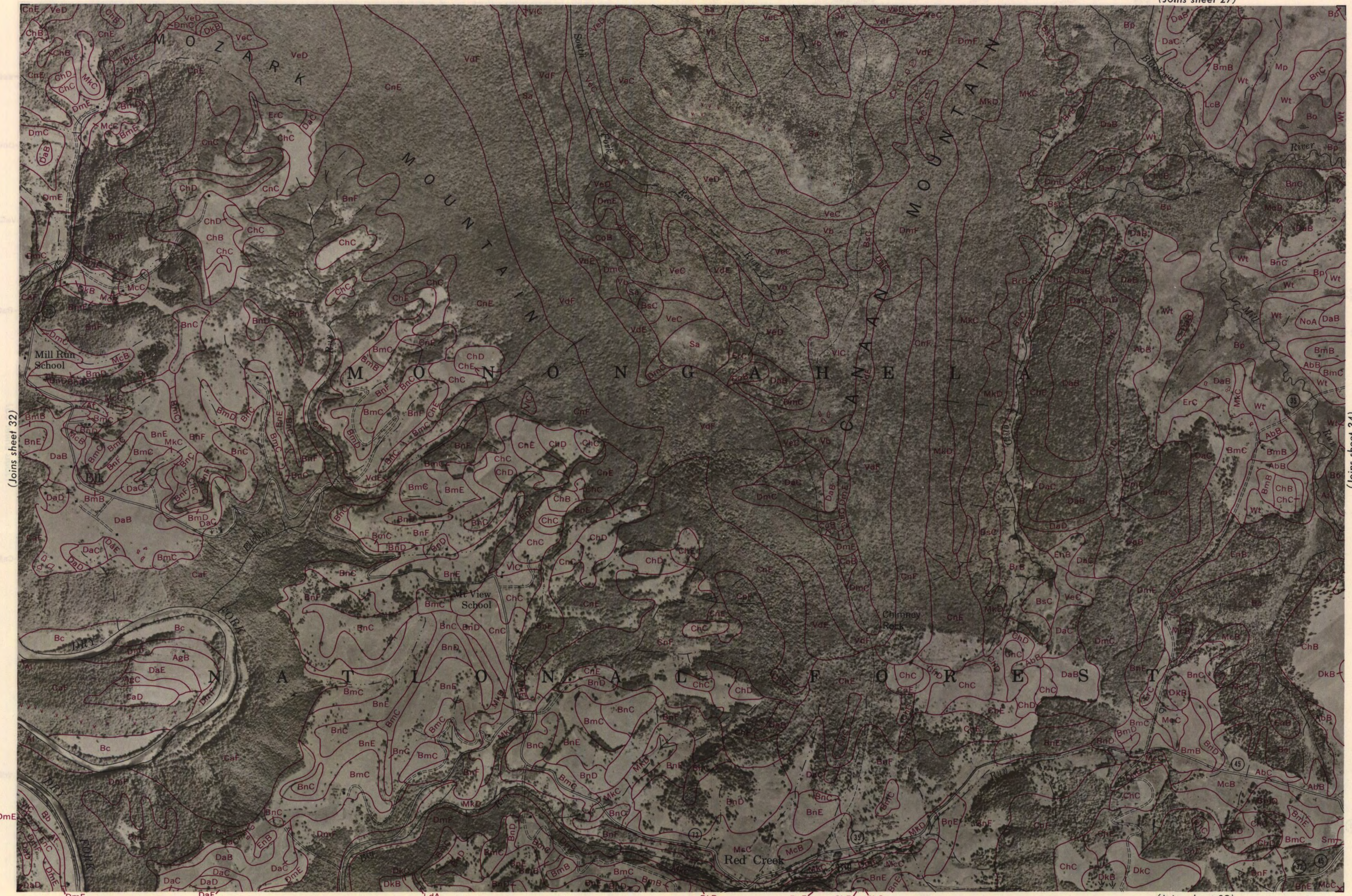
This map is one of a set compiled in 1965 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the West Virginia Agricultural Experiment Station, and the U. S. Forest Service.

(Joins sheet 26)

(Joins sheet 31)

(Joins sheet 33)

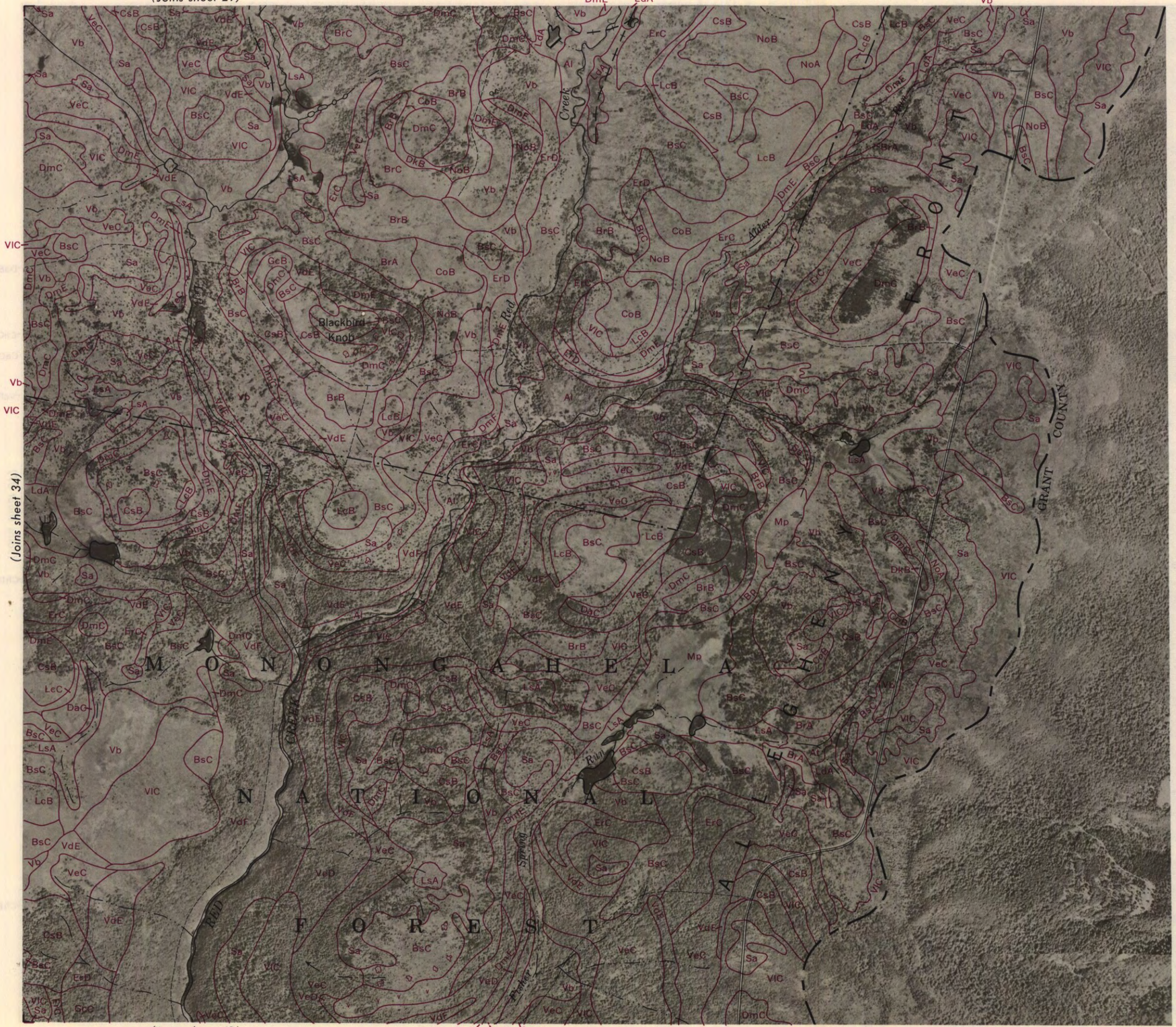
(Joins sheet 38)



This map is one of a set compiled in 1965 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the West Virginia Agricultural Experiment Station, and the U. S. Forest Service.


(Joins sheet 28)
(Joins sheet 33)
(Joins sheet 35)
(Joins sheet 40)
N
BLACKWATER
RIVER
C A N A A N
V A L L E Y
M O N O N G A H E L A
N A T I O N A L   F O R E S T
C A B I N
M O U N T A I N
Cosner School
Buena

(Joins sheet 29)



(Joins sheet 34)

(Joins sheet 41)

This map is one of a set compiled in 1965 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the West Virginia Agricultural Experiment Station, and the U. S. Forest Service.

N

N

(Joins sheet 30)

(Joins sheet 37)

(Joins sheet 42)

(Joins sheet 31)

37

N

(Joins sheet 36)

(Joins sheet 38)

(Joins sheet 43)

This map is one of a set compiled in 1965 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the West Virginia Agricultural Experiment Station, and the U. S. Forest Service.

TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA — SHEET NUMBER 38

(Joins sheet 32)

N

(Joins sheet 37)

(Joins sheet 39)

(Joins sheet 44)

TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA — SHEET NUMBER 39

(Joins sheet 33)

39

(Joins sheet 38)

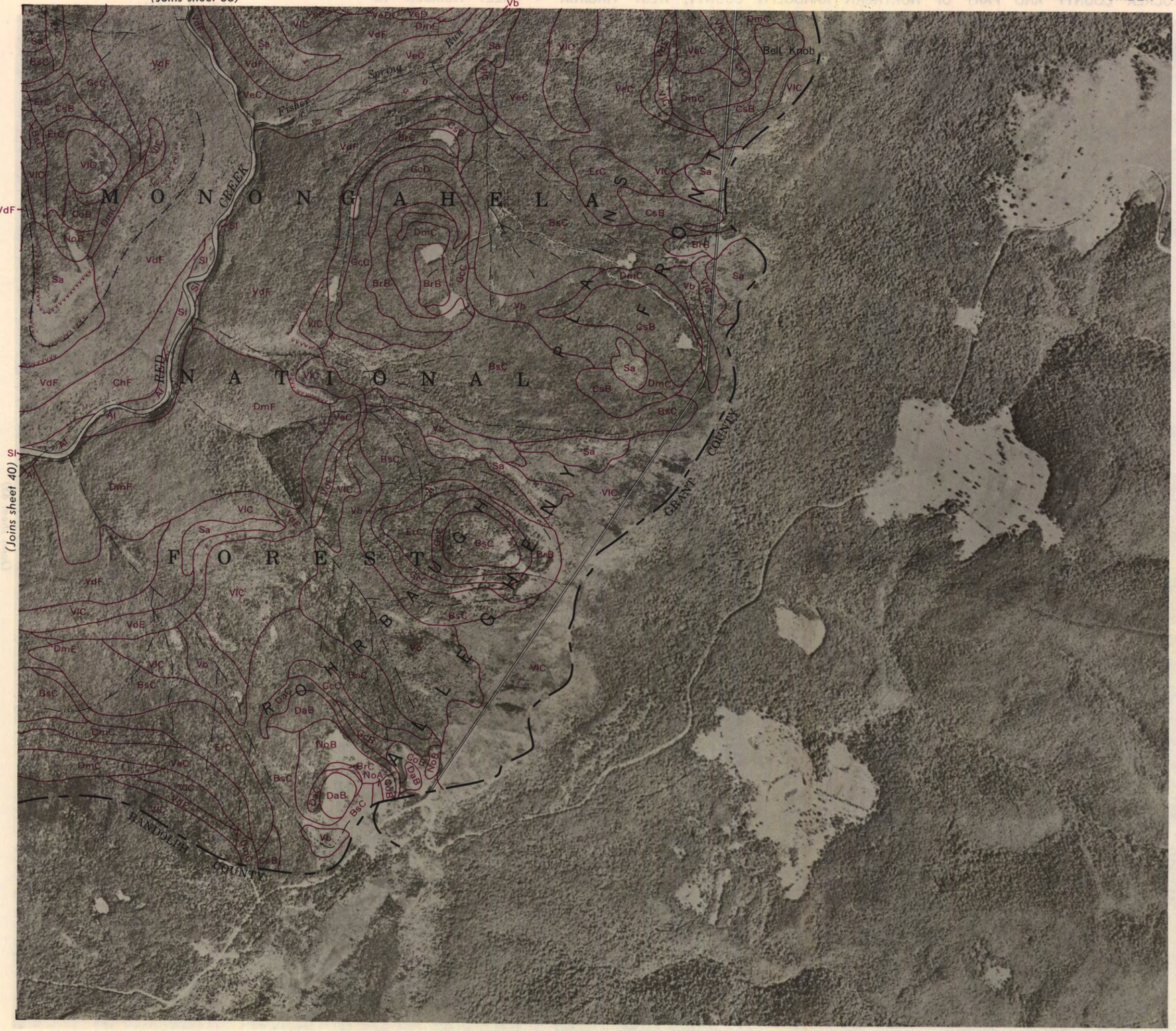
(Joins sheet 40)

(Joins sheet 45)

This map is one of a set compiled in 1965 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the West Virginia Agricultural Experiment Station, and the U. S. Forest Service.


40
(Joins sheet 34)
(Joins sheet 39)
(Joins sheet 41)
N
MONONGAHELA NATIONAL FOREST
CABIN MOUNTAIN
Weiss Knob
Laneville
RED CREEK
RANDOLPH COUNTY

(Joins sheet 35)



(Joins sheet 40)

41

N

(42)

(Joins sheet 36)

N

(Joins sheet 43)

TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA — SHEET NUMBER 43

43

(Joins sheet 37)

(Joins sheet 42)

(Joins sheet 44)

(Joins sheet 46)

N

This map is one of a set compiled in 1965 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the West Virginia Agricultural Experiment Station, and the U. S. Forest Service.

5000 Feet

(44)

(Joins sheet 38)

N

(Joins sheet 43)

(Joins sheet 45)

(Joins sheet 47)

(Joins sheet 39)

(Joins sheet 44)

This map is one of a set compiled in 1965 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the West Virginia Agricultural Experiment Station, and the U. S. Forest Service.

TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA — SHEET NUMBER 46

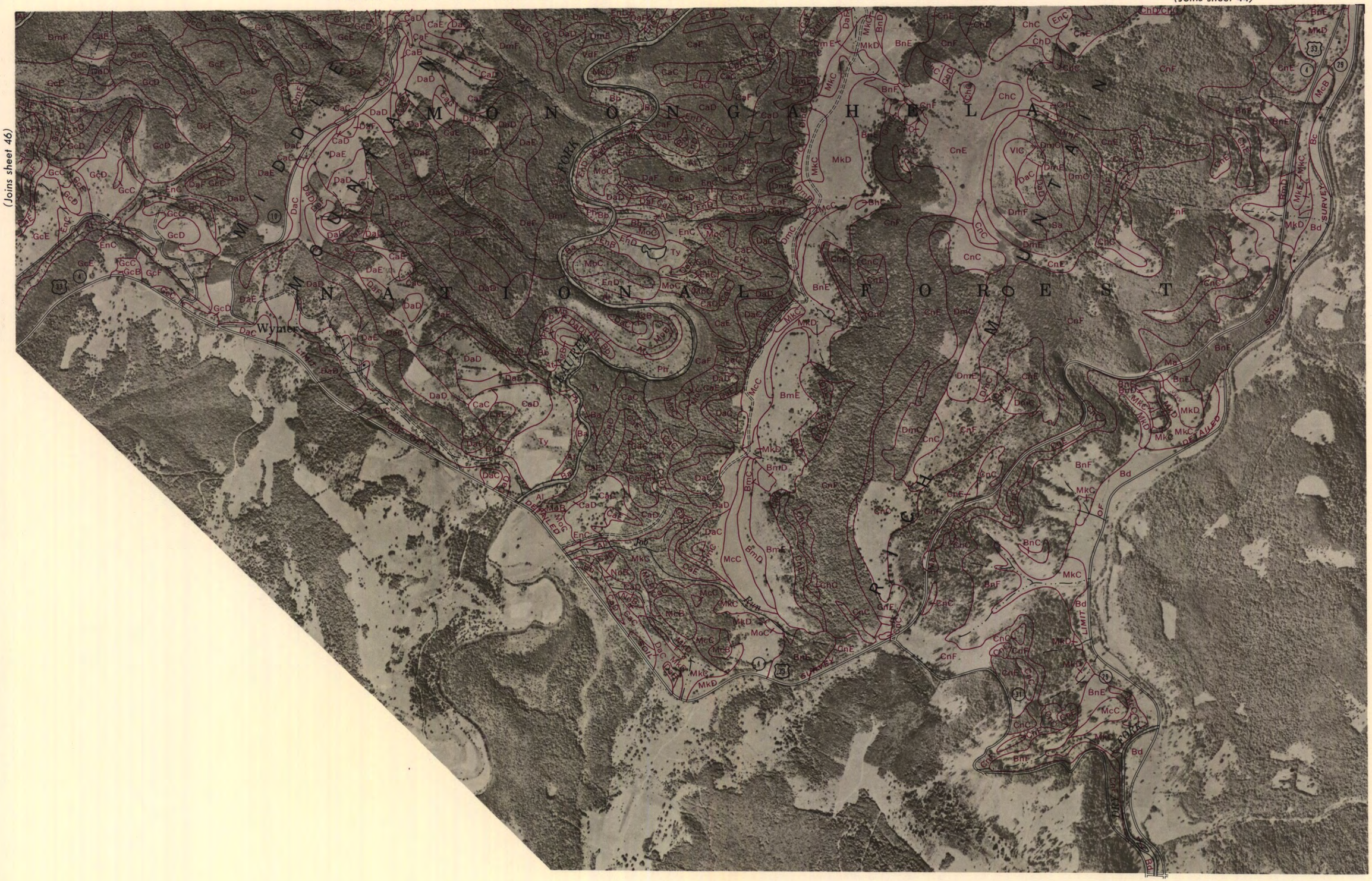
TUCKER COUNTY AND PART OF NORTHERN RANDOLPH COUNTY, WEST VIRGINIA — SHEET NUMBER 47

(Joins sheet 44)

(Joins sheet 46)

47

N



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