United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Kentucky Natural Resources and Environmental Protection Cabinet and Kentucky Agricultural Experiment Station

Soil Survey of Breckinridge and Meade Counties, Kentucky

How to Use This Soil Survey

General Soil Map

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

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

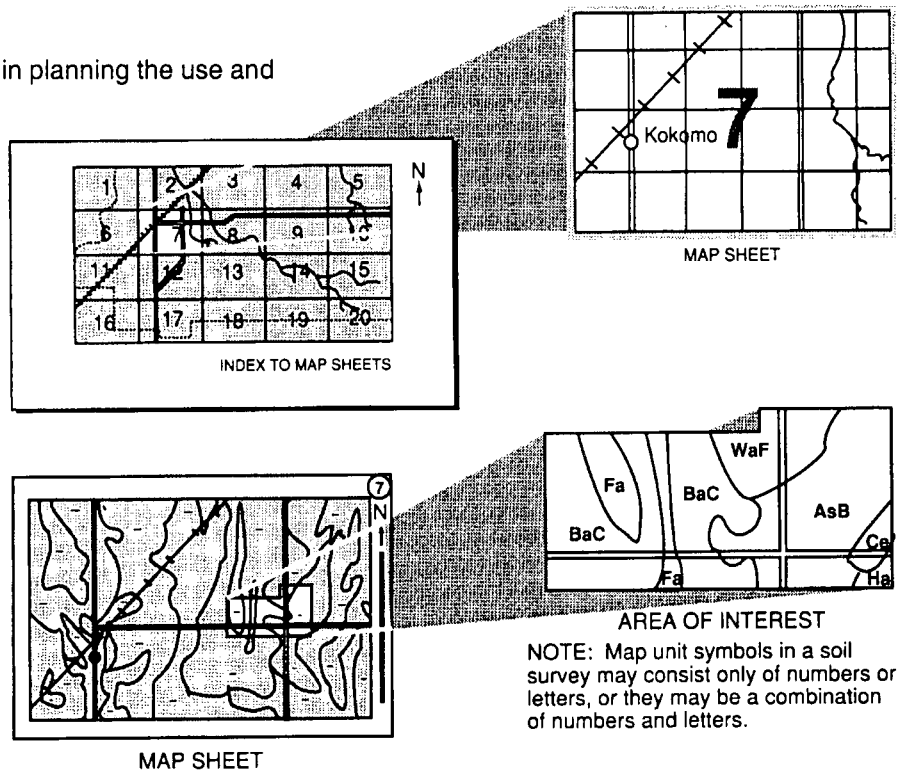
Detailed Soil Maps

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

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

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

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



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

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

Major fieldwork for this soil survey was completed in 1992. Soil names and descriptions were approved in 1992. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1992. This survey was made cooperatively by the Natural Resources Conservation Service, the Kentucky Natural Resources and Environmental Protection Cabinet, and the Kentucky Agricultural Experiment Station. The survey is part of the technical assistance furnished to the Breckinridge County Conservation District and the Meade County Conservation District.

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

Cover: Fescue pasture in an area of the Crider-Fredonia general soil map unit. Caneyville soils are in the foreground. Crider soils are in the valley. Fredonia, Caneyville, and Corydon soils are in the background.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov (click on "Technical Resources").

Contents

Issued 2001

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

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

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations that affect various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

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

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

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Soil Survey of Breckinridge and Meade Counties, Kentucky

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United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the Kentucky Natural Resources and Environmental Protection Cabinet and
the Kentucky Agricultural Experiment Station

BRECKINRIDGE AND MEADE COUNTIES are in the central part of Kentucky bordering the Ohio River (fig. 1). They are in the Kentucky and Indiana Sandstone and Shale Hills and Valleys and the Highland Rim and Pennyroyal Land Resource Areas (USDA 1981). The combined area of the counties is about 910 square miles. Breckinridge County has an area of 374,873 acres, and Meade County has an area of 207,552 acres. In 1990, Breckinridge County had a population of 16,312 and Meade County had a population of 24,170 (U.S. Department of Commerce 1991). Hardinsburg is the county seat of Breckinridge County, and Brandenburg is the county seat of Meade County.

The topography of Breckinridge and Meade Counties is very diverse. Most of Breckinridge County and the northwestern part of Meade County are in the Western Coal Fields physiographic region (Bailey and Winsor 1964). This area consists of a highly dissected plateau that has narrow to broad ridgetops, steep side slopes, and narrow valleys. The eastern part of Breckinridge County and the remainder of Meade County are in the western Pennyroyal region. This area is a lower lying karst plain that has undulating to hilly topography. Remnants of the highly dissected plateau area in Breckinridge County extend into the karst plain in the southwestern part of Meade County as isolated knobs, forming steep side slopes, narrow ridgetops, and narrow to broad karst valleys.

Rough River, which flows southwesterly, and many tributary streams drain the southern part of Breckinridge County. The northern part of Breckinridge County and the northwestern part of Meade County are drained by narrow, winding streams that flow into the Ohio River in the northernmost part of the survey area. A few small streams run through the karst plain into the Ohio River, but most of the area is drained through sinkholes into underground streams.

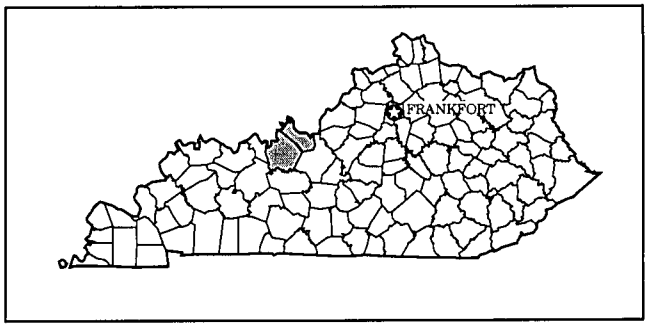

Figure 1.—Location of Breckinridge and Meade Counties in Kentucky.

The lowest elevation in the survey area is 358 feet. It is in an area where the Ohio River leaves Breckinridge County at its western boundary. The highest elevation in the survey area is 1,020 feet. It is at the top of Bee Knob Hill, directly east of Kentucky Highway 144, about 2.2 miles north of Flaherty, in southern Meade County (USGS 1963, 1965). The highest point in Breckinridge County is a small knoll

directly south of High Plains Corner. It has an elevation of 920 feet (USGS 1964).

Breckinridge and Meade Counties are mainly rural. Farming is the main source of income; however, industries in these and surrounding counties provide jobs for individuals not involved in farming or farm-related occupations. Some of these industries are construction, chemical processing, furniture manufacturing, timber production and wood processing, and automobile manufacturing. Some residents are employed at the Fort Knox Military Reservation. Others are part-time farmers and also work in one of the industries.

General Nature of the Survey Area

This section provides general information about the survey area. It describes history, geology, climate, natural resources, transportation and markets, farming, and recreation in Breckinridge and Meade Counties.

History

Breckinridge County was established from part of Hardin County in 1800 as the 39th county in Kentucky. The county was named in honor of the distinguished lawyer and statesman, John C. Breckinridge. Colonel Breckinridge helped to write the Kentucky Constitution of 1798-99. He also served as Attorney General of the United States under Thomas Jefferson. In 1780, the first permanent settlement was established in Breckinridge County. It was named Hardin's Fort by Colonel William Hardin, the nephew of John Hardin for whom Hardin County was named. The name Hardin's Fort was later changed to Hardinsburg. In 1800, Hardinsburg was incorporated. Joesville was settled in 1798 as a river town on the northwestern edge of the county. It was later called Cloverport and was incorporated in 1860. Cloverport was a regional shipping port on the Ohio River to markets in New Orleans. In 1921, a road was built connecting Bowling Green and Cloverport. From then on, agricultural products were transported to Cloverport for shipment from as far away as Bowling Green. Glen Dean and Irvington became noteworthy as trade centers in Breckinridge County when the "Iron Horse" railroad provided access to other parts of the county and state (Collins 1968; Thompson n.d.).

Meade County was the 76th county to be formed in the Commonwealth. It was established in 1823 from parts of Hardin and Breckinridge Counties. It was named in honor of Captain James Meade, a gallant solder who died in the Battle of River Raisin in 1813. Brandenburg, the county seat, was incorporated in 1825. It is situated on a bluff overlooking the Ohio River (Bicentennial Committee 1992; Collins 1968). It was important early in its history as a shipping port for agricultural products. During the Civil War, Confederate General John Hunt Morgan crossed the Ohio River at Brandenburg. He died shortly thereafter in battle.

Immigrants to Meade County established small communities in areas where water or transportation was available. In the late 1700's, several grist mills and textile mills were built on Otter Creek and Doe Run. Garnettsville, Grahamton, and other towns developed around these mills. The first railroad was built through Meade County in 1889. Guston, Ekron, Brandenburg Station, and Rock Haven were built along its tracks.

When the first settlers arrived in the area, they found large tracts of forest land and rich, fertile soils. About two-thirds of Meade County was "barrens," or native grasslands. Most of the early settlers came from Virginia, North Carolina, or Pennsylvania. They were primarily farmers who cleared the land of trees and established farms. The timber from land clearing was rolled into the creeks and floated to nearby markets.

Geology

Most of Breckinridge County and the northwestern part of Meade County are in the Western Coal Fields physiographic region. The eastern part of Breckinridge County and the remainder of Meade County are in the Western Pennyroyal physiographic region.

The bedrock in the extreme western part of Breckinridge County consists of sandstone, siltstone, and shale of the Caseyville Formation. This formation is of early Pennsylvanian age (McFarlan 1943).

The bedrock layers extending north and east across Breckinridge County and into the northwestern part of Meade County are in the Chester Series. This part of the survey area is composed of several formations and members of late Mississippian age. The formations are made up of sandstone, siltstone, shale, and limestone. This variety of formations gives rise to an area of diverse topography and soils. This area is also described as part of the Dripping Springs Cuesta, which ends to the east by a steep escarpment near Irvington, and is known locally as Sinking Creek Hill. It has many caves and springs, from which it derived its name.

East of the Dripping Springs Cuesta and 150 to 250 feet lower in elevation lies the karst plain of the Western Pennyroyal. The plain extends from the eastern edge of Breckinridge County to the eastern edge of Meade County. The bedrock, which is

Mississippian aged limestone, is from the St. Louis and Ste. Genevieve Formations (fig. 2).

A loess mantle covers the entire survey area. The thickness of the mantle ranges from a few inches on steep side slopes to more than 4 feet in other areas (Macneal unpublished).

The soils on flood plains and stream terraces are derived from alluvial and lacustrine deposits of Quaternary age. An old oxbow of the Ohio River, which is a unique geologic feature of the area, is included in the northwestern part of Meade County. The soils in this oxbow are predominantly slackwater lacustrine clays (USGS 1970, 1972).

The Locust Hill and Cave Springs Fault Systems run north and east from the North Fork of Rough River to about Brandenburg. These systems are part of the larger Rough Creek Fault System, which crosses the western part of Kentucky.

Climate

Breckinridge and Meade Counties are hot in summer, especially at low elevations, and moderately cool in winter, especially on high hills. Rainfall is fairly heavy and well distributed throughout the year. Snow falls nearly every winter, but snow cover lasts only a few days.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Rough River Dam in the period 1964 to 1988. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 33 degrees F and the average daily minimum temperature is 22 degrees. The lowest temperature on record, which occurred on January 17, 1977, is -21 degrees. In

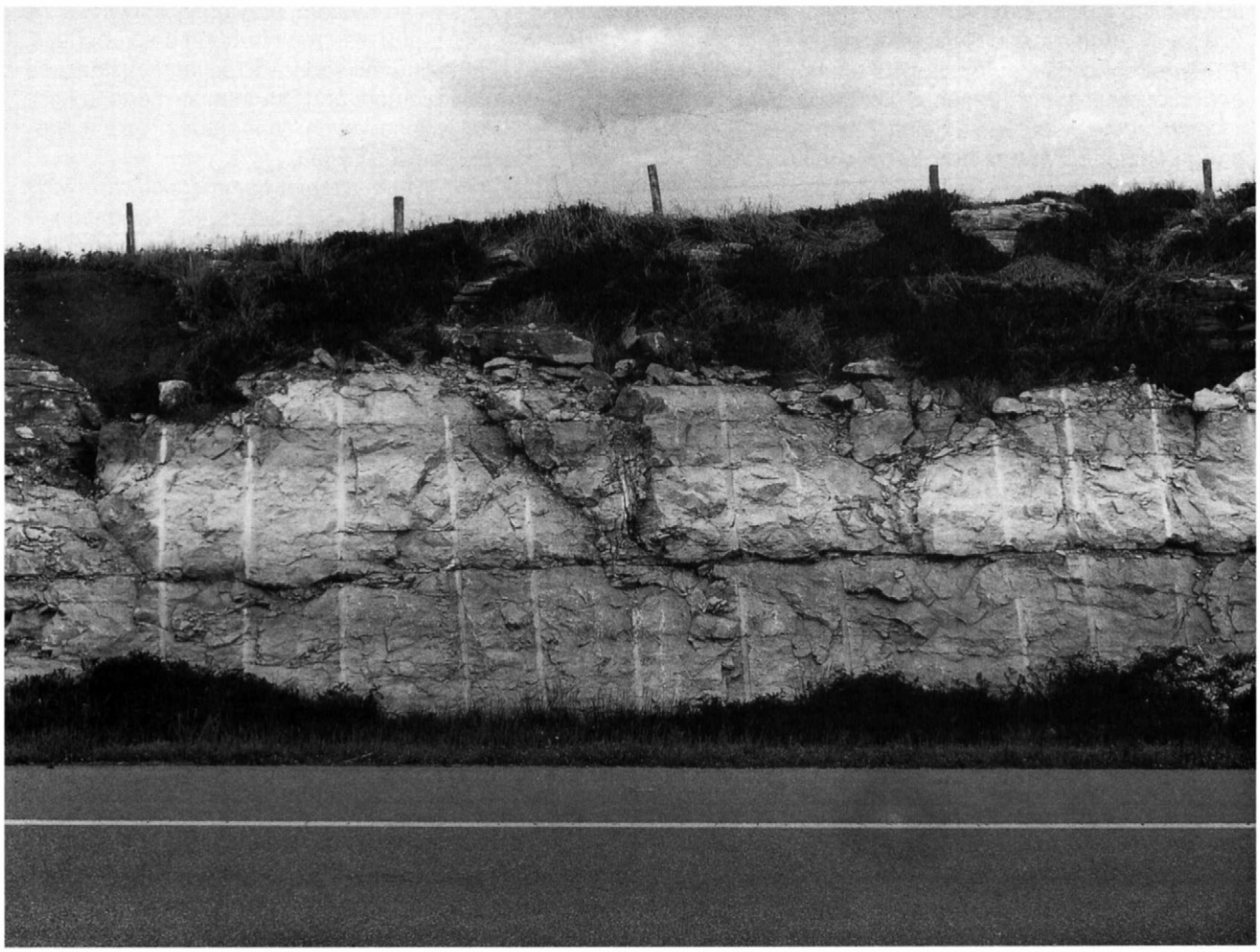

Figure 2.—Ste. Genevieve limestone exposed in a road cut in an area of Fredonia-Crider complex, karst, rocky, 6 to 12 percent slopes, eroded. This limestone underlies the karst plain of Breckinridge and Meade Counties.

summer, the average temperature is 75 degrees and the average daily maximum temperature is 87 degrees. The highest recorded temperature, which occurred on July 9, 1988, is 105 degrees.

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

The total annual precipitation is about 48 inches. Of this, 26 inches, or 54 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 22 inches. The heaviest 1-day rainfall during the period of record was 4.7 inches on February 18, 1976. Thunderstorms occur on about 45 days each year, and most occur in summer.

The average seasonal snowfall is about 9 inches. The greatest snow depth at any one time during the period of record was 12 inches. On the average, 11 days of the year have at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 65 percent of the time possible in summer and 55 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 10 miles per hour, in spring.

Natural Resources

The most important natural resources in the survey area are soil, water, timber, and limestone. Of these, soil is the most important. It is used to grow food and fiber, as a foundation for houses and factories, and as a material for building dams and roads.

Water is adequate for domestic, agricultural, and recreational uses throughout the survey area. All of the incorporated towns and many rural areas are served by community water systems. The Ohio River and Rough River Lake are the sources of water for community water systems in Breckinridge County, and the Ohio River provides water for parts of Meade County. Outlying areas obtain water from wells, cisterns, and springs. The Ohio and Rough Rivers provide water for boating and fishing. Farm ponds, springs, small lakes, and creeks are used throughout the survey area as a source of water for livestock and irrigation and for fishing and swimming.

In 1975, Breckinridge and Meade Counties had about 233,100 acres of forest land (Kinsley and Powell 1978). Most of this acreage is still used as forest. The major tree species are oak, hickory, maple, ash, beech, sweetgum, and poplar. Most of the forests have been heavily logged in the past; however, the current practice of reforestation after timber harvest will help to provide income in the future (fig. 3).

Limestone, sand, and gravel for agricultural and industrial uses are mined from several quarries in the survey area. Meade County is well known for high-grade oolitic limestone, which is used in the manufacture of cement.

Transportation and Markets

A network of Federal, State, and county highways provide access to Breckinridge and Meade Counties. The CSX Railroad System, previously known as the Seaboard System, also runs through both counties. It provides mainline rail service to several businesses in Cloverport, Irvington, and Brandenburg and to Fort Knox Military Reservation. Numerous products are shipped or received by rail.

The Ohio River is a major commercial waterway. Locks and dams on the river ensure a navigation channel that is deep enough for commercial traffic at all times. Breckinridge County Airport has a paved, 3,500-foot runway; however, Standiford Field in Louisville is the closest airport with scheduled commercial air traffic (Resources for Economic Development 1990).

Most of the agricultural products in the county are marketed elsewhere. Tobacco is sold at warehouses in Owensboro, Bowling Green, and Louisville. Grain that is not consumed locally also is sold to processors, millers, and elevators in Owensboro, Bowling Green, and Louisville. Most cattle and hogs are trucked to stockyards and meat-packing plants in Owensboro or Louisville. A small stockyard is in Irvington.

Farming

In 1987, Breckinridge County had 1,473 farms, averaging 182 acres each, and Meade County had 809 farms, averaging 145 acres each. About 74 percent of the land in Breckinridge County and about 60 percent of the land in Meade County were used as farmland (U.S. Department of Commerce 1989).

The principal crops in the survey area are corn, wheat, soybeans, tobacco, hay, and timber. The

Figure 3.—Local timber at a sawmill. Timber has been an important, income-producing resource in the survey area.

livestock raised include beef cattle, hogs, sheep, mules, horses, goats, poultry, and dairy cattle. The production of specialty crops, such as fruits, vegetables, Christmas trees, and nursery stock, has increased in both counties.

In 1990, the total cash receipts from crop production were about $21,379,000 in Breckinridge County and about $9,050,000 in Meade County. Total livestock receipts were about $21,200,000 and $10,146,000, respectively (Kentucky Agricultural Statistics Service 1991).

Recreation

A wide variety of recreational opportunities are available in the survey area. Rough River Lake, which is in the southern part of Breckinridge County, was impounded in 1959 by the U.S. Army Corps of Engineers for flood control in the Rough River valley and for recreation (fig. 4). This 5,100-acre lake and the surrounding area have been developed for fishing, swimming, boating, camping, and picnicking. Rough River Dam State Resort Park is located directly across from the dam in Grayson County.

Otter Creek Park, which is in the northern part of Meade County, covers 3,000 acres. It is a public recreation area owned by the city of Louisville. It provides opportunities for camping, picnicking, hiking, and fishing and is the site of a nature center.

The Kentucky Department of Fish and Wildlife Resources (KDFWR) manages several tracts of land in both counties for seasonal hunting and for fishing. These areas include the 6,000-acre Yellowbank Wildlife Management Area and the Glen Dean Wildlife Area in Breckinridge County. The KDFWR also supervises the management of the privately owned, 2,600-acre Lapland Wildlife Management Area in the northern part of Meade County. The land in these areas is managed to provide adequate hunting of small game, migratory birds, and white-tailed deer.

Numerous farm ponds and lakes, along with the many rivers and streams in the survey area, provide

Figure 4.—Rough River Reservoir was built for both flood control and recreation. Rosine-Gilpin-Lenberg complex, 12 to 20 percent slopes, eroded, is in the wooded area in the background.

ample fishing opportunities for local residents and visitors.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil.

The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

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

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

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

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

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

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

The soil lines on the general soil maps of Breckinridge and Meade Counties match those on the maps of the adjoining counties; however, the soil names do not always correspond. Differences are the result of the relative proportions of the soils in the counties and refinements in the classification of the soils.

Most soil lines on the detailed soil maps of Breckinridge and Meade Counties match those on the maps of adjoining counties; however, a few do not join. Differences are the result of refinements or modifications in the design of map units and improvements in the photographic base used to plot the soil lines. In many places the soil names do not fully agree. Generally, these differences are the result of laboratory analysis that refined the classification of the soils.

Survey Procedures

The general procedures followed in making this survey are described in the "National Soil Survey Handbook" of the Natural Resources Conservation

Service and in the "Soil Survey Manual" (USDA 1993). Soil surveys of other counties in the western part of Kentucky were also used as references.

Before fieldwork began, preliminary boundaries of slopes and landforms were plotted stereoscopically on high-altitude aerial photographs taken in 1982 at a scale of 1:20,000. U.S. Geological Survey geologic and topographic maps at a scale of 1:24,000 were also used (USGS 1963, 1964, 1965, 1970, 1972). Map units were then designed according to the pattern of soils interpreted from photographs, maps, and field observations (USDA 1966).

Two levels of mapping intensity were used in this survey. More closely spaced observations were made on the ridgetops and in the valleys where the soils are used for agriculture or urban development. Less closely spaced observations were made on the steeper side slopes where the soils are used as woodland and wildlife habitat. For either level of mapping intensity, the information about the soils can be used to determine soil management and to predict the suitability of the soils for various uses.

Traverses on the ridgetops and in the valleys were made by truck or on foot. The soils were examined at intervals ranging from a few hundred feet to about 1/4 mile, depending on the landscape and soil pattern. Observations of special features, such as landforms, vegetation, evidence of erosion, and evidence of flooding, were made continuously without regard to spacing. Soil boundaries were determined on the basis of soil examinations, observations, and photo interpretations. In many areas, such as those where very steep slopes intersect with flood plains, these boundaries are precise because of an abrupt change in the landform. The soils were examined with the aid of a hand probe, a bucket auger, or a spade to a depth of about 3 to 5 feet. The typical pedons were observed in pits dug by hand or by backhoe. Additional soil descriptions were obtained throughout the area as mapping progressed.

Traverses on the steeper side slopes were made by truck or on foot along the existing network of roads and trails. These traverses commonly were made from 1/4 to 1/2 mile apart where the geologic materials and landscapes were uniform. In areas where differences in geologic material or landscape were observed, traverses were made at intervals close enough for the soil scientists to observe any differences among the soils. Examinations were made at intervals ranging from a few hundred feet to about 1/4 mile. Observations of landforms and vegetation were made continuously without regard to spacing. Where soil profiles were readily observable, such as along recently constructed logging roads or excavation sites, observations of the content of rock fragments, depth to bedrock, depth of rooting, the landform, and the underlying material were made without regard to spacing. Soil boundaries were plotted stereoscopically on the basis of parent material, landform, and relief. Many of these boundaries cannot be exact because they fall within a zone of gradual change between landforms. Much intermingling of the soils occurs in these zones. Soil descriptions were obtained through statistical sampling techniques.

Samples for physical and chemical analyses were taken from the site of the typical pedon of the major soils in the survey area. Most of the analyses were made by the University of Kentucky. Commonly used laboratory procedures were followed (USDA 1996).

The results of the analyses of selected soils are given in tables 17 and 18. In addition to the selected data published in this survey, similar data were collected on Chagrin, Cuba, Stendal, Elk, Wheeling, Varilla, Sciotoville, and Pekin soils. For some of these soils, only a few horizons were analyzed.

General Soil Map Units

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

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

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

Areas Dominated by Nearly Level to Very Steep, Loamy and Clayey Soils on Alluvial Stream Terraces and Flood Plains

The soils in this group are on stream terraces and flood plains in the Ohio River valley along the northern edge of the survey area. Most of the soils are nearly level to very steep, very deep, and well drained to somewhat poorly drained.

The three map units in this group make up about 3 percent of Breckinridge County and about 6 percent of Meade County. In most areas these soils are used for cultivated crops or pasture. In a few areas on the steeper slopes, they are used as woodland. The slope, moderately slow or slow permeability, and the clayey texture of the subsoil are the main limitations affecting most uses.

1. Elk-Sciotoville-Markland

Nearly level to very steep, very deep, well drained and moderately well drained, loamy and clayey soils on stream terraces

This map unit consists of narrow, irregularly shaped areas along the Ohio River and its major tributaries in the northwestern part of Breckinridge County. The landscape is characterized by nearly level and gently sloping stream terrace flats and sloping to very steep terrace side slopes (fig. 5). The terraces run roughly parallel to the Ohio River and its major tributary streams. They extend from the Ohio River to the adjacent, wooded upland side slopes. The soils formed in old, mixed alluvium and in clayey slackwater deposits. Moderately deep, narrow drainageways dissect the map unit. The communities of Ammons, Cloverport, and Stephensport and several scattered farmsteads are located in the map unit.

This map unit makes up about 3 percent of Breckinridge County. It is about 36 percent Elk soils, 15 percent Sciotoville soils, 8 percent Markland soils, and 41 percent soils of minor extent.

Elk soils are very deep and well drained. These nearly level to very steep soils are on stream terrace flats and on the adjacent terrace side slopes. They are loamy throughout and formed in old, mixed alluvium.

Sciotoville soils are very deep and moderately well drained. These nearly level and gently sloping soils are on stream terrace flats. They have a compact and brittle fragipan at a depth of about 28 inches. They are generally at the same or on slightly lower elevations than the Elk soils. They are loamy throughout and formed in old, mixed alluvium.

Markland soils are very deep and well drained. These sloping to steep soils are on side slopes of stream terraces. They formed in slackwater deposits. They are clayey in the subsoil and substratum.

Of minor extent in this map unit are McGary, Weinbach, and Wheeling soils on stream terraces and Huntington, Lindside, Newark, and Nolin soils on flood plains.

Most of the acreage in this map unit is used for cultivated crops, hay, or pasture. The cultivated crops are mainly corn, soybeans, and tobacco. A few areas are used as woodland or have been developed for urban uses.

In most areas these soils are suited to cultivated crops, hay, and pasture. The hazard of erosion on the steeper slopes and occasional flooding on the flood plains and low stream terraces in late winter and early

Figure 5.—A typical area of the Elk-Sciotoville-Markland general soil map unit used as cropland. Rosine, Gilpin, and Lenberg soils are on the wooded hillsides in the background.

spring are the main limitations in areas that are farmed.

These soils have moderately high to very high potential for woodland productivity. The equipment limitation and plant competition are the main management concerns.

In some areas these soils are well suited to urban uses. In other areas, however, they are not suited to urban uses because of the flooding, the shrink-swell potential, the wetness, and very slow permeability.

2. Elk-Huntington-Wheeling

Nearly level to very steep, very deep, well drained, loamy soils on stream terraces and flood plains

This map unit consists of narrow, irregularly shaped areas along the northern edge of Meade County. The areas are along the Ohio River and its major tributaries. The landscape is characterized by nearly level to sloping stream terrace flats, moderately steep to very steep stream terrace side slopes, and nearly level flood plains (fig. 6). The terraces run roughly parallel to the Ohio River and its major tributary streams. They extend from the Ohio River to the adjacent, wooded upland side slopes. The soils formed in old, mixed alluvium or in recent alluvium. The community of Wolf Creek, scattered farmsteads, and a large chemical plant are located in the map unit.

This map unit makes up about 5 percent of Meade County. It is about 29 percent Elk soils, 16 percent Huntington soils, 14 percent Wheeling soils, and 41 percent soils of minor extent.

Elk soils are very deep and well drained. These nearly level to very steep soils are on stream terrace flats and on the adjacent, terrace side slopes. They are loamy throughout and formed in old, mixed alluvium.

Huntington soils are very deep and well drained. These nearly level soils are on flood plains. They are loamy throughout and formed in recent alluvium.

Wheeling soils are very deep and well drained. These gently sloping and sloping soils are on stream terrace flats and shoulder slopes. They are generally on slightly higher elevations than the Elk soils. They are loamy throughout and formed in old, mixed alluvium.

Of minor extent in this map unit are Lakin, Sciotoville, and Weinbach soils on stream terraces and Chagrin, Lindside, Newark, Nolin, and Yeager soils on flood plains.

Most of the acreage in this map unit is used for cultivated crops, hay, or pasture. The cultivated crops are mainly corn, soybeans, and tobacco. A few areas are used as woodland, and a few areas have been developed for urban uses.

In most areas these soils are well suited to cultivated crops, hay, and pasture. The hazard of erosion on the steeper slopes and occasional flooding on the flood plains and low stream terraces in late winter and early spring are the main limitations in areas that are farmed.

These soils have very high or high potential for woodland productivity. The equipment limitation and plant competition are the main management concerns.

In many areas that are not subject to flooding, these soils are suited to urban uses. They are not suited to urban development if they are subject to flooding.

3. McGary-Markland

Nearly level to steep, very deep, somewhat poorly drained to well drained, clayey soils on stream terraces

This map unit consists of an irregularly shaped area in the northwestern part of Meade County. The landscape generally is characterized by broad stream terrace flats and sloping to steep terrace side slopes. The map unit extends across the valley floor of an old oxbow of the Ohio River. The terraces are dissected by small streams that empty into Wolf Creek on the eastern side of the map unit. The soils formed in clayey slackwater deposits. The buildings on scattered farmsteads are the only structures on the soils.

This map unit makes up about 1 percent of Meade County. It is about 35 percent McGary soils, 27 percent Markland soils, and 38 percent soils of minor extent.

McGary soils are very deep and somewhat poorly drained. These nearly level soils are on broad stream terrace flats. They formed in slackwater deposits. They are clayey in the subsoil and substratum.

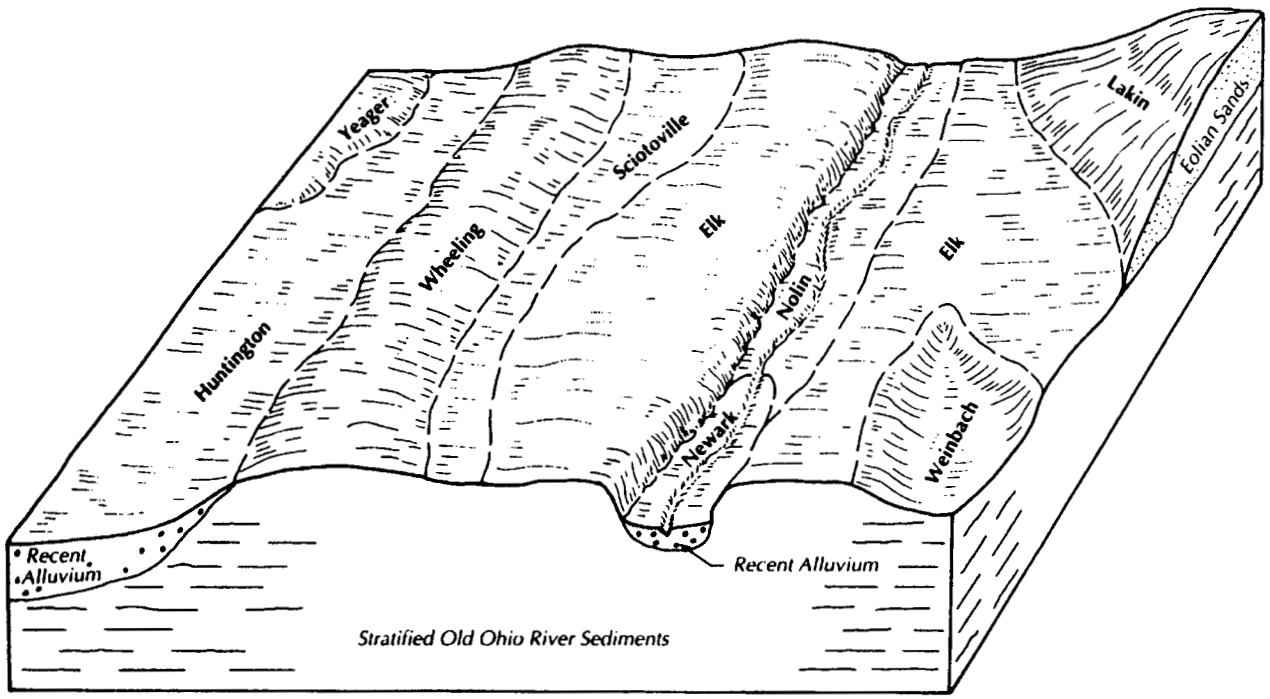

Figure 6.—Typical relationship of soils to topography and the underlying material in the Elk-Huntington-Wheeling general soil map unit.

Markland soils are very deep and well drained. These sloping to steep soils are on the side slopes of stream terraces below the McGary soils. They formed in slackwater deposits. They are clayey in the subsoil and substratum.

Of minor extent in this map unit are Elk and Sciotoville soils on the slightly higher stream terraces; Rosine soils on narrow, upland foot slopes; and Clifty, Lindside, Newark, and Nolin soils on flood plains.

Most of the acreage in this map unit is used for hay and pasture. A few areas are used for cultivated crops.

In most areas these soils generally are poorly suited to cultivated crops. The wetness, the slope, and the clayey texture are the main limitations. The soils are suited to water-tolerant pasture and hay crops.

These soils have moderately high or high potential for woodland productivity. Plant competition is a management concern in the nearly level areas. The hazard of erosion, the equipment limitation, seedling mortality, and plant competition are management concerns in the sloping to steep areas.

These soils are poorly suited to most urban uses. The wetness, the clayey texture, slow or very slow permeability, the shrink-swell potential, and the flooding are limitations affecting urban development.

Areas Dominated by Nearly Level to Very Steep, Loamy and Clayey Soils on Uplands; Underlain by Sandstone, Siltstone, Shale, or Limestone

The soils in this group are on side slopes and ridges on uplands throughout most of Breckinridge County and in the northwestern and southern parts of Meade County. Most of the soils are nearly level to very steep, very deep to moderately deep, and well drained and moderately well drained.

The four map units in this group make up about 88 percent of Breckinridge County and about 36 percent of Meade County. Most of the acreage is used for farming. The gently sloping and sloping soils are mainly used for cultivated crops or as hayland. The moderately steep soils are used as pasture. The steep and very steep soils are used as woodland. The slope, moderately slow or slow permeability, the depth to bedrock, and the clayey texture of the subsoil are the main limitations affecting most uses.

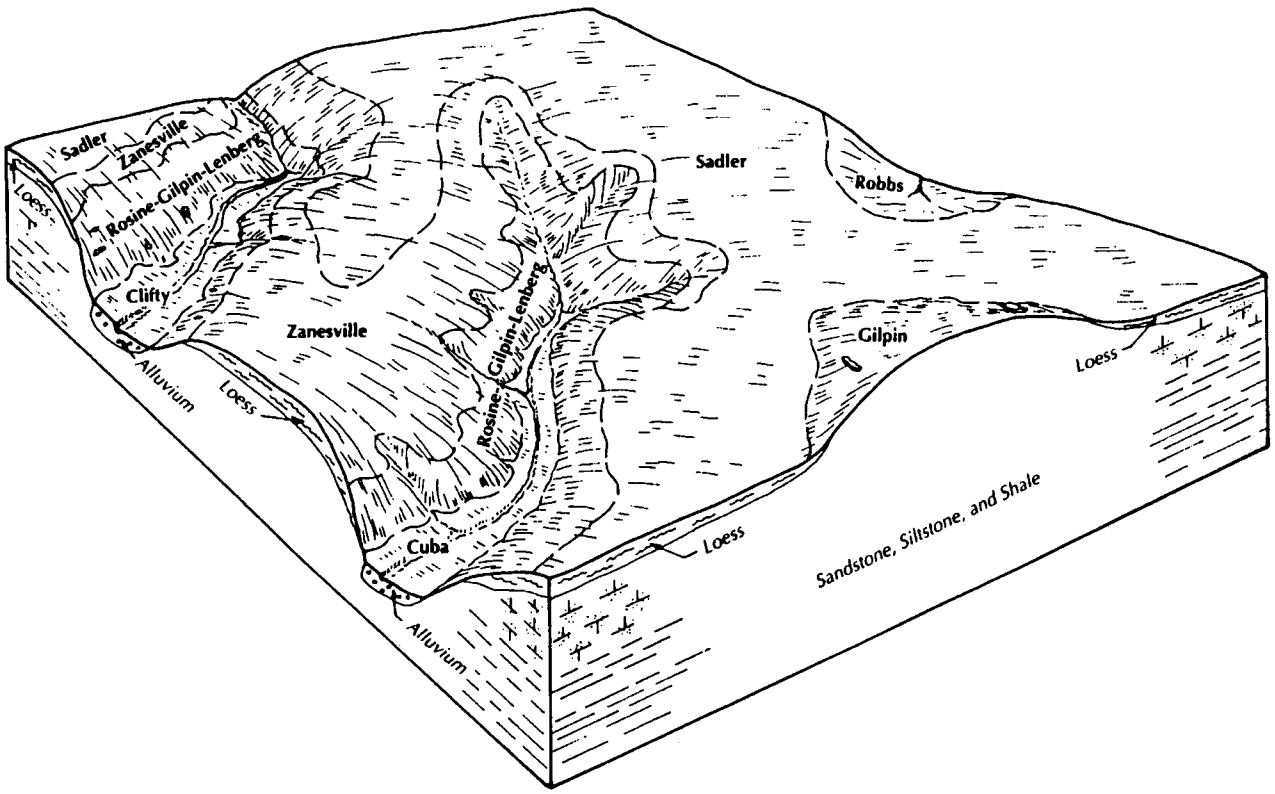

Figure 7.—Typical relationship of soils to topography and the underlying material in the Sadler-Zanesville general soil map unit.

Figure 8.—A typical area of the Sadler-Zanesville general soil map unit used extensively for various cultivated crops, hay, and pasture. The Rosine-Gilpin-Zanesville general soil map unit is on the wooded hillside in the background.

4. Sadler-Zanesville

Nearly level to sloping, deep and very deep, moderately well drained and well drained, loamy soils on ridgetops and upper side slopes

This map unit consists of narrow, irregularly shaped areas on broad upland ridgetops in Breckinridge County and in the northwestern part of Meade County. The landscape is characterized by broad upland flats connected by narrow sloping ridges and shoulder slopes (fig. 7). The communities of Hardinsburg and Payneville and several smaller communities, residential developments, and farmsteads are scattered throughout the map unit.

This map unit makes up about 19 percent of Breckinridge County and 5 percent of Meade County. In Breckinridge County it is about 49 percent Sadler soils, 24 percent Zanesville soils, and 27 percent soils of minor extent. In Meade County it is about 47 percent Sadler soils, 35 percent Zanesville soils, and 18 percent soils of minor extent.

Sadler soils are very deep and moderately well drained. These nearly level and gently sloping soils are on broad upland flats. They have a compact and brittle fragipan at a depth of about 26 inches. They are loamy throughout. They formed in a thin mantle of loess and in the underlying material weathered from sandstone, siltstone, or shale.

Zanesville soils are deep and are well drained and moderately well drained. These gently sloping and sloping soils are on convex upland ridgetops and on the upper side slopes. They are generally on the narrower ridgetops. They have a compact and brittle fragipan at a depth of about 23 inches. They formed in

a thin mantle of loess and in the underlying material weathered from sandstone, siltstone, or shale.

Of minor extent in this map unit are Lenberg, Rosine, and Gilpin soils on side slopes on uplands; Robbs soils on broad, slightly convex to concave flats on uplands; and Clifty and Cuba soils on flood plains.

Most of the acreage in this map unit is used for cultivated crops, hay, or pasture (fig. 8). The cultivated crops are mainly corn, soybeans, wheat, and tobacco.

In most areas these soils are suited to cultivated crops, hay, and pasture. The hazard of erosion in sloping areas and a restricted rooting depth and the wetness in nearly level areas are the main limitations.

These soils have moderately high potential for woodland productivity. The equipment limitation, plant competition, and the hazard of erosion are the main management concerns.

The hazard of erosion, the depth to bedrock, and the wetness are limitations if these soils are used for urban development.

5. Rosine-Gilpin-Zanesville

Very steep to gently sloping, very deep to moderately deep, well drained and moderately well drained, loamy soils on side slopes and ridgetops

This map unit consists of broad, irregularly shaped areas in Breckinridge County and in the northwestern and southwestern parts of Meade County. The landscape is characterized by moderately steep to very steep side slopes dissected by numerous intermittent drainageways (fig. 9). Many scattered residential developments and farmsteads are located in the map unit.

This map unit makes up about 69 percent of Breckinridge County and 10 percent of Meade County. In Breckinridge County it is about 22 percent Rosine soils, 16 percent Gilpin soils, 12 percent Zanesville soils, and 50 percent soils of minor extent. In Meade County it is about 18 percent Rosine soils, 15 percent Gilpin soils, 12 percent Zanesville soils, and 55 percent soils of minor extent.

Rosine soils are very deep and well drained. These sloping to very steep soils are on dissected side slopes and ridges. They are loamy in the upper part of

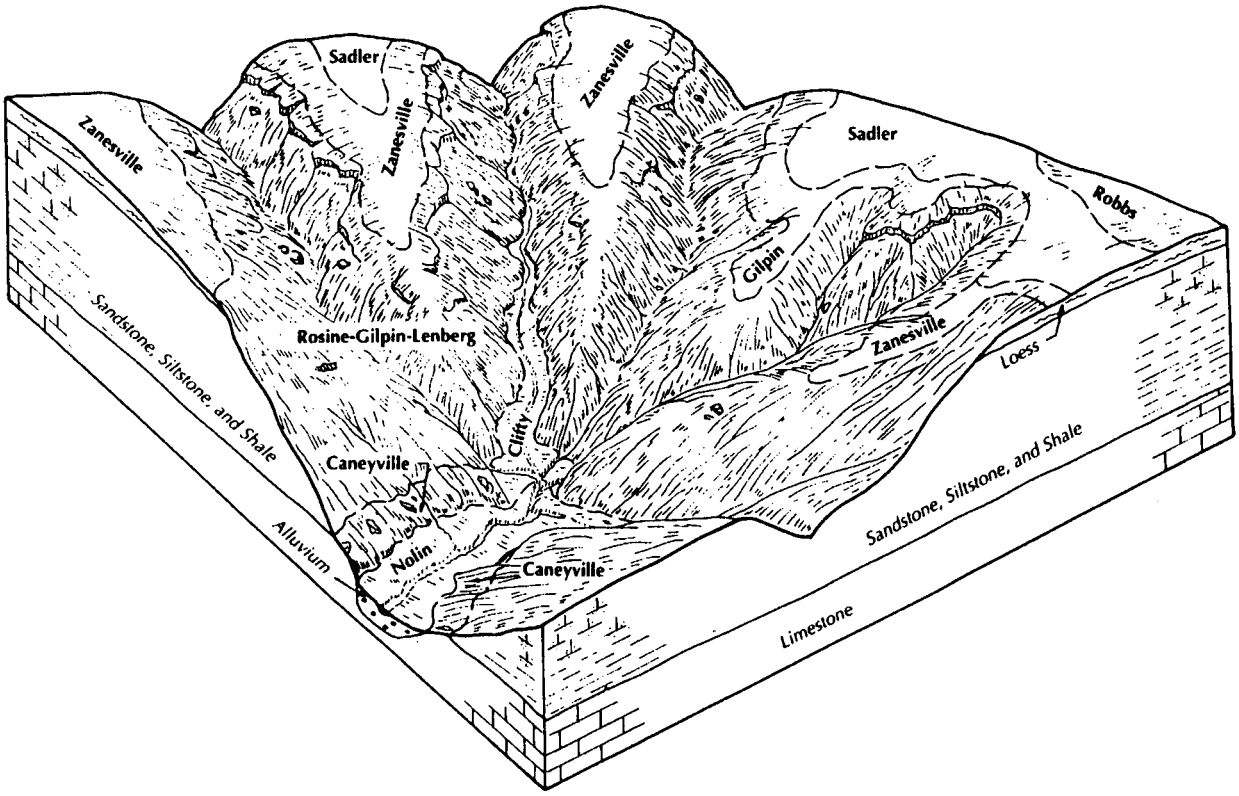

Figure 9.—Typical relationship of soils to topography and the underlying material in the Rosine-Gilpin-Zanesville general soil map unit.

the subsoil and clayey in the lower part of the subsoil and in the substratum. They formed in a thin mantle of loess and in material weathered from shale.

Gilpin soils are moderately deep and well drained. These moderately steep to very steep soils are on the upper part of convex, dissected side slopes. They generally are higher on the landscape than the Rosine and Lenberg soils. They are loamy throughout. They formed in material weathered from sandstone or siltstone.

Zanesville soils are deep and well drained and moderately well drained. These gently sloping and sloping soils are on convex ridgetops and the upper side slopes on uplands. They generally are on the narrower ridgetops. They have a compact and brittle fragipan at a depth of about 23 inches. They formed in a thin mantle of loess and in the underlying material weathered from sandstone, siltstone, or shale.

Of minor extent in this map unit are Sadler and Robbs soils on broad upland flats; Dekalb, Varilla, Lenberg, and Caneyville soils on side slopes; and Nolin, Lindside, Newark, Cuba, Steff, Stendal, and Clifty soils on alluvial flood plains. Sandstone or limestone crops out as common ledges and bluffs at the head of drainageways, along side slopes, and on points of ridges.

Most of the acreage on ridgetops and shoulder slopes in this map unit is used for hay, pasture, or cultivated crops. The cultivated crops are mainly corn, soybeans, and wheat. The acreage on side slopes generally is used as woodland or pasture.

The moderately steep soils on side slopes are suited to cultivated crops; however, erosion is a hazard if cultivated crops are grown.

These soils have moderate or high potential for woodland productivity. The hazard of erosion, the equipment limitation, seedling mortality, and plant competition are the main management concerns. The moderately steep to very steep soils are well suited to woodland and to habitat for woodland wildlife.

In most areas these soils are poorly suited to urban uses because of the slope, the depth to bedrock, the clayey texture, and moderately slow or slow permeability.

6. Gilpin-Rosine-Caneyville

Very steep to sloping, moderately deep and very deep, well drained, loamy and clayey soils on side slopes and ridgetops

This map unit consists of a broad, irregularly shaped area in the northwestern part of Meade County. The landscape is characterized by moderately steep to very steep side slopes dissected by numerous intermittent drainageways. Many scattered residential developments and farmsteads are located in the map unit.

This map unit makes up about 19 percent of Meade County. It is about 16 percent Gilpin soils, 14 percent Rosine soils, 13 percent Caneyville soils, and 57 percent soils of minor extent.

Gilpin soils are moderately deep and well drained. These moderately steep to very steep soils are on the upper part of convex, dissected side slopes. They are generally higher on the landscape than the Rosine and Lenberg soils. They are loamy throughout. They formed in material weathered from sandstone or siltstone.

Rosine soils are very deep and well drained. These moderately steep to very steep soils are on dissected side slopes. They are loamy in the upper part of the subsoil and clayey in the lower part of the subsoil and in the substratum. They formed in a thin mantle of loess and in shale residuum.

Caneyville soils are moderately deep and well drained. These moderately steep to very steep soils are on dissected side slopes. They are clayey in the subsoil. They formed in limestone residuum.

Of minor extent in this map unit are Dekalb soils on the upper side slopes and ridgetops; Varilla and Caneyville soils on side slopes; and Nolin, Lindside, Newark, Melvin, Cuba, Steff, Stendal, and Clifty soils on alluvial flood plains. Sandstone or limestone crops out as ledges and bluffs at the head of drainageways, on side slopes, and on the points of ridges.

Most of the acreage in this map unit is used as woodland or as habitat for woodland wildlife. Some of the moderately steep soils are used for hay, pasture, or cultivated crops. The cultivated crops are mainly corn, soybeans, and wheat.

The moderately steep soils on side slopes are suited to cultivated crops. Erosion is a hazard if cultivated crops are grown.

These soils have moderate or high potential for woodland productivity. The hazard of erosion, the equipment limitation, seedling mortality, and plant competition are the main management concerns. The moderately steep to very steep soils are well suited to woodland and to habitat for woodland wildlife.

In most areas these soils are poorly suited to urban uses because of the slope, the depth to bedrock, the clayey texture, and moderately slow or slow permeability.

7. Riney-Lily-Gatton

Steep to gently sloping, moderately deep and very deep, well drained and moderately well drained, loamy soils on side slopes and ridgetops

This map unit consists of two narrow, elongated areas in the southeastern part of Meade County. The landscape is characterized by steep to sloping side slopes dissected by intermittent drainageways and gently sloping, narrow ridgetops. Several scattered residential developments and farmsteads and part of the Fort Knox Military Reservation are located in the map unit.

This map unit makes up about 2 percent of Meade County. It is about 50 percent Riney soils, 19 percent Lily soils, 8 percent Gatton soils, and 23 percent soils of minor extent.

Riney soils are very deep and well drained. These sloping to steep soils are on dissected side slopes. They are loamy throughout. They formed in material weathered from unconsolidated sandstone.

Lily soils are moderately deep and well drained. These moderately steep and steep soils are on the upper part of convex, dissected side slopes. They are loamy throughout. They formed in material weathered from unconsolidated sandstone.

Gatton soils are very deep and moderately well drained. These gently sloping soils are on narrow, convex ridgetops. They have a compact and brittle fragipan at a depth of about 20 inches. They are loamy in the upper part of the subsoil and clayey in the lower part. They formed in material weathered from unconsolidated sandstone and shale.

Of minor extent in this map unit are Sadler and Zanesville soils on ridgetops; Rosine and Gilpin soils on side slopes; Crider, Nicholson, Hammack, and Baxter soils on foot slopes; and Nolin, Newark, and Melvin soils on alluvial flood plains and in upland depressions.

Most of the acreage on ridgetops and shoulder slopes in this map unit is used for hay, pasture, or cultivated crops. The cultivated crops are mainly corn, soybeans, and wheat. The acreage on side slopes is generally used as woodland or pasture.

The moderately steep soils on side slopes are suited to cultivated crops. Erosion is a hazard if cultivated crops are grown.

These soils have moderate or high potential for woodland productivity. The hazard of erosion, the equipment limitation, seedling mortality, and plant competition are the main management concerns.

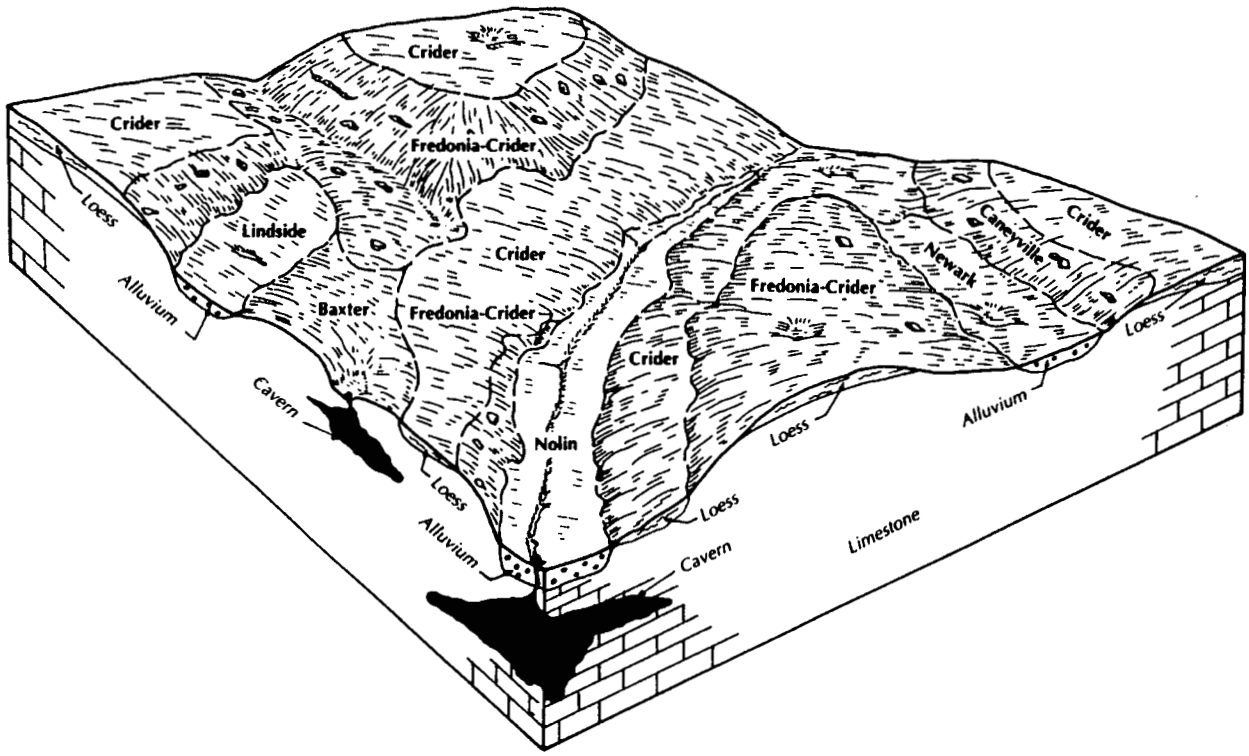

Figure 10.—Typical relationship of soils to topography and the underlying material in the Crider-Fredonia general soil map unit.

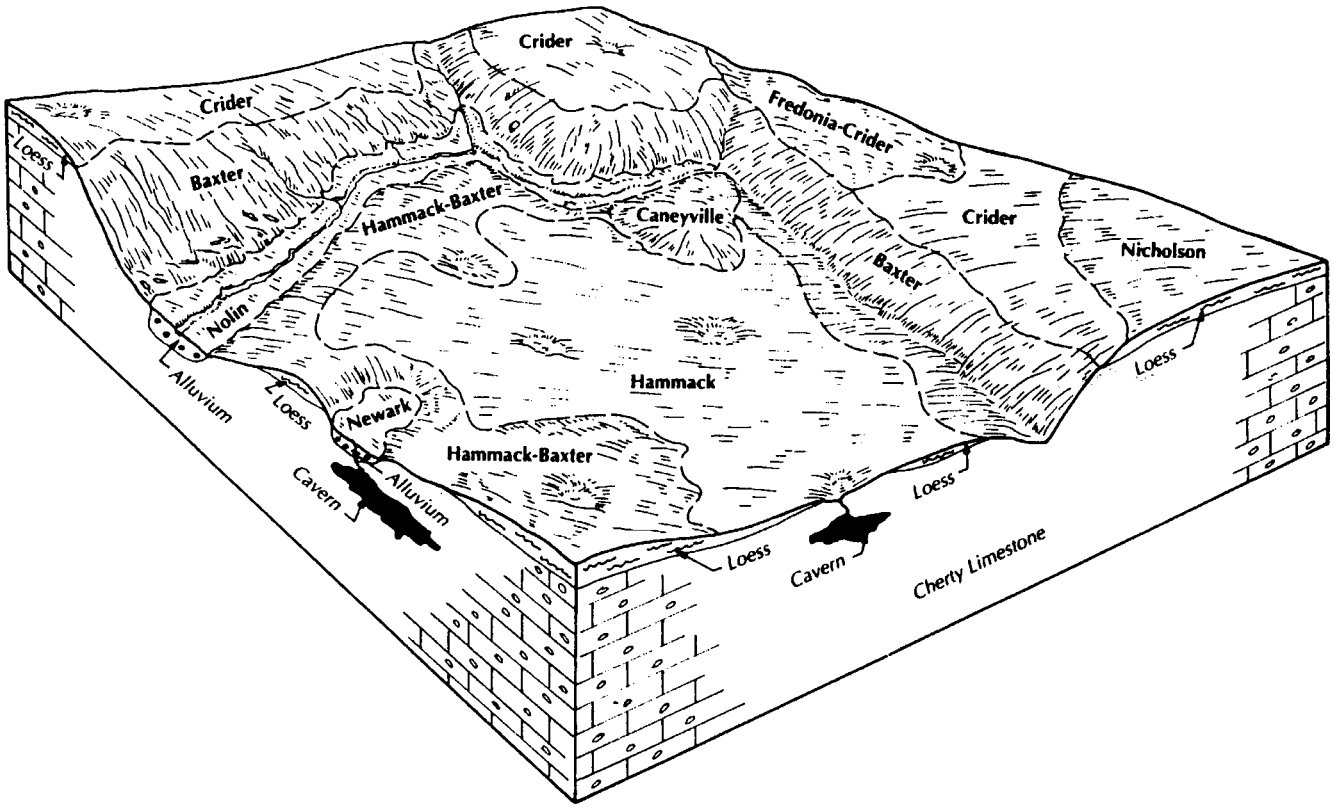

Figure 11.—Typical relationship of soils to topography and the underlying material in the Baxter-Hammack-Crider general soil map unit.

The moderately steep to very steep soils are well suited to woodland and to habitat for woodland wildlife.

In most areas these soils are poorly suited to urban uses because of the slope, the depth to bedrock, and moderately slow or slow permeability.

Areas Dominated by Undulating to Steep, Loamy and Clayey Soils on Karst Uplands; Underlain by Limestone

The soils in this group are along the northern edge of the survey area. Most of the soils are nearly level to very steep, very deep and moderately deep, and well drained.

The two map units in this group make up about 9 percent of Breckinridge County and about 58 percent of Meade County. In most areas these soils are used for cultivated crops, hay, or pasture. In some areas they are used as woodland. The slope, moderately slow or slow permeability, occasional rock outcrops, and the clayey texture of the subsoil are the main limitations affecting most uses.

8. Crider-Fredonia

Undulating to hilly, very deep and moderately deep, well drained, loamy and clayey soils on karst ridges and side slopes

This map unit consists of an irregularly shaped area along the northeastern edge of Breckinridge County and a narrow, elongated area extending from north-central to southwestern Meade County. The landscape is characterized by undulating to hilly karst topography, roughly paralleling the Dripping Springs Cuesta (fig. 10). Most of the drainage in the map unit is through cavernous sinkholes into underground streams. The community of Irvington, which is in the northeastern part of Breckinridge County, and several smaller communities and scattered farmsteads are located in the map unit.

This map unit makes up about 9 percent of Breckinridge County and 18 percent of Meade County. In Breckinridge County it is about 60 percent Crider soils, 10 percent Fredonia soils, and 30 percent soils of minor extent. In Meade County it is about

Figure 12.—A typical area of the Baxter-Hammack-Crider general soil map unit used as pasture. Riney and Lily soils are on the wooded hillsides in the background.

55 percent Crider soils, 10 percent Fredonia soils, and 35 percent soils of minor extent.

Crider soils are very deep and well drained. These undulating to hilly soils are on karst ridgetops and side slopes in the uplands. They are loamy in the upper part of the subsoil and clayey in the lower part. They formed in a thin mantle of loess and in the underlying limestone residuum.

Fredonia soils are moderately deep and well drained. These rolling and hilly soils are on karst side slopes and ridges in the uplands. They are clayey in the subsoil. They formed in limestone residuum.

Of minor extent in this map unit are Caneyville, Hammack, and Baxter soils on karst uplands and Nolin, Lindside, and Newark soils on flood plains and in depressions on uplands. Bedrock crops out as ledges, bluffs, and individual croppings in scattered areas throughout the unit.

Most of the acreage in this map unit is used for hay, pasture, or cultivated crops. The cultivated crops are mainly corn, soybeans, wheat, and tobacco. Some of the steeper and rockier areas are used as woodland.

In most areas these soils are suited to cultivated crops, hay, and pasture. The main limitations are the hazard of erosion, the depth to bedrock, the clayey texture, and frequent flooding during late winter and early spring in areas of the included soils that are in depressions.

These soils have moderate to very high potential for woodland productivity. The hazard of erosion, the

equipment limitation, plant competition, and seedling mortality are the main management concerns.

Most of the undulating and rolling soils are suited to urban uses. The moderately slow or slow permeability, the depth to bedrock, and the rock outcrop are the main limitations.

9. Baxter-Hammack-Crider

Undulating to steep, very deep, well drained, clayey and loamy soils on karst ridges and side slopes

This map unit consists of a broad, irregularly shaped area in the eastern half of Meade County. The landscape is characterized by undulating to steep karst topography (fig. 11). Most of the drainage in the map unit is through cavernous sinkholes into underground streams. The communities of Brandenburg and Muldraugh and several smaller communities, residential developments, and farmsteads are scattered throughout the map unit. Otter Creek Park, Doe Run Lake, and part of the Fort Knox Military Reservation also are in areas of the map unit.

This map unit makes up about 40 percent of Meade County. It is about 49 percent Baxter soils, 19 percent Hammack soils, 10 percent Crider soils, and 22 percent soils of minor extent.

Baxter soils are very deep and well drained. These undulating to steep soils are on ridgetops, shoulder slopes, and side slopes. They are clayey in the subsoil. They formed in material weathered from cherty limestone.

Hammack soils are very deep and well drained. These undulating to rolling soils are on ridgetops and shoulder slopes generally above the Baxter soils where the deposition of loess is greater. They are loamy in the upper part of the subsoil and clayey in the lower part. They formed in a thin mantle of loess and in the underlying material weathered from cherty limestone.

Crider soils are very deep and well drained. These undulating to hilly soils are on broad ridges that are between areas having more karst topography. They are loamy in the upper part of the subsoil and clayey in the lower part. They formed in a thin mantle of loess and in the clayey limestone residuum.

Of minor extent in this map unit are Fredonia, Caneyville, and Nicholson soils on karst uplands; Westmoreland and Caneyville soils on steep bluffs adjacent to the Ohio River; and Nolin, Lindside, and Newark soils on flood plains and in depressions on uplands.

Most of the acreage in this map unit is used for hay, pasture, or cultivated crops (fig. 12). The cultivated crops are mainly corn, soybeans, wheat, and tobacco. The steeper and rockier areas are used as woodland.

In most areas these soils are suited to cultivated crops, hay, and pasture. The main limitations are the hazard of erosion, the clayey texture, the large amount of chert fragments, and frequent flooding during late winter and early spring in areas of the included soils that are in depressions.

These soils have moderately high to very high potential for woodland productivity. The hazard of erosion, the equipment limitation, plant competition, and seedling mortality are the main management concerns.

Most of the undulating and rolling soils are suited to urban uses. The shrink-swell potential is the main limitation.

Detailed Soil Map Units

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

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

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

Each soil is rated according to its suitability for specific uses. The soil is rated *well suited, suited, poorly suited,* or *not suited.* Soils that are *well suited* have favorable properties for the specified use and limitations are easy to overcome. Good performance and low maintenance can be expected. Soils that are *suited* have moderately favorable properties for the selected use. One or more properties make these soils less desirable than well suited soils. Soils that are *poorly suited* have one or more properties unfavorable for the selected use. Overcoming the limitations requires special design, extra maintenance, or costly alteration. Soils that are *not suited* do not meet the expected performance for the selected use or extreme measures are needed to overcome the undesirable features.

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

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is

divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Baxter very gravelly silt loam, karst, 6 to 12 percent slopes, eroded, is a phase of the Baxter series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are called soil complexes. A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Rosine-Gilpin-Lenberg complex, very rocky, 20 to 30 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. The map unit Pits, quarries, is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

AlB2—Alford silt loam, 2 to 6 percent slopes, eroded

This very deep, well drained, gently sloping soil is on narrow, slightly convex ridgetops above the Ohio River flood plain in the northern part of the survey area. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 28 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches; brown silt loam

Subsoil:
9 to 28 inches; strong brown silt loam
28 to 55 inches; yellowish brown silt loam that has mottles below a depth of 45 inches
55 to 72 inches; yellowish red silty clay loam

This soil is medium in natural fertility and low or moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium.

Included with this soil in mapping are a few small areas of Hosmer and Crider soils and a soil that formed in loess overlying sandstone residuum and a few areas of Alford soils that are severely eroded. The included soils are in landscape positions similar to those of this Alford soil. They make up about 15 percent of the map unit. Individual areas are less than 3 acres in size.

Most areas of this Alford soil are used for cultivated crops, hay, or pasture.

This soil is well suited to cultivated crops. The hazard of erosion and the moderate organic matter content are major management concerns. If cultivated, the soil should be protected from further erosion. Conservation tillage, contour stripcropping, cover crops, crop residue management, and a cropping system that includes grasses and legumes help to control erosion, reduce the runoff rate, and maintain high yields and good tilth.

This soil is suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Good management practices are needed to establish and maintain hay and pasture. Seeding or renovating in late summer or early fall generally results in better stands, minimizes competition from weeds, and helps to control erosion. Applications of lime and fertilizer, weed control, and proper stocking rates help to produce and maintain good yields of high-quality forage.

This soil is well suited to woodland. Productivity is high. Plant competition is the main management concern. The preferred species for planting include black walnut, white ash, yellow-poplar, white oak, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to most urban uses. The hazard of erosion and the slope are limitations on sites for sanitary facilities and dwellings. Proper design, installation, and site preparation can help to overcome these limitations.

This soil is in capability subclass IIe.

AlC2—Alford silt loam, 6 to 12 percent slopes, eroded

This very deep, well drained, sloping soil is on narrow ridgetops and side slopes above the Ohio River flood plain in the northern part of the survey

area. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 73 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches; brown silt loam

Subsoil:
9 to 28 inches; strong brown silt loam
28 to 55 inches; yellowish brown silt loam that has mottles below a depth of 45 inches
55 to 72 inches; yellowish red silty clay loam

This soil is medium in natural fertility and low or moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium.

Included with this soil in mapping are a few small areas of Hosmer and Crider soils and a soil that formed in loess overlying sandstone residuum and a few areas of Alford soils that are severely eroded. The included soils are in landscape positions similar to those of this Alford soil. They make up about 15 percent of the map unit. Individual areas are less than 3 acres in size.

Most areas of this Alford soil are used for cultivated crops, hay, or pasture.

This soil is suited to cultivated crops. The hazard of erosion is the main management concern. If cultivated, the soil should be protected from further erosion. Conservation tillage, contour stripcropping, cover crops, crop residue management, and a cropping system that includes grasses and legumes help to control erosion, reduce the runoff rate, and maintain high yields and good tilth.

This soil is suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Good management practices are needed to establish and maintain hay and pasture. Seeding or renovating in late summer or early fall generally results in better stands, minimizes competition from weeds, and helps to control erosion. Applications of lime and fertilizer, weed control, and proper stocking rates help to produce and maintain good yields of high-quality forage.

This soil is well suited to woodland. Productivity is high. Plant competition is the main management concern. The preferred species for planting include black walnut, white ash, yellow-poplar, white oak, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to most urban uses. The hazard of erosion and the slope are limitations on sites for sanitary facilities and dwellings. Proper design, installation, and site preparation can help to overcome these limitations.

This soil is in capability subclass IIIe.

AlD2—Alford silt loam, 12 to 20 percent slopes, eroded

This very deep, well drained, moderately steep soil is on side slopes above the Ohio River flood plain in the northern part of the survey area. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 5 to 67 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches; brown silt loam

Subsoil:
9 to 28 inches; strong brown silt loam
28 to 55 inches; yellowish brown silt loam that has mottles below a depth of 45 inches
55 to 72 inches; yellowish red silty clay loam

This soil is medium in natural fertility and low or moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is rapid.

Included with this soil in mapping are areas of Crider and Caneyville soils, areas of a soil that formed in loess overlying sandstone residuum, and some severely eroded areas where limestone crops out. The inclusions are in landscape positions similar to those of the Alford soil. They make up 20 percent of the map unit. Individual areas are less than 3 acres in size.

Most areas of the Alford soil are used as pasture or woodland. A few areas are used for cultivated crops.

This soil is poorly suited to cultivated crops and small grain because of the hazard of erosion and the moderately steep slope. If cultivated, the soil should be protected from further erosion. Conservation tillage, contour stripcropping, cover crops, crop residue management, and a cropping system that includes

grasses and legumes help to control erosion and reduce the runoff rate.

This soil is suited to hay and pasture. The hazard of erosion and the moderately steep slope are the main management concerns in establishing and maintaining good stands of forage. Seeding or renovating in late summer or early fall generally results in better stands, minimizes competition from weeds, and helps to control erosion. Applications of lime and fertilizer, weed control, and proper stocking rates help to produce and maintain high yields of quality forage.

This soil is suited to woodland. Productivity is high. Plant competition is the main management concern. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. The preferred species for planting include black walnut, white ash, yellow-poplar, white oak, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is not suited to most urban uses. The hazard of erosion and the moderately steep slope are limitations on sites for sanitary facilities and dwellings.

This soil is in capability subclass IVe.

BaB2—Baxter very gravelly silt loam, karst, 2 to 6 percent slopes, eroded

This very deep, well drained, undulating soil is on ridgetops of karst limestone uplands in the central and eastern parts of Meade County. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 19 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:

0 to 5 inches; dark yellowish brown very gravelly silt loam

Subsoil:

5 to 11 inches; yellowish red gravelly silty clay
11 to 71 inches; red gravelly clay
71 to 97 inches; dark red gravelly clay

This soil is medium in natural fertility and low or moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium.

Included with this soil in mapping are a few small areas of Crider and Fredonia soils and a soil that formed in a thin silty mantle overlying cherty residuum, a few areas of soils that are severely eroded, and a few areas of Baxter soils that have slopes of more than 6 percent. These included soils are in landscape positions similar to those of this Baxter soil. Also included are areas of Nolin, Lindside, and Newark soils in small depressions and drainageways. Included soils make up 15 percent of the map unit. Individual areas are less than 2 acres in size.

Most areas of this Baxter soil are used for cultivated crops, hay, or pasture.

This soil is suited to cultivated crops. If the soil is properly managed, high yields can be obtained. Good tilth is easily maintained by returning crop residue to the soil. If cultivated crops are grown, erosion is a hazard. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes help to control erosion and reduce the runoff rate.

This soil is suited to hay and pasture. The hazard of erosion and the rapid runoff are the main management concerns. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Proper seeding mixtures and rates, applications of lime and fertilizer, rotational grazing, and renovation help to produce good yields and control erosion.

This soil is well suited to woodland. Productivity is high. Plant competition is the main management concern. The preferred species for planting include white oak, northern red oak, yellow-poplar, white ash, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to most urban uses. The undulating slope, the clayey subsoil, and the moderate shrink-swell potential are the main limitations. Low strength is a limitation on sites for local roads and streets. Proper design, installation, and site preparation can help to overcome these limitations.

This soil is in capability subclass IIe.

BaC2—Baxter very gravelly silt loam, karst, 6 to 12 percent slopes, eroded

This very deep, well drained, rolling soil is on side slopes and ridgetops of karst limestone uplands in the central and eastern parts of Meade County. Most slopes are irregular and convex. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 223 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 5 inches; dark yellowish brown very gravelly silt loam

Subsoil:
5 to 11 inches; yellowish red gravelly silty clay
11 to 71 inches; red gravelly clay
71 to 97 inches; dark red gravelly clay

This soil is medium in natural fertility and low or moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium.

Included with this soil in mapping are a few small areas of Crider, Hammack, Caneyville, and Fredonia soils and a few areas of Baxter soils that have slopes of more than 12 percent or less than 6 percent or that are severely eroded. These included soils are in landscape positions similar to those of this Baxter soil. Also included are scattered areas of rock outcrop and areas of Nolin, Lindside, and Newark soils in small depressions and drainageways. Inclusions make up 20 percent of the map unit. Individual areas are less than 2 acres in size.

Most areas of this Baxter soil are used for cultivated crops, hay, or pasture.

This soil is suited to cultivated crops. Most crops grow well on the soil. Chert fragments in the surface layer, however, can hinder seedbed preparation. The hazard of erosion is also a management concern if the soil is cultivated. Adequate conservation measures are needed to prevent further erosion.

This soil is suited to hay and pasture. The hazard of erosion is the main management concern. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Proper seeding mixtures and rates, applications of lime and fertilizer, rotational grazing, and renovation of old stands without plowing help to produce good yields and control erosion.

This soil is well suited to woodland. Productivity is high. Plant competition is the main management concern. The preferred species for planting include white oak, northern red oak, yellow-poplar, white ash, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to most urban uses. The slope, however, is a severe limitation that may be difficult and costly to overcome.

This soil is in capability subclass IIIe.

BaD2—Baxter very gravelly silt loam, karst, 12 to 20 percent slopes, eroded

This very deep, well drained, hilly soil is on side slopes and ridgetops of karst limestone uplands in the central and eastern parts of Meade County. Most slopes are irregular and convex. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 586 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 5 inches; dark yellowish brown very gravelly silt loam

Subsoil:
5 to 11 inches; yellowish red gravelly silty clay
11 to 71 inches; red gravelly clay
71 to 97 inches; dark red gravelly clay

This soil is medium in natural fertility and low or moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is rapid.

Included with this soil in mapping are a few small areas of Hammack, Caneyville, and Fredonia soils; a few areas of soils that are severely eroded; scattered areas of rock outcrop; and a few areas of Baxter soils that have slopes of more than 20 percent or less than 12 percent. These included soils are in landscape positions similar to those of this Baxter soil. Also included are Nolin, Lindside, and Newark soils in small depressions and drainageways. Inclusions make up about 20 percent of the map unit. Individual areas are less than 2 acres in size.

Most areas of this Baxter soil are used for pasture, hay, or woodland (fig. 13). A few areas are used for cultivated crops.

This soil is poorly suited to cultivated crops. Chert fragments in the surface layer and the moderately steep slope hinder seedbed preparation. Conservation practices, such as contour farming, are not feasible because of the karst topography. Erosion is a hazard if cultivated crops are grown.

This soil is suited to hay and pasture (fig. 14). The hazard of erosion and the rapid runoff are the main management concerns. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Proper seeding mixtures and rates, applications of lime and fertilizer, rotational grazing, and renovation of old stands without plowing help to produce good yields and control erosion.

This soil is well suited to woodland. Productivity is high. Plant competition, the hazard of erosion, and the equipment limitation are management concerns. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Erosion is a hazard on logging roads and skid trails. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. The preferred species for planting include white oak, yellow-poplar, white ash, eastern white pine, loblolly

Figure 13.—Alfalfa and orchardgrass being cut for hay. Baxter very gravelly silt loam, karst, 12 to 20 percent slopes, eroded, is on the side slopes. Nolin silt loam, depressional, frequently flooded, is in the basin in the center of the photograph.

Figure 14.—An area of Baxter very gravelly silt loam, karst, 12 to 20 percent slopes, eroded, used for hay. Contour farming is difficult in areas of karst topography.

pine, and shortleaf pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to most urban uses. The slope is a severe limitation that is difficult and costly to overcome.

This soil is in capability subclass IVe.

BaE2—Baxter very gravelly silt loam, karst, 20 to 30 percent slopes, eroded

This very deep, well drained, steep soil is on side slopes of karst limestone uplands in the central and eastern parts of Meade County. Most slopes are irregular and convex. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 35 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:

0 to 5 inches; dark yellowish brown very gravelly silt loam

Subsoil:

5 to 11 inches; yellowish red gravelly silty clay
11 to 71 inches; red gravelly clay
71 to 97 inches; dark red gravelly clay

This soil is medium in natural fertility and low or moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is rapid.

Included with this soil in mapping are small areas of Caneyville and Fredonia soils, a few areas of soils that are severely eroded, scattered areas of rock outcrop, and a few areas of Baxter soils that have slopes of more than 30 percent or less than 20 percent. These inclusions are in landscape positions similar to those of this Baxter soil. Also included are Nolin, Lindside, and Newark soils in small depressions and drainageways. Inclusions make up about 20 percent of the map unit. Individual areas are less than 2 acres in size.

Most areas of this Baxter soil are used as pasture or woodland.

This soil is poorly suited to cultivated crops. Chert fragments in the surface layer and the slope hinder seedbed preparation. Erosion is a hazard if cultivated crops are grown.

This soil is suited to hay and pasture. The hazard of erosion and the rapid runoff are the main management concerns. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Proper seeding mixtures and rates, applications of lime and fertilizer, rotational grazing, and renovation of old stands without plowing help to produce good yields and control erosion.

This soil is well suited to woodland. Productivity is high. Plant competition, the hazard of erosion, and the equipment limitation are concerns in producing and harvesting good-quality timber. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. The preferred species for planting include white oak, yellow-poplar, white ash, eastern white pine, loblolly pine, and shortleaf pine. See table 7 for specific information relating to potential productivity.

The potential for woodland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Brushy thickets can be established in areas of mature woodland. Food plots or areas of green browse can be planted along field borders or logging roads. Shallow water areas are needed. Den trees should not be harvested.

This soil is poorly suited to most urban uses. The slope is a severe limitation that is difficult and costly to overcome.

This soil is in capability subclass VIe.

BbC3—Baxter very gravelly silty clay loam, karst, 6 to 12 percent slopes, severely eroded

This very deep, well drained, rolling soil is on side slopes and ridgetops of karst limestone uplands in the central and eastern parts of Meade County. Most slopes are irregular and convex. Erosion has removed 75 to 100 percent of the original surface layer. Rills and small gullies are common. Individual areas range from 4 to 98 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:

0 to 6 inches; strong brown very gravelly silty clay loam

Subsoil:

6 to 64 inches; red gravelly clay
64 to 90 inches; dark red gravelly clay

This soil is low in natural fertility and organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is moderate, and surface runoff is medium. The shrink-swell potential is moderate.

Included with this soil in mapping are a few small areas of Crider, Hammack, Caneyville, and Fredonia soils; a few areas of Baxter soils that have slopes of more than 12 percent or less than 6 percent or that are moderately eroded; and scattered areas of rock outcrop. These inclusions are in landscape positions similar to those of this Baxter soil. Also included are areas of Nolin, Lindside, and Newark soils in small depressions and drainageways. Inclusions make up about 15 percent of the map unit. Individual areas are less than 2 acres in size.

Most areas of this Baxter soil are used for cultivated crops, hay, or pasture.

This soil is poorly suited to cultivated crops. Chert fragments in the surface layer can hinder seedbed preparation. Erosion is a hazard if cultivated crops are grown. If the soil is cultivated, appropriate conservation measures are needed to prevent further erosion.

This soil is suited to hay and pasture. The hazard of erosion and the rapid runoff are the main management concerns. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Proper seeding mixtures and rates, applications of lime and fertilizer, rotational grazing, and renovation of old stands without plowing help to produce good yields and control erosion.

This soil is well suited to woodland. Productivity is high. Plant competition, seedling mortality, and the equipment limitation are management concerns. The preferred species for planting include eastern white pine, white oak, white ash, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Strip plantings of herbaceous plants, shrubs, and trees are more attractive than solid plantings. Grasses, legumes, and grain crops can be planted for food and cover. A good plant cover requires maintenance measures, which include applying fertilizer and reseeding or replanting where the vegetation failed to become established. Shallow water areas are needed. Brush piles or other nesting sites also are needed.

This soil is suited to most urban uses. The slope, however, is a severe limitation that may be difficult and costly to overcome.

This soil is in capability subclass IVe.

BbD3—Baxter very gravelly silty clay loam, karst, 12 to 20 percent slopes, severely eroded

This very deep, well drained, hilly soil is on side slopes and ridgetops of karst limestone uplands in the central and eastern parts of Meade County. Most slopes are irregular and convex. Erosion has removed 75 to 100 percent of the original surface layer. Rills and small gullies are common. Individual areas range from 4 to 270 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:

0 to 6 inches; strong brown very gravelly silty clay loam

Subsoil:

6 to 64 inches; red gravelly clay

64 to 90 inches; dark red gravelly clay

This soil is low in natural fertility and organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is moderate, and surface runoff is rapid. The shrink-swell potential is moderate.

Included with this soil in mapping are a few small areas of Crider, Hammack, Caneyville, and Fredonia soils; a few areas of Baxter soils that haves slopes of more than 20 percent or less than 12 percent; and scattered areas of rock outcrop. These inclusions are in landscape positions similar to those of this Baxter soil. Also included are areas of Nolin, Lindside, and Newark soils in small depressions and drainageways. Inclusions make up 20 percent of the map unit. Individual areas are less than 2 acres in size.

Most areas of this Baxter soil are used for cultivated crops, hay, or pasture.

This soil is poorly suited to cultivated crops. Chert fragments in the surface layer can hinder seedbed preparation. Erosion is a hazard if the soil is cultivated. If cultivated crops are grown, appropriate conservation measures are needed to prevent further erosion.

This soil is suited to hay and pasture. The hazard of erosion and the rapid runoff are the main management concerns. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Proper seeding mixtures and rates, applications of lime and fertilizer, rotational grazing, and renovation of old stands without plowing help to produce good yields and control erosion.

This soil is well suited to woodland. Productivity is high. The hazard of erosion, seedling mortality, plant competition, and the equipment limitation are concerns in producing and harvesting good-quality timber. The preferred species for planting include eastern white pine, white oak, white ash, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Strip plantings of herbaceous plants, shrubs, and trees are more attractive than solid plantings. Grasses, legumes, and grain crops can be planted for food and cover. A good plant cover requires maintenance measures, which include applying fertilizer and reseeding or replanting where the vegetation failed to become established. Shallow water areas are needed. Brush piles or other nesting sites also are needed.

This soil is poorly suited to most urban uses. The slope is a severe limitation that may be difficult and costly to overcome.

This soil is in capability subclass VIe.

BeC4—Baxter soils, karst, 6 to 12 percent slopes, very severely eroded

These very deep, well drained, rolling soils are on side slopes and ridgetops of karst limestone uplands. This map unit is in the tank training areas of Fort Knox Military Reservation along the eastern edge of Meade County. Most slopes are irregular and convex. Erosion has removed most of the original surface layer and, in places, part of the subsoil. Gullies form an intricate pattern in the map unit. The original soils are identifiable in only a few locations. Individual areas range from 4 to 185 acres in size.

The typical sequence, depth, and composition of the layers of these soils are as follows—

Surface layer:
0 to 6 inches; strong brown very gravelly silty clay loam

Subsoil:
6 to 64 inches; red gravelly clay
64 to 90 inches; dark red gravelly clay

These soils are low in natural fertility and organic matter content. Permeability is moderate. The root zone is very deep, and penetration by plant roots is difficult in areas where heavy equipment has compacted the soils. Available water capacity is moderate, and surface runoff is rapid. The shrink-swell potential is moderate.

Included with these soils in mapping are a few small areas of Crider, Hammack, Caneyville, and Fredonia soils; a few areas of Baxter soils having slopes of more than 12 percent or less than 6 percent or that are moderately eroded; and scattered areas of rock outcrop. These inclusions are in landscape positions similar to those of these Baxter soils. Also included are areas of Nolin, Lindside, and Newark soils in small depressions and drainageways. Inclusions make up about 15 percent of the map unit. Individual areas are less than 2 acres in size.

Most areas of these Baxter soils are used by personnel from the Fort Knox Military Reservation for training exercises. Some areas have been abandoned or are used as woodland.

In most areas these soils are not suited to cultivated crops, hay, or pasture because of chert fragments in the surface layer, the hazard of erosion, the rock outcrop in the included areas, and the abundance of deep gullies.

These soils are suited to woodland. Productivity is moderate. The equipment limitation, seedling mortality, and plant competition are management concerns in producing and harvesting good-quality timber. Mechanical planting equipment cannot be used in some of the severely eroded areas. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. Larger planting stock or special site preparation, such as bedding or furrowing, reduces the seedling mortality rate. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. The preferred species for planting include white oak, eastern white pine, white ash, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Strip plantings of herbaceous plants, shrubs, and trees are more attractive than solid plantings. Grasses, legumes, and grain crops can be planted for food and cover. A good plant cover requires maintenance measures, which include applying fertilizer and reseeding or replanting where the vegetation failed to become established. Shallow water areas are needed. Brush piles or other nesting sites also are needed.

These soils are not suited to most urban uses. The slope, the rock outcrop in the included areas, and the moderate shrink-swell potential are the main limitations.

These soils are in capability subclass VIe.

BeD4—Baxter soils, karst, 12 to 20 percent slopes, very severely eroded

These very deep, well drained, hilly soils are on side slopes and ridgetops of karst limestone uplands. This map unit is in the tank training areas of Fort Knox Military Reservation along the eastern edge of Meade County. Most slopes are irregular and convex. Erosion has removed most of the original surface layer and, in places, part of the subsoil. Gullies form an intricate pattern in the map unit. The original soils are identifiable only in a few locations. Individual areas range from 4 to 285 acres in size.

The typical sequence, depth, and composition of the layers of these soils are as follows—

Surface layer:
0 to 6 inches; strong brown very gravelly silty clay loam

Subsoil:
6 to 64 inches; red gravelly clay
64 to 90 inches; dark red gravelly clay

These soils are low in natural fertility and organic matter content. Permeability is moderate. The root zone is very deep, and penetration by plant roots is difficult in areas where heavy equipment has compacted the soils. Available water capacity is moderate, and surface runoff is rapid. The shrink-swell potential is moderate.

Included with these soils in mapping are a few small areas of Hammack, Caneyville, and Fredonia soils; a few areas of soils that are moderately eroded; scattered areas of rock outcrop; and a few areas of Baxter soils that have slopes of more than 20 percent or less than 12 percent. These inclusions are in landscape positions similar to those of these Baxter soils. Also included are Nolin, Lindside, and Newark soils in small depressions and drainageways. Inclusions make up about 20 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of these Baxter soils are used by personnel from the Fort Knox Military Reservation for training exercises. Some areas have been abandoned or are used as woodland.

In most areas these soils are not suited to cultivated crops, hay, or pasture because of the chert fragments in the surface layer, the hazard of erosion, the rock outcrop in the included areas, and the numerous deep gullies.

These soils are suited to woodland. Productivity is moderate. The hazard of erosion, the equipment limitation, seedling mortality, and plant competition are management concerns in producing and harvesting good-quality timber. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. Mechanical planting equipment cannot be used in some of the severely eroded areas. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. Larger planting stock or special site preparation, such as bedding or furrowing, reduces the seedling mortality rate. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. The preferred species for planting include white oak, eastern white pine, white ash, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Strip plantings of herbaceous plants, shrubs, and trees are more attractive than solid plantings. Grasses, legumes, and grain crops can be planted for food and cover. A good plant cover requires maintenance measures, which include applying fertilizer and reseeding or replanting where the vegetation failed to become established. Shallow water areas are needed. Brush piles or other nesting sites also are needed.

These soils are not suited to most urban uses. The slope, the rock outcrop in the included areas, and the deep gullies are limitations.

These soils are in capability subclass VIIe.

CaC2—Caneyville silt loam, 6 to 12 percent slopes, eroded

This moderately deep, well drained, sloping soil is on ridgetops and side slopes of limestone uplands throughout Breckinridge County and in the northwestern part of Meade County. Some areas are karst. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 116 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 6 inches; brown silt loam

Subsoil:
6 to 10 inches; yellowish red silty clay loam
10 to 24 inches; red, mottled clay

Bedrock:
24 inches; hard, light gray limestone

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately slow. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is medium. The shrink-swell potential is moderate. Limestone bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are a few small areas of Rosine and Lenberg soils. These soils are in landscape positions similar to those of the Caneyville soil. Also included are areas of a yellowish brown clayey soil that is less than 20 inches deep over limestone bedrock; small areas of a soil that is similar to the Caneyville soil but is more than 40 inches deep over bedrock; areas of soils that have slopes of more than 12 percent; and scattered areas of rock outcrop. Inclusions make up about 15 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Caneyville soil are used for hay, pasture, or woodland. A few areas are used for cultivated crops.

This soil is poorly suited to cultivated crops. The hazard of erosion and irregular slopes are limitations in farmed areas. The moderate depth to bedrock and

the clayey subsoil limit the available water capacity. Contour stripcropping is difficult to apply in some areas because of the irregular slopes. Conservation tillage, crop residue management, cover crops, and a cropping system that includes grasses and legumes help to control erosion and improve tilth.

This soil is suited to pasture and hay; however, pasture and hay crops are limited by the moderate available water capacity and the depth to bedrock. Crops respond well to applications of lime and fertilizer. Proper seeding mixtures and rates, rotational grazing, and renovation of old stands help to produce good yields.

This soil is suited to woodland. Productivity is moderately high. Plant competition is the main management concern. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, or cutting or girdling, or by managing the existing stand. The preferred species for planting include Virginia pine, eastern white pine, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to most urban uses. The depth to bedrock, the slope, and the shrink-swell potential are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIIe.

CaD2—Caneyville silt loam, 12 to 20 percent slopes, eroded

This moderately deep, well drained, moderately steep soil is on side slopes of limestone uplands throughout Breckinridge County and in the northwestern part of Meade County. Some areas are karst. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 249 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 6 inches; brown silt loam

Subsoil:
6 to 10 inches; yellowish red silty clay loam
10 to 24 inches; red, mottled clay

Bedrock:
24 inches; hard, light gray limestone

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately slow. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is rapid. The shrink-swell potential is moderate. Limestone bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are a few small areas of Rosine, Lenberg, and Gilpin soils. These soils are in landscape positions similar to those of the Caneyville soil. Also included are areas of a soil that is similar to the Caneyville soil but is more than 40 inches deep over bedrock, some areas of soils that have slopes of less than 12 percent or more than 20 percent, and some scattered areas of rock outcrop. Inclusions make up 20 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Caneyville soil are used for hay, pasture, or woodland.

This soil is not suited to cultivated crops. The hazard of erosion and the moderately steep slope are limitations in farmed areas.

This soil is suited to pasture and hay; however, pasture and hay crops are limited by the available water capacity and the depth to bedrock. Crops respond well to applications of lime and fertilizer. Proper seeding mixtures and rates, rotational grazing, and renovation of old stands help to produce good yields.

This soil is suited to woodland. Productivity is moderately high. The hazard of erosion, the equipment limitation, seedling mortality, and plant competition are management concerns. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. Mechanical planting equipment cannot be used in some areas. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. Seedling mortality is a hazard on warm slopes. Larger planting stock or special site preparation, such as bedding or furrowing, reduces the seedling mortality rate. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. The preferred species for planting on cool slopes include white oak, yellow-poplar, white ash, eastern white pine, and loblolly pine. Those preferred for

planting on warm slopes include Virginia pine, eastern redcedar, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to most urban uses. The depth to bedrock, the slope, and the shrink-swell potential are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass VIe.

CeC3—Caneyville silty clay, 6 to 12 percent slopes, severely eroded

This moderately deep, well drained, sloping soil is on ridgetops and side slopes of limestone uplands throughout Breckinridge County and in the northwestern part of Meade County. Some areas are karst. Erosion has removed 75 to 100 percent of the original surface layer. Small gullies are common. Individual areas range from 4 to 39 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 5 inches; yellowish red silty clay

Subsoil:
5 to 23 inches; red, mottled clay

Bedrock:
23 inches; hard, light gray limestone

This soil is low in natural fertility and organic matter content. Permeability is moderately slow. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is rapid. The shrink-swell potential is moderate. Limestone bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are a few small areas of Rosine, Lenberg, and Gilpin soils. These soils are in landscape positions similar to those of the Caneyville soil. Also included are areas of clayey soils that are less than 20 inches deep over bedrock, a few areas of Caneyville soils that are moderately eroded, and scattered areas of rock outcrop. Inclusions make up about 15 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of this Caneyville soil are used as woodland or brushy pasture.

This soil is not suited to cultivated crops and small grain but is suited to hay and pasture. The hazard of erosion, poor tilth, the low natural fertility, and irregular terrain are limitations in establishing and maintaining good pasture. Land leveling is needed in some areas. Because of the hazard of erosion and poor tilth, renovation of hay or pasture fields in late summer or early fall is desirable. Forage crops respond well to applications of lime and fertilizer. Quickly establishing an adequate cover and avoiding overgrazing help to maintain a good stand of forage crops.

This soil is suited to woodland. Productivity is moderate. Plant competition and seedling mortality are the main management concerns. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Larger planting stock or special site preparation, such as bedding or furrowing, reduces the seedling mortality rate. The preferred species for planting include Virginia pine and eastern redcedar. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Strip plantings of herbaceous plants, shrubs, and trees are more attractive than solid plantings. Grasses, legumes, and grain crops can be planted for food and cover. A good plant cover requires maintenance measures, which include applying fertilizer and reseeding or replanting where the vegetation failed to become established. Shallow water areas are needed. Brush piles or other nesting sites also are needed.

This soil is poorly suited to most urban uses. The depth to bedrock, the restricted permeability, and the shrink-swell potential are limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IVe.

CeD3—Caneyville silty clay, 12 to 20 percent slopes, severely eroded

This moderately deep, well drained, moderately steep soil is on side slopes of limestone uplands throughout Breckinridge County and in the northwestern part of Meade County. Some areas are karst. Erosion has removed 75 to 100 percent of the original surface layer. Small gullies are common. Individual areas range from 4 to 67 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 5 inches; yellowish red silty clay

Subsoil:
5 to 23 inches; red, mottled clay

Bedrock:
23 inches; hard, light gray limestone

This soil is low in natural fertility and organic matter content. Permeability is moderately slow. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is rapid. The shrink-swell potential is moderate. Limestone bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are a few small areas of Rosine, Lenberg, and Gilpin soils. These soils are in landscape positions similar to those of the Caneyville soil. Also included are areas of a clayey soil that is less than 20 inches deep over bedrock; a few areas of Caneyville soils that are moderately eroded; and some scattered areas of rock outcrop. Inclusions make up about 15 percent of the map unit. Individual areas are less than 3 acres in size.

Most areas of this Caneyville soil are used as woodland or brushy pasture.

This soil is not suited to cultivated crops. The slope, the hazard of erosion, and the gullies are limitations affecting cropland.

This soil is suited to hay and pasture. The hazard of erosion, poor tilth, and low natural fertility are limitations in establishing and maintaining good hay and pasture crops. Land leveling is necessary in some areas. Because of the hazard of erosion and poor tilth, renovation of hay or pasture fields in late summer or early fall is desirable. Forage crops respond well to applications of lime and fertilizer. Quickly establishing an adequate cover and avoiding overgrazing help to maintain a good stand of forage crops.

This soil is suited to woodland. Productivity is moderate. The hazard of erosion, plant competition, the equipment limitation, and seedling mortality are management concerns. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Mechanical planting equipment cannot be used in some areas. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. Larger planting stock or special site preparation, such as bedding or furrowing, reduces the seedling mortality rate. The preferred species for planting on cool slopes include white oak, Virginia pine, white ash, eastern white pine, and loblolly pine. Those preferred on warm slopes include Virginia pine and eastern redcedar. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Strip plantings of herbaceous plants, shrubs, and trees are more attractive than solid plantings. Grasses, legumes, and grain crops can be planted for food and cover. A good plant cover requires maintenance measures, which include applying fertilizer and reseeding or replanting where the vegetation failed to become established. Shallow water areas are needed. Brush piles or other nesting sites also are needed.

This soil is poorly suited to most urban uses. The depth to bedrock, the restricted permeability, the shrink-swell potential, and the slope are limitations for most uses. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass VIe.

CkD—Caneyville-Rock outcrop complex, 12 to 30 percent slopes

This map unit occurs as areas of a moderately deep, well drained, moderately steep and steep Caneyville soil intermingled with areas of Rock outcrop. It is on side slopes throughout Breckinridge County and in the northwestern part of Meade County. Some areas are karst. The Caneyville soil and the areas of Rock outcrop could not be separated at the scale selected for mapping. Individual areas range from 4 to 1,153 acres in size.

Caneyville and similar soils make up about 40 percent of the map unit, and the Rock outcrop makes up about 30 percent. Inclusions make up the remainder of the map unit.

The typical sequence, depth, and composition of the layers of the Caneyville soil are as follows—

Surface layer:
0 to 6 inches; brown silt loam

Subsoil:
6 to 10 inches; yellowish red silty clay loam
10 to 24 inches; red, mottled clay

Bedrock:
24 inches; hard, light gray limestone

This Caneyville soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately slow. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is rapid. The shrink-swell potential is moderate. Limestone bedrock is at a depth of 20 to 40 inches.

The Rock outcrop consists of limestone in individual outcrops or in ledges or escarpments extending horizontally around slopes.

Included in this unit in mapping are small areas of Gilpin, Rosine, Lenberg, Fredonia, and Crider soils. These soils are in landscape positions similar to those of the Caneyville soil. Also included are areas of brown to black clayey soils that are less than 10 inches deep over bedrock, areas of a yellowish brown loamy soil that formed in loess over sandstone residuum, areas of a brown or yellowish brown clayey soil that is less than 20 inches deep over limestone bedrock, and small areas of Nolin soils along drainageways. Included soils make up about 30 percent of the map unit. Individual areas are less than 3 acres in size.

Most areas of the unit are used as woodland. A few areas are used as unimproved pasture.

This map unit is not suited to cultivated crops, small grain, or hay. The main limitations are the slope, the moderate depth to bedrock, and the Rock outcrop.

This map unit is poorly suited to pasture. Pasture management is difficult.

This map unit is suited to woodland. Productivity is moderately high on cool slopes and moderate on warm slopes. The hazard of erosion, plant competition, and the equipment limitation are management concerns. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of 10 percent or less helps to control erosion. Permanent access roads can be protected by installing water breaks and culverts and by applying gravel. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Seedling mortality is a concern on warm slopes. Harvesting equipment that was designed for operation on steep, rocky slopes is needed. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. The preferred species for planting on cool slopes include white oak, yellow-poplar, white ash, eastern white pine, and loblolly pine. Those preferred on warm slopes include Virginia pine, eastern redcedar, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for woodland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Brushy thickets can be established in areas of mature woodland. Food plots or areas of green browse can be planted along field borders or logging roads. Shallow water areas are needed. Den trees should not be harvested.

This map unit is poorly suited to urban uses. The slope, the depth to bedrock, the shrink-swell potential, and the Rock outcrop are the main limitations. Most of these limitations are difficult to overcome.

The Caneyville soil is in capability subclass VIe. The Rock outcrop is in capability subclass VIIIs.

Cn—Chagrin fine sandy loam, occasionally flooded

This very deep, well drained, nearly level soil is on flood plains of the Ohio River along the northern edge of the survey area. Slopes range from 0 to 2 percent. Individual areas range from 4 to 123 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches; brown fine sandy loam

Subsoil:
9 to 37 inches; dark brown silt loam

Substratum:
37 to 63 inches; yellowish brown silt loam

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is slow. The soil is subject to occasional flooding in late winter and early spring.

Included with this soil in mapping are small areas of Huntington, Lakin, Lindside, and Newark soils. These soils are in landscape positions similar to those of the Chagrin soil. Also included in areas adjacent to the Ohio River are soils that have an overwash of loamy sand or sand 12 to 15 inches thick. Included soils make up about 10 percent of the map unit. Individual areas are less than 3 acres in size.

Most areas of the Chagrin soil are used for cultivated crops. A few areas are used as woodland.

This soil is well suited to cultivated crops. The hazard of erosion is slight, and the soil can be worked throughout a wide range of moisture content without clodding or crusting. The flooding in late winter or early spring is the main limitation. Summer crops are not generally affected, but the soil is poorly suited to winter crops because of the flooding. Cover crops and crop residue management help to maintain the organic matter content and tilth.

This soil is suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. Perennials, however, may be damaged by flooding in some years. Proper seeding mixtures and rates, applications of fertilizer, controlled grazing, and weed control are needed.

This soil is well suited to woodland. Productivity is high. Plant competition and seedling mortality are management concerns. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking and applying herbicides, or by managing the existing stand. The flooding can damage new seedlings. Reinforcement plantings may be needed to achieve a fully stocked stand. The preferred species for planting include black walnut, yellow-poplar, white oak, northern red oak, and white ash. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to most urban uses. The flooding is the main limitation.

This soil is in capability subclass IIw.

Co—Clifty gravelly silt loam, occasionally flooded

This very deep, well drained, nearly level soil is on flood plains in narrow valleys throughout Breckinridge County and in the northwestern part of Meade County. Slopes range from 0 to 4 percent. Individual areas range from 4 to 119 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches; brown gravelly silt loam

Subsoil:
8 to 34 inches; dark yellowish brown silt loam

Substratum:
34 to 64 inches; dark yellowish brown very gravelly loam

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately rapid. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is moderate, and surface runoff is slow. The soil is subject to occasional flooding in late winter and early spring.

Included with this soil in mapping are small areas of Cuba, Steff, and Stendal soils. These soils are in landscape positions similar to those of the Clifty soil. Also included are small areas of a soil that is similar to the Clifty soil but that is 40 to 60 inches deep over bedrock, small areas of gravelly soils that are moderately well drained or somewhat poorly drained, small areas of soils that are less acid than the Clifty soil, and small areas of a soil that has 35 to 50 percent gravel in the subsoil. Included soils make up 20 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of the Clifty soil are used for cultivated crops, hay, or pasture. Some areas in narrow valleys are used as woodland.

This soil is well suited to cultivated crops. The hazard of erosion is slight, and the soil can be cultivated in short rotations without increasing soil loss. Most floods are of short duration and occur in late winter or early spring when cultivated crops are not growing. Most crops respond to applications of lime and fertilizer. Coarse fragments in the plow layer interfere with tillage in some places. Cover crops and crop residue management help to maintain the organic matter content and improve tilth.

This soil is suited to hay and pasture. Most of the commonly grown grasses and legumes grow well in this soil. Perennials, however, may be damaged by flooding in some years. The main management concerns are proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and rotational grazing.

This soil is well suited to woodland. Productivity is high. Plant competition and seedling mortality are management concerns. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking and applying herbicides, or by managing the existing stand. The flooding can damage new seedlings. Reinforcement plantings help achieve a fully stocked stand. The preferred species for planting include sweetgum, white ash, white oak, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to many urban uses because of the flooding. The moderately rapid permeability is an additional limitation on sites for sanitary facilities.

This soil is in capability subclass IIs.

CrB2—Crider silt loam, 2 to 6 percent slopes, eroded

This very deep, well drained, undulating soil is on narrow to broad karst ridgetops in the eastern part of Breckinridge County and in the central and eastern parts of Meade County. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 829 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 7 inches; brown silt loam

Subsoil:
7 to 24 inches; strong brown silt loam
24 to 31 inches; yellowish red, mottled silt loam
31 to 80 inches; red, mottled silty clay loam and clay

This soil is high in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium. The shrink-swell potential is low in the upper part of the subsoil and moderate in the lower part.

Included with this soil in mapping are small areas of Baxter, Nicholson, Fredonia, Caneyville, and Hammack soils. These soils are in landscape positions

Figure 15.—Bell peppers in an area of Crider silt loam, 2 to 6 percent slopes, eroded. The cornfield is in an area of Baxter very gravelly silt loam, karst, 6 to 12 percent slopes, eroded.

Figure 16.—Alfalfa hay in an area of Crider silt loam, 2 to 6 percent slopes, eroded. The soil is well suited to alfalfa and other deep-rooted crops.

similar to those of the Crider soil. Also included are areas of Nolin, Lindside, and Newark soils and areas of a soil having an overwash of silt loam that is 10 to 20 inches thick. These included soils are in depressional areas. Inclusions make up about 15 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Crider soil are used for cultivated crops, small grain, hay, or pasture (fig. 15).

This soil is well suited to cultivated crops and small grain. It is one of the more productive soils in the survey area and is used for intensive cropping systems. The hazard of erosion is a limitation if cultivated crops are grown. Conservation tillage, contour stripcropping, and crop residue management help to control erosion, reduce the runoff rate, and maintain high yields and good tilth.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa (fig. 16). Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is well suited to woodland. Productivity is high. Plant competition is a management concern when establishing new stands. The preferred species

for planting include white oak, northern red oak, white ash, yellow-poplar, black walnut, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to most urban uses. The high clay content and low strength are limitations on sites for buildings and local roads and streets. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIe.

CrC2—Crider silt loam, 6 to 12 percent slopes, eroded

This very deep, well drained, rolling soil is on convex karst ridgetops and on side slopes in the eastern part of Breckinridge County and in the central and eastern parts of Meade County. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 405 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 7 inches; brown silt loam

Subsoil:
7 to 24 inches; strong brown silt loam
24 to 31 inches; yellowish red, mottled silt loam
31 to 80 inches; red, mottled silty clay loam and clay

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium. The shrink-swell potential is low in the upper part of the subsoil and moderate in the lower part.

Included with this soil in mapping are a few areas of Baxter, Nicholson, Caneyville, and Fredonia soils. These soils are in landscape positions similar to those of the Crider soil. Also included are areas of Nolin, Lindside, and Newark soils in small depressions; a few areas of Crider soils that are severely eroded; areas of soils that have slopes of more than 12 percent; and areas of soils that have 10 to 20 percent chert fragments, by volume, in the subsoil. Included soils make up 15 percent of the map unit. Individual areas are less than 4 acres in size.

Most areas of this Crider soil are used for cultivated crops, small grain, hay, or pasture.

This soil is suited to most cultivated crops grown in the area. Erosion is a hazard if cultivated crops are grown. Conservation tillage, contour stripcropping, terraces, and crop residue management help to control erosion and reduce the runoff rate.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is well suited to woodland. Productivity is high. Plant competition is a management concern when establishing new seedlings. The preferred species for planting include white oak, northern red oak, white ash, yellow-poplar, black walnut, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to most urban uses. The slope and low strength are limitations on sites for sanitary facilities, dwellings, and local roads and streets. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIIe.

CrD2—Crider silt loam, 12 to 20 percent slopes, eroded

This very deep, well drained, hilly soil is on karst side slopes in the eastern part of Breckinridge County and in the central and eastern parts of Meade County. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 123 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 7 inches; brown silt loam

Subsoil:

7 to 24 inches; strong brown silt loam
24 to 31 inches; yellowish red, mottled silt loam
31 to 80 inches; red, mottled silty clay loam and clay

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is rapid. The shrink-swell potential is low in the upper part of the subsoil and moderate in the lower part.

Included with this soil in mapping are a few areas of Baxter, Fredonia, Caneyville, and Rosine soils. These soils are in landscape positions similar to those of the Crider soil. Also included are a few areas of soils that severely eroded; areas of soils that have slopes of less than 12 percent; and areas of Nolin, Lindside, and Newark soils in small depressions and drainageways. Included soils make up 20 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of the Crider soil are used for hay and pasture. A few areas are used as woodland.

This soil is poorly suited to cultivated crops because of the slope and the hazard of erosion. If the soil is cultivated, conservation tillage, stripcropping, contour terraces, and crop residue management help to control erosion and reduce the runoff rate.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is well suited to woodland. Productivity is high. Plant competition, the equipment limitation, and the hazard of erosion are the main management concerns. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. The slope limits the use of harvesting or planting equipment in some areas. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. The preferred species for planting include white oak, northern red oak, white ash, yellow-poplar, black walnut, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to most urban uses. The slope and low strength are limitations on sites for sanitary facilities, dwellings, and local roads and streets. These limitations can be overcome with proper design, installation, and site preparation.

This soil is in capability subclass IVe.

CtC3—Crider silty clay loam, 6 to 12 percent slopes, severely eroded

This very deep, well drained, rolling soil is on convex karst ridgetops and side slopes in the eastern part of Breckinridge County and in the central and eastern parts of Meade County. Slopes are smooth and convex. Erosion has removed 75 to 100 percent of the original surface layer. Individual areas range from 4 to 238 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:

0 to 6 inches; strong brown silty clay loam

Subsoil:

6 to 26 inches; strong brown and yellowish red silt loam that has mottles below a depth of 19 inches
26 to 75 inches; red, mottled silty clay loam and clay

This soil is medium in natural fertility and low in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium. The shrink-swell potential is low in the upper part of the subsoil and moderate in the lower part.

Included with this soil in mapping are a few areas of Baxter, Nicholson, Fredonia, Caneyville, and Hammack soils. These soils are in landscape positions similar to those of the Crider soil. Also included are a few areas of Nolin and Lindside soils in depressions. Included soils make up 15 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Crider soil are used for cultivated crops, small grain, hay, or pasture. A few areas are used as woodland.

This soil is poorly suited to cultivated crops. The hazard of erosion and the low content of organic matter are the main management concerns.

Conservation tillage, stripcropping, contour terraces, and crop residue management help to control erosion and reduce the runoff rate.

This soil is suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is well suited to woodland. Productivity is high. Plant competition is a management concern. The preferred species for planting include white oak, northern red oak, white ash, yellow-poplar, black walnut, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Strip plantings of herbaceous plants, shrubs, and trees are more attractive than solid plantings. Grasses, legumes, and grain crops can be planted for food and cover. A good plant cover requires maintenance measures, which include applying fertilizer and reseeding or replanting where the vegetation failed to become established. Shallow water areas are needed. Brush piles or other nesting sites also are needed.

This soil is suited to most urban uses. The slope and low strength are limitations on sites for sanitary facilities, dwellings, and local roads and streets. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IVe.

CtD3—Crider silty clay loam, 12 to 20 percent slopes, severely eroded

This very deep, well drained, hilly soil is on karst side slopes in the eastern part of Breckinridge County and in the central and eastern parts of Meade County. Erosion has removed 75 to 100 percent of the original surface layer. Individual areas range from 4 to 110 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:

0 to 6 inches; strong brown silty clay loam

Subsoil:

6 to 26 inches; strong brown and yellowish red silt loam that has mottles below a depth of 19 inches

26 to 75 inches; red, mottled silty clay loam and clay

This soil is medium in natural fertility and low in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is rapid. The shrink-swell potential is low in the upper part of the subsoil and moderate in the lower part.

Included with this soil in mapping are a few areas of Nicholson, Baxter, Fredonia, Caneyville, and Rosine soils. These soils are in landscape positions similar to those of the Crider soil. Also included are small areas of Nolin and Lindside soils in depressions; a few areas of moderately eroded soils; areas of soils that have slopes of less than 12 percent; and areas of soils that have 10 to 20 percent chert fragments, by volume, in the subsoil. Included soils make up 15 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Crider soil are used for hay, pasture, or woodland.

This soil is poorly suited to cultivated crops because of the slope and the hazard of erosion. If the soil is cultivated, conservation tillage, stripcropping, contour terraces, and crop residue management help to control erosion and reduce the runoff rate.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is well suited to woodland. Productivity is high. Plant competition, the hazard of erosion, and the equipment limitation are management concerns in producing high-quality timber. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Erosion is a hazard along logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. The slope limits the use of harvesting or planting equipment in some areas. Seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. The preferred species for planting include white oak, northern red oak, white ash, yellow-poplar, black walnut, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Strip plantings of herbaceous plants, shrubs, and trees are more attractive than solid plantings. Grasses, legumes, and

grain crops can be planted for food and cover. A good plant cover requires maintenance measures, which include applying fertilizer and reseeding or replanting where the vegetation failed to become established. Shallow water areas are needed. Brush piles or other nesting sites also are needed.

This soil is poorly suited to most urban uses. The slope and low strength are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass VIe.

Cu—Cuba silt loam, occasionally flooded

This very deep, well drained, nearly level soil is on flood plains in narrow valleys and near the larger streams in Breckinridge County. Slopes range from 0 to 3 percent. Individual areas range from 4 to 325 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches; brown silt loam

Subsoil:
8 to 30 inches; brown, mottled silt loam

Substratum:
30 to 66 inches; dark yellowish brown and light brownish gray silt loam

This soil is medium in natural fertility and moderate or high in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is slow. The soil is subject to occasional flooding in late winter and early spring.

Included with this soil in mapping are small areas of Clifty, Steff, Stendal, Nolin, and Lindside soils. These soils are in landscape positions similar to those of the Cuba soil. Also included, along streambanks and at the head of narrow drains, are soils that have more sand in the profile than the Cuba soil. Included soils make up 10 percent of the map unit. Individual inclusions are generally less than 2 acres in size.

Most areas of the Cuba soil are used for cultivated crops, hay, or pasture. A few areas are used as woodland.

This soil is well suited to cultivated crops. The hazard of erosion is slight. The soil is subject to occasional flooding, but most floods occur during winter and spring and are of short duration. Cover crops and crop residue management help to maintain the organic matter content and tilth.

This soil is suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is suited to woodland. Productivity is high. Plant competition is the main management concern. The preferred species for planting include yellow-poplar, eastern white pine, black walnut, and white ash. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to most urban uses because of the flooding and the seasonal high water table. In some places dikes and levees can be used to protect urban structures.

This soil is in capability subclass IIw.

EkA—Elk silt loam, 0 to 2 percent slopes

This very deep, well drained, nearly level soil is on stream terraces along the Ohio River and its tributaries. It is in the northern part of the survey area. Individual areas range from 4 to 76 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches; brown silt loam

Subsoil:
8 to 51 inches; dark yellowish brown and dark brown silt loam

Substratum:
51 to 76 inches; yellowish brown and dark yellowish brown sandy loam

This soil is high in natural fertility and moderate or high in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is slow.

Included with this soil in mapping are a few areas of Wheeling, Weinbach, and Sciotoville soils. These soils are in landscape positions similar to those of the Elk soil. They make up 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Elk soil are used for cultivated crops, hay, or pasture.

This soil is well suited to cultivated crops. Good tilth is easily maintained by returning crop residue to the soil. Erosion is not a hazard because the soil is nearly level.

This soil is well suited to hay and pasture. A cropping system that includes hay or pasture and grain crops helps to control erosion, maintain the organic matter content, and improve tilth.

This soil is well suited to woodland. Productivity is high. Plant competition is a management concern when establishing new seedlings. The preferred species for planting include black walnut, yellow-poplar, white oak, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is well suited to most urban uses. Flooding may occur in a few of the low-lying, included areas.

This soil is in capability class I.

EkB—Elk silt loam, 2 to 6 percent slopes

This very deep, well drained, gently sloping soil is on stream terraces along the Ohio River and its tributaries in the northern part of the survey area. Individual areas range from 4 to 290 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches; brown silt loam

Subsoil:
8 to 51 inches; dark yellowish brown and dark brown silt loam

Substratum:
51 to 76 inches; yellowish brown and dark yellowish brown sandy loam

This soil is high in natural fertility and moderate or high in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium.

Included with this soil in mapping are a few areas of Wheeling, Sciotoville, and Weinbach soils. These soils are in landscape positions similar to those of the Elk soil. They make up 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Elk soil are used for cultivated crops, small grain, hay, or pasture.

This soil is well suited to cultivated crops. Erosion is a hazard if conventional tillage is used. Conservation tillage, stripcropping, cover crops, and crop residue management help to control erosion and maintain the organic matter content.

This soil is well suited to hay and pasture. A cropping system that includes hay or pasture and grain crops helps to control erosion, maintain the organic matter content, and improve tilth.

This soil is well suited to woodland. Productivity is high. Plant competition is a management concern. The preferred species for planting include yellow-poplar, black walnut, white oak, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is well suited to most urban uses. Flooding may occur in a few of the low-lying, included areas.

This soil is in capability subclass IIe.

EkC2—Elk silt loam, 6 to 12 percent slopes, eroded

This very deep, well drained, sloping soil is on stream terraces along the Ohio River and its tributaries in the northern part of the survey area. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 25 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches; brown silt loam

Subsoil:
8 to 48 inches; dark yellowish brown and dark brown silt loam

Substratum:
48 to 75 inches; yellowish brown and dark yellowish brown sandy loam

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium.

Included with this soil in mapping are a few areas of Wheeling and Lakin soils. These soils are in landscape positions similar to those of the Elk soil. Also included are a few areas of severely eroded soils. Included soils make up about 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Elk soil are used for cultivated crops, small grain, hay, or pasture.

This soil is suited to cultivated crops and small grain. Most crops grow well on the soil. Erosion is a hazard if conventional tillage is used. Conservation tillage, stripcropping, cover crops, and crop residue management help to control erosion, maintain the organic matter content, and improve tilth.

This soil is well suited to hay and pasture. The commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Most areas of this soil are above flood level, but in a few areas flooding can damage perennial grasses and legumes. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is well suited to woodland, although most areas have been cleared of trees. Productivity is high. Plant competition is a management concern when establishing new stands. The preferred species for planting include black walnut, yellow-poplar, white oak, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to most urban uses. The slope is the main limitation. Flooding may occur in a few of the low-lying, included areas.

This soil is in capability subclass IIIe.

EkD2—Elk silt loam, 12 to 20 percent slopes, eroded

This very deep, well drained, moderately steep soil is on side slopes of stream terraces along the Ohio River and its tributaries in the northern part of the survey area. Erosion has removed 25 to 75 percent of the original surface layer. Brief periods of flooding occur on an average of once every 20 to 30 years from January to April. Individual areas range from 6 to 98 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches; brown silt loam

Subsoil:
8 to 48 inches; dark yellowish brown and dark brown silt loam

Substratum:
48 to 75 inches; yellowish brown and dark yellowish brown sandy loam

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is rapid. The soil is subject to brief periods of flooding on the lower slopes in winter and early spring.

Included with this soil in mapping are a few areas of Wheeling, Markland, and Lakin soils. These soils are in landscape positions similar to those of the Elk soil. Also included are a few areas of severely eroded soils. Included soils make up about 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Elk soil are used for cultivated crops, small grain, hay, or pasture.

This soil is suited to cultivated crops and small grain. Most crops grow well on the soil. Erosion is a hazard if conventional tillage is used. Conservation tillage, stripcropping, cover crops, and crop residue management help to control erosion, maintain the organic matter content, and improve tilth.

This soil is well suited to hay and pasture. The commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Most areas of this soil are above flood level, but in a few areas perennial grasses and legumes are subject to flood damage. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is well suited to woodland, although most areas have been cleared of trees. Productivity is high. The hazard of erosion, the equipment limitation, and plant competition are management concerns. The preferred species for planting include black walnut, yellow-poplar, white oak, cherrybark oak, white ash, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair.

Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to most urban uses. The slope is the main limitation. Flooding may occur in a few of the low-lying, included areas.

This soil is in capability subclass IVe.

EkD3—Elk silt loam, 12 to 20 percent slopes, severely eroded

This very deep, well drained, moderately steep soil is on the side slopes of stream terraces along the Ohio River and its tributaries in the northern part of the survey area. Erosion has removed 75 to 100 percent of the original surface layer. Brief periods of flooding occur on an average of once every 20 to 30 years from January to April. Individual areas range from 4 to 110 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 7 inches; brown silt loam

Subsoil:
7 to 45 inches; dark yellowish brown and dark brown silt loam

Substratum:
45 to 70 inches; yellowish brown and dark yellowish brown sandy loam

This soil is low in natural fertility and organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is rapid. The soil is subject to brief periods of flooding on the lower slopes in winter and early spring.

Included with this soil in mapping are a few areas of Wheeling and Markland soils. These soils are in landscape positions similar to those of the Elk soil. Also included are a few areas of Elk soils that are moderately eroded and areas of soils that have slopes of more than 20 percent or less than 12 percent. Included soils make up 15 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of this Elk soil are used as woodland. A few areas are used as pasture.

This soil is not suited to cultivated crops and small grain. The slope and the hazard of erosion are the main limitations.

This soil is suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is well suited to woodland. Productivity is high. Plant competition, the equipment limitation, and the hazard of erosion are management concerns. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. The slope limits the use of harvesting or planting equipment in some areas. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. The preferred species for planting include black walnut, yellow-poplar, white oak, cherrybark oak, white ash, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Strip plantings of herbaceous plants, shrubs, and trees are more attractive than solid plantings. Grasses, legumes, and grain crops can be planted for food and cover. A good plant cover requires maintenance measures, which include applying fertilizer and reseeding or replanting where the vegetation failed to become established. Shallow water areas are needed. Brush piles or other nesting sites also are needed.

This soil is poorly suited to most urban uses. The slope is the main limitation. It is difficult to overcome.

This soil is in capability subclass VIe.

EkE—Elk silt loam, 20 to 40 percent slopes

This very deep, well drained, steep and very steep soil is on the side slopes of stream terraces along the Ohio River and its tributaries in the northern part of the survey area. Brief periods of flooding occur on an average of once each 20 to 30 years from January to April. Individual areas range from 6 to 210 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches; brown silt loam

Subsoil:
8 to 51 inches; dark yellowish brown and dark brown silt loam

Substratum:
51 to 76 inches; yellowish brown and dark yellowish brown sandy loam

This soil is medium in natural fertility and moderate or high in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is rapid. The soil is subject to brief periods of flooding on the lower slopes in winter and early spring.

Included with this soil in mapping are a few areas of Wheeling and Markland soils. These soils are in landscape positions similar to those of the Elk soil. Also included are small areas of Nolin soils along drainageways, a few areas of Elk soils that are moderately eroded, and areas of soils that have slopes of more than 30 percent or less than 20 percent. Included soils make up 15 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of this Elk soil are used as woodland. A few areas are used as pasture.

This soil is not suited to cultivated crops, small grain, and hay. The slope and the hazard of erosion are the main limitations.

This soil is suited to pasture. Most of the commonly grown grasses and legumes grow well on the soil. Most areas of this soil are above flood level, but in a few areas perennial grasses and legumes are subject to flood damage. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is well suited to woodland. Productivity is high. Plant competition, the equipment limitation, and the hazard of erosion are management concerns. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. The slope limits the use of harvesting or planting equipment. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. The preferred species for planting include black walnut, yellow-poplar, white oak, cherrybark oak, white ash, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to most urban uses. The slope is the main limitation. It is difficult to overcome.

This soil is in capability subclass VIe.

FcC2—Fredonia-Crider complex, karst, rocky, 6 to 12 percent slopes, eroded

These moderately deep and very deep, well drained, rolling soils are on uplands. They are on karst ridgetops and side slopes throughout the central and eastern parts of the survey area. Erosion has removed 25 to 75 percent of the original surface layer, and limestone crops out on about 2 percent of the soil surface. Intermittent streams are mostly short and lead through sinkholes into underground streams. The two soils occur as areas so closely intermingled that they could not be separated at the scale used in mapping. Individual areas range from 4 to 629 acres in size.

Fredonia and similar soils make up about 45 percent of the map unit, and Crider and similar soils make up about 30 percent. Inclusions make up the remainder of the map unit.

The typical sequence, depth, and composition of the layers of the Fredonia soil are as follows—

Surface layer:
0 to 4 inches; dark brown silt loam

Subsoil:
4 to 26 inches; yellowish red and red silty clay that has mottles below a depth of 19 inches

Substratum:
26 to 30 inches; red, mottled silty clay

Bedrock:
30 inches; hard, gray limestone

The Fredonia soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately slow or slow. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is medium. The shrink-swell potential is moderate. Limestone bedrock is at a depth of 20 to 40 inches.

The typical sequence, depth, and composition of the layers of the Crider soil are as follows—

Surface layer:
0 to 7 inches; brown silt loam

Subsoil:
7 to 24 inches; strong brown silt loam
24 to 31 inches; yellowish red, mottled silt loam
31 to 80 inches; red, mottled silty clay loam and clay

The Crider soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium. The shrink-swell potential is low in the upper part of the subsoil and moderate in the lower part.

Included in this unit in mapping are small areas of Baxter, Rosine, Caneyville, and Corydon soils. These soils are in landscape positions similar to those of the Fredonia and Crider soils. Also included are small areas of Nolin and Lindside soils in depressions; small areas of Fredonia and Crider soils that are severely eroded; small areas of soils that have less clay in the subsoil than the Fredonia soil; areas of a shallow, clayey soil near rock outcrop; areas of a fine-silty soil that is less than 60 inches deep over bedrock; and areas of rock outcrop that occur as tilted rock ledges protruding above the soil surface or as shelf rock roughly parallel to the soil surface. Inclusions make up about 25 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most of the acreage in the unit is used for hay and pasture or is idle land. A few areas are cultivated.

The Fredonia and Crider soils are not suited to cultivated crops. The moderate depth to bedrock and the moderate available water capacity of the Fredonia soil, the hazard of erosion, and distribution of rock outcrop make tillage difficult and limit the production of cultivated crops. Some areas between outcrops, however, are large enough for small fields of specialty crops.

These soils are suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soils. The moderate depth to bedrock and the moderate available water capacity of the Fredonia soil are limitations for growing deep-rooted legumes and for producing good yields. The hazard of erosion and the scattered areas of rock outcrop make tilling and harvesting difficult. Renovating or seeding pastures in late summer or early fall helps to reduce the hazard of erosion. Rotational grazing and applications of lime and fertilizer help to produce adequate yields and control erosion.

These soils are suited to woodland. Productivity is moderately high on the Fredonia soil and high on the Crider soil. Plant competition and the equipment limitation are management concerns. The preferred species for planting on both soils include white oak, white ash, and eastern white pine. Yellow-poplar, black walnut, northern red oak, or loblolly pine are additional recommended species for planting in areas of the Crider soil. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

These soils are poorly suited to most urban uses. The moderate depth to bedrock, the rock outcrop, the slope, the slow permeability, and the moderate shrink-swell potential are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

These soils are in capability subclass VIs.

FcD2—Fredonia-Crider complex, karst, rocky, 12 to 20 percent slopes, eroded

These moderately deep and very deep, well drained, hilly soils are on uplands. They are on karst ridgetops and side slopes throughout the central and eastern parts of the survey area. Erosion has removed 25 to 75 percent of the original surface layer, and limestone crops out on about 2 percent of the soil surface. Intermittent streams are mostly short and lead through sinkholes into underground streams. The two soils occur as areas so closely intermingled that they could not be separated at the scale used in mapping. Individual areas range from 4 to 272 acres in size.

Fredonia and similar soils make up about 45 percent of the map unit, and Crider and similar soils make up about 30 percent. Inclusions make up the remainder of the map unit.

The typical sequence, depth, and composition of the layers of the Fredonia soil are as follows—

Surface layer:
0 to 4 inches; dark brown silt loam

Subsoil:
4 to 26 inches; yellowish red and red silty clay that has mottles below a depth of 19 inches

Substratum:
26 to 30 inches; red, mottled silty clay

Bedrock:
30 inches; hard, gray limestone

The Fredonia soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately slow or slow. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is rapid. The shrink-swell potential is moderate. Limestone bedrock is at a depth of 20 to 40 inches.

The typical sequence, depth, and composition of the layers of the Crider soil are as follows—

Surface layer:
0 to 7 inches; brown silt loam

Subsoil:
7 to 24 inches; strong brown silt loam
24 to 31 inches; yellowish red, mottled silt loam
31 to 80 inches; red, mottled silty clay loam and clay

The Crider soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is rapid. The shrink-swell potential is low in the upper part of the subsoil and moderate in the lower part.

Included in this unit in mapping are small areas of Baxter, Rosine, Caneyville, and Corydon soils. These soils are in landscape positions similar to those of the Fredonia and Crider soils. Also included are small areas of Nolin and Lindside soils in depressions; small areas of Fredonia and Crider soils that are severely eroded; small areas of soils that have less clay in the subsoil than the Fredonia soil; small areas of a shallow, clayey soil near rock outcrop; areas of a fine-silty soil that is less than 60 inches deep over bedrock; and areas of rock outcrop that occur as tilted rock ledges protruding above the soil surface or as shelf rock roughly parallel to the soil surface. Inclusions make up about 25 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of the Fredonia and Crider soils are used as pasture or woodland.

These soils are not suited to cultivated crops. The depth to bedrock and the moderate available water capacity of the Fredonia soil, the hazard of erosion, and distribution of rock outcrop make tillage difficult and limit the production of cultivated crops.

These soils are suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soils. The depth to bedrock and the moderate available water capacity of the Fredonia soil are limitations for growing deep-rooted legumes and for producing good yields. The hazard of erosion and the scattered areas of rock outcrop make tilling and harvesting difficult. Renovating or seeding pastures in late summer or early fall helps to control erosion. Rotational grazing and applications of lime and fertilizer produce good yields and help to control erosion.

These soils are suited to woodland. Productivity is moderately high on the Fredonia soil and high on the Crider soil. Plant competition, the hazard of erosion, and the equipment limitation are management concerns. Undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. The slope and the rock outcrop limit the use of harvesting or planting equipment in some areas. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. The preferred species for planting on both soils include white oak, white ash, and eastern white pine. Yellow-poplar, black walnut, northern red oak, or loblolly pine are additional recommended species for planting in areas of the Crider soil. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

These soils are poorly suited to most urban uses. The depth to bedrock, the rock outcrop, the slope, the slow permeability, and the moderate shrink-swell potential are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

These soils are in capability subclass VIs.

FrD3—Fredonia-Crider complex, karst, very rocky, 6 to 20 percent slopes, severely eroded

These moderately deep and very deep, well drained, rolling to hilly soils are on uplands. They are on karst ridgetops and side slopes throughout the central and eastern parts of the survey area. Erosion has removed 75 to 100 percent of the original surface layer, and limestone crops out on about 10 percent of the soil surface. Intermittent streams are mostly short and lead through sinkholes into underground streams.

The two soils occur as areas so closely intermingled that they could not be separated at the scale used in mapping. Individual areas range from 4 to 154 acres in size.

Fredonia and similar soils make up about 50 percent of the map unit, and Crider and similar soils make up about 25 percent. Inclusions make up the remainder of the map unit.

The typical sequence, depth, and composition of the layers of the Fredonia soil are as follows—

Surface layer:
0 to 3 inches; dark brown silty clay loam

Subsoil:
3 to 23 inches; yellowish red and red silty clay that has mottles below a depth of 16 inches

Substratum:
23 to 27 inches; red, mottled silty clay

Bedrock:
27 inches; hard, gray limestone

The Fredonia soil is low in natural fertility and organic matter content. Permeability is moderately slow or slow. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is medium or rapid. The shrink-swell potential is moderate. Limestone bedrock is at a depth of 20 to 40 inches.

The typical sequence, depth, and composition of the layers of the Crider soil are as follows—

Surface layer:
0 to 6 inches; strong brown silty clay loam

Subsoil:
6 to 26 inches; strong brown and yellowish red silt loam that has mottles below a depth of 19 inches
26 to 75 inches; red, mottled silty clay loam and clay

The Crider soil is medium in natural fertility and low in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium or rapid. The shrink-swell potential is low in the upper part of the subsoil and moderate in the lower part.

Included in this unit in mapping are small areas of Baxter, Rosine, Caneyville, and Corydon soils. These soils are in landscape positions similar to those of the Fredonia and Crider soils. Also included are small areas of Nolin and Lindside soils in depressions; small areas of Fredonia and Crider soils that are moderately eroded; small areas of soils that have less clay in the subsoil than the Fredonia soil; small areas of a shallow, clayey soil near rock outcrop; areas of a fine-silty soil that is less than 60 inches deep over bedrock; and areas of rock outcrop that occur as tilted rock ledges protruding above the soil surface or as shelf rock roughly parallel to the soil surface. In places large stones have broken off from the rock outcrop and are scattered on the surface or have filled drainageways. Inclusions make up about 25 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most of the acreage in the unit is used as pasture or woodland or is idle land.

The Fredonia and Crider soils are not suited to cultivated crops. The hazard of erosion, the moderate depth to bedrock, the scattered areas of rock outcrop, and the moderate available water capacity make tillage difficult and limit the production of cultivated crops.

These soils are poorly suited to hay and pasture. The hazard of erosion, the moderate depth to bedrock, and the moderate available water capacity limit production. Renovating or seeding pastures in late summer or early fall helps to control erosion. The moderately deep root zone in the Fredonia soil limits the growth of deep-rooted plants. Rotational grazing and applications of lime and fertilizer help to produce adequate yields and control erosion.

These soils are suited to woodland. Productivity is moderate on the Fredonia soil and high on the Crider soil. Plant competition, the hazard of erosion, and the equipment limitation are management concerns. Undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. The slope and the rock outcrop limit the use of harvesting or planting equipment in some areas. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. The preferred species for planting on the Fredonia soil include white ash, Virginia pine, and eastern redcedar. The preferred species for planting on the Crider soil include white oak, yellow-poplar, black walnut, eastern white pine, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for woodland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Brushy thickets can be established in areas of mature woodland. Food

plots or areas of green browse can be planted along field borders or logging roads. Shallow water areas are needed. Den trees should not be harvested.

These soils are poorly suited to most urban uses. The depth to bedrock, the rock outcrop, the slope, the slow permeability, and the moderate shrink-swell potential are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

These soils are in capability subclass VIIs.

GaB2—Gatton silt loam, 2 to 6 percent slopes, eroded

This very deep, moderately well drained, gently sloping soil is on narrow ridgetops in the Sand Ridge area of the southeastern part of Meade County. Slopes are smooth and slightly convex. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 95 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 6 inches; brown silt loam

Subsoil:
6 to 20 inches; strong brown and yellowish brown silt loam that is mottled below a depth of 12 inches
20 to 34 inches; a fragipan of yellowish brown, mottled loam
34 to 72 inches; red, mottled red, and strong brown sandy clay

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate above the fragipan and slow in the fragipan. The root zone is only moderately deep because of the fragipan. Available water capacity is moderate, and surface runoff is medium. The seasonal high water table is at a depth of 18 to 24 inches in winter and early spring.

Included with this soil in mapping are a few small areas of Sadler, Zanesville, and Riney soils. These soils are in landscape positions similar to those of the Gatton soil. They make up less than 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Gatton soil are used for cultivated crops or small grain.

This soil is well suited to cultivated crops and small grain. It can be worked throughout a wide range of moisture conditions without clodding or crusting. Erosion is a hazard if cultivated crops are grown. Conservation tillage, contour stripcropping, crop residue management, and a cropping system that includes grasses and legumes help to control erosion and reduce the runoff rate. During extended dry periods, the soil may become droughty because of the restricted rooting depth and the moderate available water capacity.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil; however, the growth of deep-rooted plants is limited by the dense fragipan. Good yields can be obtained with proper applications of lime and fertilizer. Weed control, controlled grazing, and erosion control when seeding or renovating are management concerns.

This soil is suited to woodland. Productivity is moderately high. Plant competition is a management concern. The preferred species for planting include white oak, yellow-poplar, eastern white pine, shortleaf pine, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to most urban uses. The wetness, the slow permeability, and low strength are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIe.

GIC2—Gilpin silt loam, 6 to 12 percent slopes, eroded

This moderately deep, well drained, sloping soil is on convex ridgetops and side slopes throughout Breckinridge County and in the northwestern part of Meade County. The soil formed in material weathered from acid sandstone, siltstone, and shale. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 85 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 5 inches; dark grayish brown silt loam

Subsoil:
5 to 24 inches; yellowish brown and strong brown loam and channery loam
24 to 29 inches; strong brown very channery loam

Bedrock:
29 inches; fractured, yellowish brown sandstone

This soil is low in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is medium. Sandstone, siltstone, or shale bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are small areas of Zanesville, Lenberg, and Rosine soils. These soils are in landscape positions similar to those of the Gilpin soil. Also included are a few areas of Gilpin soils that are severely eroded and a deep, loamy soil that formed in loess and sandstone residuum. Included soils make up 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Gilpin soil are used for hay, pasture, or cropland.

This soil is suited to the cultivated crops commonly grown in the survey area. The slope, the moderate depth to bedrock, and the hazard of erosion are the main management concerns. Conservation tillage, contour stripcropping, cover crops, and crop residue management help to control erosion and reduce the runoff rate. Tilth and the organic matter content can be maintained by returning crop residue to the soil and by including grasses and legumes in the cropping system.

This soil is well suited to hay and pasture. Most of the commonly grown grasses grow well on the soil. Applications of lime and fertilizer, proper seeding mixtures and rates, pasture renovation, controlled grazing, and weed control help to produce and maintain good yields of high-quality forage.

This soil is well suited to woodland. Productivity is high. Plant competition is a management concern when establishing new stands. The preferred species for planting include white oak, eastern white pine, loblolly pine, and yellow-poplar. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to most urban uses. The slope, the depth to bedrock, and low strength are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIIe.

GIC3—Gilpin silt loam, 6 to 12 percent slopes, severely eroded

This moderately deep, well drained, sloping soil is on convex ridgetops and side slopes throughout Breckinridge County and in the northwestern part of Meade County. The soil formed in material weathered from acid sandstone, siltstone, and shale. Erosion has removed 75 to 100 percent of the original surface layer. Individual areas range from 4 to 127 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 3 inches; brown silt loam

Subsoil:
3 to 19 inches; yellowish brown and strong brown loam and channery loam
19 to 24 inches; strong brown very channery loam

Bedrock:
24 inches; fractured, yellowish brown sandstone

This soil is low in natural fertility and organic matter content. Permeability is moderate. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is medium. Sandstone, siltstone, or shale bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are small areas of Zanesville, Lenberg, and Rosine soils. These soils are in landscape positions similar to those of the Gilpin soil. Also included are areas of rock outcrop and areas of a deep, loamy soil that formed in loess and sandstone residuum. Inclusions make up 15 percent of the map unit. Individual inclusions are generally less than 2 acres in size.

Most areas of the Gilpin soil are used for hay, pasture, or woodland.

This soil is poorly suited to cultivated crops. The hazard of erosion, poor tilth, and the low content of organic matter are the main limitations.

This soil is suited to hay and pasture. Most of the commonly grown grasses grow well on the soil. The slope and the hazard of erosion are management concerns. Applications of lime and fertilizer, proper seeding mixtures and rates, controlled grazing, weed control, and timely harvest help to produce and maintain good yields of high-quality forage.

This soil is well suited to woodland. Productivity is high. Plant competition is a management concern when establishing new stands. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking,

applying herbicides, and cutting or girdling, or by managing the existing stand. The preferred species for planting include white oak, eastern white pine, loblolly pine, and yellow-poplar. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Strip plantings of herbaceous plants, shrubs, and trees are more attractive than solid plantings. Grasses, legumes, and grain crops can be planted for food and cover. A good plant cover requires maintenance measures, which include applying fertilizer and reseeding or replanting where the vegetation failed to become established. Shallow water areas are needed. Brush piles or other nesting sites also are needed.

This soil is suited to most urban uses. The slope, the depth to bedrock, and low strength are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IVe.

GwF—Gilpin-Dekalb-Rock outcrop complex, 30 to 60 percent slopes

This map unit occurs as areas of moderately deep, well drained, very steep soils intermingled with areas of Rock outcrop. It is on moderately wide, convex side slopes in the uplands throughout Breckinridge County and in the northwestern part of Meade County. Most areas are dissected by small, intermittent drains. The Gilpin and Dekalb soils are on the steeper, more convex, upper side slopes. The Gilpin and Dekalb soils and the areas of Rock outcrop could not be separated at the scale selected for mapping. Individual areas range from 5 to 1,667 acres in size.

Gilpin and similar soils make up about 35 percent of the map unit, Dekalb and similar soils make up about 25 percent, and the Rock outcrop makes up about 15 percent. Inclusions make up the remainder of the map unit.

The typical sequence, depth, and composition of the layers of the Gilpin soil are as follows—

Surface layer:
0 to 4 inches; dark brown loam

Subsurface layer:
4 to 10 inches; yellowish brown loam

Subsoil:
10 to 24 inches; strong brown and dark brown loam and channery loam
24 to 29 inches; strong brown very channery loam

Bedrock:
29 inches; fractured, yellowish brown sandstone

The Gilpin soil is low in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is very rapid. Sandstone, siltstone, or shale bedrock is at a depth of 20 to 40 inches.

The typical sequence, depth, and composition of the layers of the Dekalb soil are as follows—

Surface layer:
0 to 2 inches; very dark grayish brown loam

Subsurface layer:
2 to 5 inches; yellowish brown channery loam

Subsoil:
5 to 14 inches; yellowish brown channery sandy loam
14 to 28 inches; yellowish brown very channery sandy loam

Substratum:
28 to 38 inches; brownish yellow extremely channery sandy loam

Bedrock:
38 inches; yellowish brown sandstone

The Dekalb soil is low in natural fertility and moderate in organic matter content. Permeability is rapid. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is very rapid. Sandstone bedrock is at a depth of 20 to 40 inches.

The Rock outcrop consists of sandstone ledges, escarpments, and individual outcrops extending horizontally along the slope. Escarpments range from 15 to 35 feet high.

Included in this unit in mapping are small areas of Caneyville, Rosine, Lenberg, and Varilla soils on steep side slopes. These soils are in landscape positions similar to those of the Gilpin and Dekalb soils. Also included are areas of Cuba, Steff, Nolin, and Clifty soils on flood plains in narrow valleys and areas of a deep, loamy soil that formed in loess and sandstone residuum. Included soils make up 25 percent of the map unit. Individual inclusions are less than 4 acres in size.

Most areas of the unit are used as woodland.

This map unit is not suited to farming. The very steep slopes, the hazard of erosion, the Rock outcrop, and stones on the surface are severe limitations in farmed areas.

This map unit is suited to woodland. Productivity is

high on cool slopes and moderately high on warm slopes. The hazard of erosion, plant competition, and the equipment limitation are the main management concerns. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. Permanent access roads can be protected by installing water breaks and culverts and by applying gravel. Undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Because of the slope and the cliffs, tracked or other specialized equipment is needed. Log yards can be established on benches or in level areas adjacent to permanent access roads. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. Seedling mortality is a concern on warm slopes. The preferred species for planting on cool slopes include white oak, northern red oak, yellow-poplar, eastern white pine, and shortleaf pine. Those preferred for planting on warm slopes include white oak, shortleaf pine and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for woodland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Brushy thickets can be established in areas of mature woodland. Food plots or areas of green browse can be planted along field borders or logging roads. Shallow water areas are needed. Den trees should not be harvested.

This map unit is not suited to urban uses. The very steep slope, the hazard of erosion, and the Rock outcrop are the main management concerns affecting most uses.

The Gilpin and Dekalb soils are in capability subclass VIIe. The Rock outcrop is in capability subclass VIIIs.

HaB2—Hammack silt loam, 2 to 6 percent slopes, eroded

This very deep, well drained, undulating soil is on narrow karst ridgetops in the eastern part of Breckinridge County and in the central and eastern parts of Meade County. Slopes are smooth and slightly convex. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 99 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 4 inches; brown silt loam

Subsurface layer:
4 to 9 inches; dark yellowish brown and strong brown silt loam

Subsoil:
9 to 27 inches; strong brown silty clay loam and strong brown and yellowish red silt loam
27 to 40 inches; red and yellowish red extremely gravelly silty clay loam
40 to 86 inches; dark red, mottled clay

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium. The shrink-swell potential is low in the upper part of the subsoil and moderate in the lower part.

Included with this soil in mapping are a few small areas of Baxter, Crider, and Nicholson soils. These soils are in landscape positions similar to those of the Hammack soil. Also included are a few areas of Nolin and Lindside soils in small depressions. Included soils make up 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Hammack soil are used for cultivated crops, small grain, hay, or pasture.

This soil is well suited to cultivated crops and small grain. It can be worked throughout a wide range of moisture conditions without clodding or crusting. Erosion is a hazard if conventional tillage is used. Conservation tillage, contour stripcropping, crop residue management, and a cropping system that includes grasses and legumes help to control erosion and reduce the runoff rate.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Good yields can be produced with proper applications of lime and fertilizer. Weed control, controlled grazing, and erosion control when seeding or renovating are needed.

This soil is well suited to woodland. Productivity is high. Plant competition is a management concern. The preferred species for planting include northern red oak, yellow-poplar, eastern white pine, shortleaf pine, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and

maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to most urban uses. The high clay content and the moderate shrink-swell potential in the subsoil, however, are limitations affecting some uses. Low strength is also a limitation on sites for local roads and streets. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIe.

HbC2—Hammack-Baxter complex, karst, 6 to 12 percent slopes, eroded

These very deep and well drained soils are on relatively broad, rolling karst ridgetops and side slopes on uplands throughout the eastern part of Breckinridge County and in the central and eastern parts of Meade County. The Hammack soil is generally on narrow, rolling ridgetops, and the Baxter soil is on irregular side slopes around sinkholes and depressional basins. The two soils occur as areas so closely intermingled that they could not be separated at the scale used in mapping. Slopes are irregular. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 1,145 acres in size.

Hammack and similar soils make up about 45 percent of the map unit, and Baxter and similar soils make up about 35 percent. Inclusions make up the remainder of the map unit.

The typical sequence, depth, and composition of the layers of the Hammack soil are as follows—

Surface layer:
0 to 4 inches; brown silt loam

Subsurface layer:
4 to 9 inches; dark yellowish brown and strong brown silt loam

Subsoil:
9 to 27 inches; strong brown silty clay loam and strong brown and yellowish red silt loam
27 to 40 inches; red and yellowish red extremely gravelly silty clay loam
40 to 86 inches; dark red, mottled clay

The Hammack soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium. The shrink-swell potential is low in the upper part of the subsoil and moderate in the lower part.

The typical sequence, depth, and composition of the layers of the Baxter soil are as follows—

Surface layer:
0 to 5 inches; dark yellowish brown very gravelly silt loam

Subsoil:
5 to 11 inches; yellowish red gravelly silty clay loam
11 to 71 inches; red gravelly clay
71 to 97 inches; dark red gravelly clay

The Baxter soil is medium in natural fertility and low or moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium. The shrink-swell potential is moderate.

Included in this unit in mapping are a few small areas of Crider and Nicholson soils. These soils are in landscape positions similar to those of the Hammack and Baxter soils. Also included are a few areas of Nolin and Lindside soils in depressions, areas of Hammack and Baxter soils that are severely eroded, and areas of a soil that is similar to the Baxter soil but that has less than 15 percent rock fragments in the control section. Included soils make up less than 20 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Hammack and Baxter soils are used for cultivated crops, small grain, hay, or pasture. A few areas are used as woodland.

These soils are suited to cultivated crops and small grain. Most of the commonly grown crops grow well on the soils. Erosion is a hazard if conventional tillage is used. Contour stripcropping is difficult in some areas because of the irregular slopes. Conservation tillage, contour stripcropping, crop residue management, and a cropping system that includes grasses and legumes help to slow runoff and reduce erosion (fig. 17).

These soils are well suited to hay and pasture (fig. 18). Deep-rooted grasses and legumes grow well on the soils. Proper seeding rates, applications of lime and fertilizer, rotational grazing, and renovation without turning the soil over help to produce good yields and control erosion.

These soils are well suited to woodland. Productivity is high. Plant competition is a management concern in producing high-quality timber. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. The preferred species for planting include white oak,

Figure 17.—No-till soybeans double cropped into wheat stubble in an area of Hammack-Baxter complex, karst, 6 to 12 percent slopes, eroded.

northern red oak, yellow-poplar, eastern white pine, shortleaf pine, and white ash. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

These soils are suited to most urban uses. The moderate shrink-swell potential, the slope, and the high clay content, however, are limitations on most building sites. Low strength is also a limitation on sites for local roads and streets. Proper design, installation, and site preparation help to reduce or overcome these limitations.

These soils are in capability subclass IIIe.

HbC3—Hammack-Baxter complex, karst, 6 to 12 percent slopes, severely eroded

These very deep and well drained soils are on relatively broad, rolling karst uplands throughout the eastern part of Breckinridge County and in the central and eastern parts of Meade County. The Hammack soil is generally on narrow, rolling ridgetops, and the Baxter soil is on irregular side slopes around sinks or depressions. The two soils occur as areas so closely intermingled that they could not be separated at the

Figure 18.—An area of Hammack-Baxter complex, karst, 6 to 12 percent slopes, eroded, used for hay and pasture.

scale used in mapping. Erosion has removed 75 to 100 percent of the original surface layer. Rills and small gullies are common. Individual areas range from 4 to 279 acres in size.

Hammack and similar soils make up about 40 percent of the map unit, and Baxter and similar soils make up about 40 percent. Inclusions make up the remainder of the map unit.

The typical sequence, depth, and composition of the layers of the Hammack soil are as follows—

Surface layer:
0 to 5 inches; strong brown silty clay loam

Subsoil:
5 to 23 inches; strong brown silty clay loam and strong brown and yellowish red silt loam
23 to 36 inches; red and yellowish red extremely gravelly silty clay loam
36 to 82 inches; dark red, mottled clay

The Hammack soil is low in natural fertility and organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium. The shrink-swell potential is low in the upper part of the subsoil and moderate in the lower part.

The typical sequence, depth, and composition of the layers of the Baxter soil are as follows—

Surface layer:
0 to 6 inches; strong brown very gravelly silty clay loam

Subsoil:
6 to 64 inches; red gravelly clay
64 to 90 inches; dark red gravelly clay

The Baxter soil is low in natural fertility and organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is moderate, and surface runoff is medium. The shrink-swell potential is moderate.

Included in this unit in mapping are a few small areas of Crider and Nicholson soils. These soils are in landscape positions similar to those of the Hammack and Baxter soils. Also included are areas of Nolin and Lindside soils in depressions; areas of Hammack and Baxter soils that are moderately eroded; and areas of a soil that is similar to the Baxter soil but that has less than 15 percent rock fragments in the control section. Included soils make up about 20 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of the Hammack and Baxter soils are used for cultivated crops, small grain, hay, or pasture. A few areas are used as woodland.

These soils are poorly suited to cultivated crops and small grain. Erosion is a hazard if cultivated crops are grown. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes help to control erosion and reduce the runoff rate.

These soils are suited to hay and pasture. Erosion is a hazard. Most deep-rooted grasses and legumes grow well on the soils. Proper seeding mixtures and rates, proper seeding times, applications of lime and fertilizer, rotational grazing, and renovation without turning the soil over help to produce good yields and control erosion.

These soils are well suited to woodland. Productivity is high. Plant competition is the main management concern. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. The preferred species for planting include white oak, northern red oak, eastern white pine, and shortleaf pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Strip plantings of herbaceous plants, shrubs, and trees are more attractive than solid plantings. Grasses, legumes, and grain crops can be planted for food and cover. A good plant cover requires maintenance measures, which include applying fertilizer and reseeding or replanting where the vegetation failed to become established. Shallow water areas are needed. Brush piles or other nesting sites also are needed.

These soils are suited to most urban uses. The moderate shrink-swell potential, the slope, and the high clay content, however, are limitations on most building sites. Low strength also is a limitation on sites for local roads and streets. Proper design, installation, and site preparation help to reduce or overcome these limitations.

These soils are in capability subclass IVe.

HoB2—Hosmer silt loam, 2 to 6 percent slopes, eroded

This very deep, well drained and moderately well drained, gently sloping soil is on narrow, slightly convex ridgetops above the Ohio River flood plain. It formed in a mantle of loess more than 4 feet thick. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 54 areas.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches; brown silt loam

Subsoil:
9 to 25 inches; yellowish brown and strong brown silt loam and silty clay loam having mottles below a depth of 16 inches
25 to 61 inches; a fragipan of dark yellowish brown, mottled silt loam

Substratum:
61 to 70 inches; yellowish brown, mottled silt loam

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate above the fragipan and slow in the fragipan. Plant roots easily penetrate the soil; however, the root zone is only moderately deep because of the fragipan. Available water capacity is moderate, and surface runoff is medium. The seasonal high water table is at a depth of 24 to 36 inches in winter and early spring.

Included with this soil in mapping are small areas of Sadler, Zanesville, Nicholson, and Alford soils. These soils are in landscape positions similar to those of the Hosmer soil. Also included are areas of a deep, loamy soil that formed in loess and sandstone residuum. Included soils make up 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Hosmer soil are used for cultivated crops, small grain, hay, or pasture.

This soil is well suited to cultivated crops and small grain. It can be worked throughout a wide range in moisture content without clodding or crusting. Erosion is a hazard if conventional tillage is used. Conservation tillage, contour stripcropping, crop residue management, and a cropping system that includes grasses and legumes help to control erosion and reduce the runoff rate. During extended dry periods, the soil may become droughty because of the restricted rooting depth and the moderate available water capacity.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil; however, the growth of deep-rooted plants is limited by the dense fragipan. Good yields can be produced with proper applications of lime and fertilizer. Weed control, controlled grazing, and erosion control when seeding or renovating are management concerns.

This soil is suited to woodland. Productivity is high. Plant competition is a management concern. The preferred species for planting include white ash, yellow-poplar, eastern white pine, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to most urban uses. The wetness and the slow permeability are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIe.

HoC2—Hosmer silt loam, 6 to 12 percent slopes, eroded

This very deep, well drained and moderately well drained, sloping soil is on narrow, slightly convex ridgetops and side slopes above the Ohio River flood plain. It formed in a mantle of loess more than 4 feet thick. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 85 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches; brown silt loam

Subsoil:
9 to 25 inches; yellowish brown and strong brown silt loam and silty clay loam having mottles below a depth of 16 inches
25 to 61 inches; a fragipan of dark yellowish brown, mottled silt loam

Substratum:
61 to 70 inches; yellowish brown, mottled silt loam

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate above the fragipan and slow in the fragipan. Plant roots easily penetrate the soil; however, the root zone is only moderately deep because of the fragipan. Available water capacity is moderate, and surface runoff is medium. The seasonal high water table is at a depth of 24 to 36 inches in winter and early spring.

Included with this soil in mapping are a few small areas of Alford, Zanesville, Nicholson, and Rosine soils. These soils are in landscape positions similar to those of the Hosmer soil. Also included are areas of a deep, loamy soil that formed in loess and sandstone residuum. Included soils make up about 15 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Hosmer soil are used for cultivated crops, small grain, hay, or pasture.

This soil is well suited to cultivated crops and small grain. Most of the commonly grown crops grow well on the soil. The hazard of erosion and restricted rooting depth are the main management concerns. Conservation tillage, contour stripcropping, crop residue management, and a cropping system that includes grasses and legumes help to prevent further erosion. During extended dry periods, the soil may become droughty because of the restricted rooting depth and the moderate available water capacity.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil; however, the growth of deep-rooted plants is limited by the dense fragipan. Good yields can be produced by applications of lime and fertilizer. Weed control, controlled grazing, and erosion control when seeding or renovating are management concerns.

This soil is suited to woodland. Productivity is high. Plant competition is a management concern. The preferred species for planting include white ash, yellow-poplar, eastern white pine, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting

brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to most urban uses. The wetness and the slow permeability are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIIe.

Hu—Huntington silt loam, occasionally flooded

This very deep, well drained, nearly level soil is on flood plains along the Ohio River. Slopes range from 0 to 2 percent. Individual areas range from 4 to 220 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 15 inches; dark brown silt loam

Subsoil:
15 to 46 inches; brown silt loam

Substratum:
46 to 70 inches; brown, mottled silt loam

This soil is high in natural fertility and organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is slow. The soil is occasionally flooded for brief periods in winter and early spring.

Included with this soil in mapping are small areas of Nolin, Lindside, Newark, Chagrin, and Yeager soils. These soils are in landscape positions similar to those of the Huntington soil. They make up 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Huntington soil are used for cultivated crops hay, or pasture. A few areas are used as woodland.

This soil is well suited to cultivated crops (fig. 19). The good tilth can be maintained by returning crop residue to the soil. The soil can be worked throughout a wide range of moisture content without clodding or crusting. The flooding is a hazard that affects the suitability of some winter crops.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. Perennials, however, may be damaged by flooding in some years. Proper seeding mixtures and rates, applications of lime and fertilizer, controlled grazing, and weed control are needed.

This soil is well suited to woodland. Productivity is high. Plant competition is a management concern. Undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. The preferred species for planting include black walnut, yellow-poplar, eastern white pine, and northern red oak. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to most urban uses. The flooding is the main limitation.

This soil is in capability subclass IIw.

LaB—Lakin loamy fine sand, 2 to 6 percent slopes

This very deep, excessively drained, undulating soil is on stream terraces along the Ohio River in Meade County. Slopes are smooth and convex. Individual areas range from 5 to 253 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 6 inches; dark yellowish brown loamy fine sand

Subsurface layer:
6 to 11 inches; yellowish brown, mottled loamy sand

Subsoil:
11 to 65 inches; yellowish brown, mottled loamy sand

This soil is low in natural fertility and organic matter content. Permeability is rapid. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is low, and surface runoff is slow.

Included with this soil in mapping are a few areas of Elk, Wheeling, Sciotoville, and Weinbach soils. These soils are in landscape positions similar to those of the Lakin soil. They make up about 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Figure 19.—Corn being harvested in an area of Huntington silt loam, occasionally flooded. The farmstead in the background is in an area of Elk soils on terraces along the Ohio River.

Most areas of the Lakin soil are used for cultivated crops, hay, or pasture.

This soil is poorly suited to cultivated crops. Productivity is low because of the rapid permeability, the low available water capacity, and the low natural fertility. Conservation tillage, cover crops, and crop residue management help to conserve moisture and maintain the organic matter content.

This soil is suited to hay and pasture; however, the grass and legume species that can withstand droughtiness should be selected for planting. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is well suited to woodland. Productivity is high. Plant competition and the equipment limitation are the main management concerns. The preferred species for planting include eastern white pine and shortleaf pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is well suited to most urban uses. Seepage is the main limitation.

This soil is in capability subclass IIIs.

LaC—Lakin loamy fine sand, 6 to 15 percent slopes

This very deep, excessively drained, rolling and hilly soil is on stream terraces along the Ohio River in Meade County. Slopes are smooth and convex. Individual areas range from 4 to 189 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 6 inches; dark yellowish brown loamy fine sand

Subsurface layer:
6 to 11 inches; yellowish brown, mottled loamy sand

Subsoil:
11 to 65 inches; yellowish brown, mottled loamy sand

This soil is low in natural fertility and organic matter content. Permeability is rapid. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is low, and surface runoff is medium.

Included with this soil in mapping are a few areas of Elk, Wheeling, Sciotoville, and Weinbach soils. These soils are in landscape positions similar to those of the Lakin soil. Also included are a few areas that are severely eroded. Included soils make up less than 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Lakin soil are used for cultivated crops, hay, or pasture.

This soil is poorly suited to cultivated crops. Productivity is low because of the rapid permeability, the low available water capacity, and the low natural fertility.

This soil is suited to hay and pasture; however, the grass and legume species that can withstand droughtiness should be selected for planting. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is well suited to woodland. Productivity is high. Plant competition and the equipment limitation are the main management concerns. The preferred species for planting include eastern white pine and shortleaf pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to most urban uses. The slope and seepage are limitations for some uses.

This soil is in capability subclass IVs.

Ld—Lindside silt loam, occasionally flooded

This very deep, moderately well drained, nearly level soil is on flood plains throughout the survey area. Slopes range from 0 to 2 percent. Individual areas range from 4 to 120 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches; brown silt loam

Subsoil:
8 to 49 inches; yellowish brown and brown silt loam that has mottles below a depth of 16 inches

Substratum:
49 to 65 inches; brown silty clay loam

This soil is high in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is slow. The seasonal high water table is at a depth of 18 to 36 inches. The soil is occasionally flooded for brief periods in late winter and early spring.

Included with this soil in mapping are a few areas of Nolin, Newark, Cuba, and Steff soils. These soils are in landscape positions similar to those of the Lindside soil. Also included are areas of a soil that is loam or fine sandy loam throughout. Included soils make up about 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Lindside soil are used for cultivated crops, hay, or pasture. A few areas are used as woodland.

This soil is well suited to cultivated crops. It is not subject to erosion and can be cropped intensively without soil loss. The flooding and the wetness are the main limitations. In some years the wetness delays planting. A subsurface drainage system is not generally needed, but in some areas it can lengthen the period of time during which fieldwork can be completed and improve the suitability of the soil to some crops. Diversion ditches help to prevent

overwash from adjacent uplands. In some years cover crops that are made up of small grain are damaged by winter flooding. Returning crop residue to the soil and planting cover crops help to maintain the organic matter content and tilth.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. Perennials, however, may be damaged by flooding in some years. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, controlled grazing, and proper stocking rates are needed.

This soil is well suited to woodland. Productivity is very high. Plant competition and seedling mortality are the main management concerns. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. In some years the flooding damages new seedlings. Reinforcement plantings may be needed to achieve a fully stocked stand. The preferred species for planting include white ash, white oak, black walnut, yellow-poplar, eastern white pine, and shortleaf pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to most urban uses. The flooding and the wetness are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capacity subclass IIw.

Ln—Lindside silt loam, depressional, frequently flooded

This very deep, moderately well drained, nearly level soil is in alluvial depressions on uplands in the eastern part of Breckinridge County and in the central and eastern parts of Meade County. Slopes range from 0 to 2 percent. Individual areas range from 4 to 21 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches; brown silt loam

Subsoil:
8 to 49 inches; yellowish brown and brown silt loam that has mottles below a depth of 16 inches

Substratum:
49 to 65 inches; brown silty clay loam

This soil is high in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is slow. The seasonal high water table is at a depth of 18 to 36 inches. The soil is frequently flooded for brief periods in late winter and in spring.

Included with this soil in mapping are a few areas of Nolin, Newark, Steff, and Stendal soils. These soils are in landscape positions similar to those of the Lindside soil. Also included are areas of a soil that is coarse-loamy throughout. Included soils make up about 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Lindside soil are used for cultivated crops, hay, or pasture. A few areas are used as woodland.

This soil is well suited to cultivated crops. It is not subject to erosion and can be cropped intensively without soil loss. Tilth is good, and the soil can be worked throughout a wide range in moisture content without clodding or crusting. The flooding and the wetness are the main limitations. In some years the wetness delays planting. A subsurface drainage system is generally not needed, but in some areas it can lengthen the period of time during which fieldwork can be completed and can improve the suitability of the soil to some crops. In some years cover crops that are made up of small grain are damaged by winter flooding. Returning crop residue to the soil and growing cover crops help to maintain the organic matter content and tilth.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. Perennials, however, may be damaged by flooding in some years. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, controlled grazing, and proper stocking rates are needed.

This soil is well suited to woodland. Productivity is very high. Plant competition and seedling mortality are the main management concerns. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. The flooding may

damage new seedlings. Reinforcement plantings may be needed to achieve a fully stocked stand. The preferred species for planting include white ash, white oak, black walnut, yellow-poplar, eastern white pine, and shortleaf pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to most urban uses. The flooding and the seasonal high water table are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capacity subclass IIw.

MaC3—Markland silty clay loam, 6 to 12 percent slopes, severely eroded

This very deep, well drained, sloping soil is on side slopes of slackwater terraces along the Ohio River and its major tributaries in the northern part of the survey area. Erosion has removed 75 to 100 percent of the original surface layer. Slopes are short, irregular, and convex. Areas range from 4 to 60 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches; dark brown silty clay loam

Subsoil:
2 to 22 inches; dark yellowish brown and yellowish brown silty clay
22 to 36 inches; brown, mottled silty clay

Substratum:
36 to 48 inches; dark yellowish brown, grayish brown, and yellowish brown silty clay
48 to 67 inches; brown, mottled silty clay

This soil is low in natural fertility and organic matter content. Permeability is slow. The root zone is very deep. Available water capacity is moderate, and surface runoff is medium. The shrink-swell potential is high. The seasonal high water table is at a depth of 36 to 72 inches.

Included with this soil in mapping are a few small areas of Elk, Wheeling, and McGary soils. These soils are in landscape positions similar to those of the Markland soil. Also included are areas of Markland soils that are moderately eroded. Included soils make up less than 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of this Markland soil are used as pasture or woodland. A few areas are used for hay.

This soil is poorly suited to cultivated crops. The slope and the severely eroded surface layer are the main limitations.

This soil is poorly suited to hay and pasture. The hazard of erosion, the slope, and the clayey subsoil are the main limitations. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, controlled grazing, and proper stocking rates are needed.

This soil is suited to woodland. Seedling mortality and plant competition are the main management concerns. The preferred species for planting include white oak, eastern white pine, yellow-poplar, and white ash. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Strip plantings of herbaceous plants, shrubs, and trees are more attractive than solid plantings. Grasses, legumes, and grain crops can be planted for food and cover. A good plant cover requires maintenance measures, which include applying fertilizer and reseeding or replanting where the vegetation failed to become established. Shallow water areas are needed. Brush piles or other nesting sites also are needed.

This soil is poorly suited to most urban uses. The slope, the high shrink-swell potential, and the clayey texture are limitations on sites for small buildings, local roads and streets, and septic tank absorption fields. These limitations are very difficult to overcome.

This soil is in capability subclass VIe.

MaD3—Markland silty clay loam, 12 to 35 percent slopes, severely eroded

This very deep, well drained, moderately steep and steep soil is on side slopes of slackwater terraces along the Ohio River and its major tributaries in the northern part of the survey area. Erosion has removed 75 to 100 percent of the original surface layer. Gullies are common. Slopes are short, irregular, and convex. Areas range from 4 to 129 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches; dark brown silty clay loam

Subsoil:

2 to 22 inches; dark yellowish brown and yellowish brown silty clay

22 to 36 inches; brown, mottled silty clay

Substratum:

36 to 48 inches; dark yellowish brown, grayish brown, and yellowish brown silty clay

48 to 67 inches; brown, mottled silty clay

This soil is low in natural fertility and organic matter content. Permeability is slow. The root zone is very deep. Available water capacity is moderate, and surface runoff is rapid. The shrink-swell potential is high. The seasonal high water table is at a depth of 36 to 72 inches.

Included with this soil in mapping are a few small areas of Elk, Wheeling, and McGary soils. These soils are in landscape positions similar to those of the Markland soil. Also included are areas of Markland soils that are moderately eroded. Included soils make up less than 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of this Markland soil are used as pasture or woodland.

This soil is not suited to cultivated crops because of the slope, the hazard of erosion, and the clayey subsoil.

This soil is poorly suited to hay and pasture. The hazard of erosion, the slope, and the clayey subsoil are the main management concerns. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, controlled grazing, and proper stocking rates are needed.

This soil is suited to woodland. The hazard of erosion, the equipment limitation, seedling mortality, and plant competition are management concerns. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of 10 percent or less helps to control erosion. Permanent access roads can be protected by installing water breaks and culverts and by applying gravel. The slope limits the use of harvesting or planting equipment in some areas. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. Larger planting stock or special site preparation, such as bedding or furrowing, reduces the seedling mortality rate. Undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. The preferred species for planting include white oak, eastern white pine, yellow-poplar, and white ash. See table 7 for specific information relating to potential productivity.

The potential for woodland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Brushy thickets can be established in areas of mature woodland. Food plots or areas of green browse can be planted along field borders or logging roads. Shallow water areas are needed. Den trees should not be harvested.

This soil is not suited to most urban uses. The slope, the high shrink-swell potential, and the clayey texture are limitations on sites for small buildings, local roads and streets, and septic tank absorption fields. These limitations are very difficult to overcome.

This soil is in capability subclass VIIe.

Mc—McGary silt loam

This very deep, somewhat poorly drained, nearly level soil is on slackwater terraces along the Ohio River and its major tributaries in the northern part of the survey area. Slopes range from 0 to 4 percent, but most are less than 2 percent. Individual areas range from 4 to 340 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:

0 to 7 inches; brown silt loam

Subsoil:

7 to 38 inches; yellowish brown and grayish brown, mottled silty clay

Substratum:

38 to 64 inches; dark yellowish brown, mottled silty clay

This soil is low in natural fertility and low or moderate in organic matter content. Permeability is slow. The root zone is very deep. Available water capacity is high, and surface runoff is slow. The shrink-swell potential is high. The seasonal high water table is at a depth of 12 to 36 inches.

Included with this soil in mapping are small areas of Elk, Wheeling, Weinbach, and Markland soils. These soils are in landscape positions similar to those of the McGary soil. Also included are areas of a soil that has less clay in the subsoil than the McGary soil. Included soils make up about 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the McGary soil are used for cultivated crops, hay, or pasture.

This soil is suited to cultivated crops. It can be tilled throughout a wide range in moisture content without clodding or crusting. The wetness is the main limitation.

This soil is suited to hay and pasture. Crops respond well to applications of fertilizer and lime. The wetness and the clayey subsoil are the main limitations.

This soil is suited to woodland. Productivity is high. The equipment limitation during wet periods and plant competition are the main management concerns. The preferred species for planting include eastern white pine, green ash, and pin oak. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to most urban uses. The wetness and the shrink-swell potential are the main limitations.

This soil is in capability subclass IIIw.

Me—Melvin silt loam, occasionally flooded

This very deep, poorly drained, nearly level soil is on flood plains throughout the survey area. Slopes range from 0 to 2 percent. Individual areas range from 4 to 44 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 7 inches; dark gray, mottled silt loam

Subsoil:
7 to 25 inches; light brownish gray, mottled silt loam

Substratum:
25 to 65 inches; gray, mottled silty clay loam

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is very slow. The seasonal high water table is within 12 inches of the surface. The soil is occasionally flooded for brief periods in late winter and in spring.

Included with this soil in mapping are small areas of Newark and Lindside soils. These soils are in landscape positions similar to those of the Melvin soil. Also included are a few areas of soils that have a dark colored surface layer and that are silty clay or clay throughout. Included soils make up 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Melvin soil are used for cultivated crops, hay, or pasture. A few areas are used as woodland.

This soil is poorly suited to cultivated crops. The wetness and the flooding are the main limitations. In most years the wetness delays planting and harvesting. The soil is not suited to winter crops because of the flooding and the seasonal high water table. Cover crops and crop residue management help to maintain the organic matter content and tilth.

This soil is suited to hay and pasture. The grass and legume species that can tolerate the wetness and the flooding should be selected for planting. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, controlled grazing, and proper stocking rates are needed.

This soil is well suited to woodland. Productivity is very high. Plant competition, the equipment limitation, and seedling mortality are management concerns. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Operating equipment when the soil is wet can result in compaction and the formation of ruts. Equipment should be operated only when the soil is dry. Logging roads can be built in nearby areas of soils that are less likely to form ruts and to become compacted. The wetness is a limitation when new seedlings are planted. Reinforcement plantings may be needed to achieve a fully stocked stand. The preferred species for planting include pin oak, willow oak, eastern cottonwood, sweetgum, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for wetland wildlife habitat is good. Providing food, cover, den sites, and nesting sites helps to maintain or improve the habitat.

This soil is poorly suited to most urban uses. The flooding and the wetness are the main limitations. They are difficult to overcome.

This soil is in capability subclass IIIw.

Mf—Melvin silt loam, depressional, frequently flooded

This very deep, poorly drained, nearly level soil is on flood plains and in upland depressions throughout the survey area. Slopes range from 0 to 2 percent. Individual areas range from 4 to 14 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 7 inches; dark gray, mottled silt loam

Subsoil:
7 to 25 inches; light brownish gray, mottled silt loam

Substratum:
25 to 65 inches; gray, mottled silty clay loam

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is very slow. The seasonal high water table is within 12 inches of the surface. The soil is frequently flooded for brief to long periods in late winter and in spring.

Included with this soil in mapping are small areas of Newark and Lindside soils. These soils are in landscape positions similar to those of the Melvin soil. Also included are a few areas of soils that have a dark colored surface layer and that are silty clay or clay throughout. Included soils make up 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Melvin soil are used for cultivated crops, hay, or pasture. A few areas are used as woodland.

This soil is poorly suited to cultivated crops. The wetness and the flooding are the main limitations. In most years the wetness hinders planting and harvesting. The soil is not suited to winter crops because of the flooding and the seasonal high water table. Cover crops and crop residue management help to maintain the organic matter content and tilth.

This soil is suited to hay and pasture. The grass and legume species that can withstand the wetness and the flooding are better suited than other varieties. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, controlled grazing, and proper stocking rates are needed.

This soil is well suited to woodland. Productivity is very high. Plant competition, the equipment limitation, and seedling mortality are management concerns. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Operating equipment when the soil is wet can result in compaction and the formation of ruts. Equipment should be operated only when the soil is dry. Logging roads can be built in nearby areas of soils that are less likely to form ruts and to become compacted. The wetness is a limitation when new seedlings are planted. Reinforcement plantings may be needed to achieve a fully stocked stand. The preferred species for planting include pin oak, willow oak, eastern cottonwood, sweetgum, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for wetland wildlife habitat is good. Providing food, cover, den sites, and nesting sites helps to maintain or improve the habitat.

This soil is poorly suited to most urban uses. The flooding and the wetness are the main limitations. They are difficult to overcome.

This soil is in capability subclass IIIw.

Na—Newark silt loam, occasionally flooded

This very deep, somewhat poorly drained, nearly level soil is on flood plains throughout the survey area. Slopes range from 0 to 2 percent. Individual areas range from 4 to 68 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches; dark grayish brown silt loam

Subsoil:
9 to 18 inches; dark grayish brown and grayish brown silt loam
18 to 30 inches; light brownish gray, mottled silty clay loam

Substratum:
30 to 68 inches; light brownish gray, mottled silt loam

This soil is medium or high in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is slow. The seasonal high water table is at a depth of 6 to 18 inches. The soil is occasionally flooded for brief periods in late winter and in spring.

Included with this soil in mapping are a few areas of Lindside, Melvin, Chagrin, and Stendal soils. These soils are in landscape positions similar to those of the Newark soil. They make up 15 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Newark soil are used for cultivated crops, hay, or pasture. A few areas are used as woodland.

This soil is suited to cultivated crops. The flooding

and the wetness are the main limitations. Most floods occur during the winter and spring months when crops are not grown, but some occasionally occur during the growing season. In most years the wetness delays planting, and in some years it also hinders harvesting. Applying good water management practices in cultivated areas helps to increase the effective length of the growing season and widen the range of suitable plants. In some years cover crops that are made up of small grain are damaged by winter flooding. Crop residue management and cover crops help to maintain the organic matter content and tilth.

This soil is suited to hay and pasture. The grass and legume species that can withstand the wetness and the brief periods of flooding are better suited than other varieties. Proper seeding mixtures and rates, applications of fertilizer, weed control, controlled grazing, and proper stocking rates are needed.

This soil is well suited to woodland. Productivity is very high. Plant competition, the equipment limitation, and seedling mortality are management concerns. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Operating equipment when the soil is wet can result in compaction and the formation of ruts. Equipment should be operated only when the soil is dry. Logging roads can be built in nearby areas of soils that are less likely to form ruts and to become compacted. The wetness is a limitation when new seedlings are planted. Reinforcement plantings may be needed to achieve a fully stocked stand. The preferred species for planting include eastern cottonwood, sweetgum, and green ash. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to most urban uses. The flooding and the seasonal high water table are the main limitations.

This soil is in capability subclass IIw.

Ne—Newark silt loam, depressional, frequently flooded

This very deep, somewhat poorly drained, nearly level soil is in alluvial, upland depressions in the eastern part of Breckinridge County and in the central and eastern parts of Meade County. Slopes range from 0 to 2 percent. Individual areas range from 4 to 57 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches; dark grayish brown silt loam

Subsoil:
9 to 18 inches; dark grayish brown and grayish brown silt loam
18 to 30 inches; light brownish gray, mottled silty clay loam

Substratum:
30 to 68 inches; light brownish gray, mottled silt loam

This soil is medium or high in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is slow. The seasonal high water table is at a depth of 6 to 18 inches. The soil is frequently flooded for brief to long periods in late winter and in spring.

Included with this soil in mapping are a few areas of Lindside, Melvin, and Stendal soils. These soils are in landscape positions similar to those of the Newark soil. They make up 15 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Newark soil are used for cultivated crops, hay, or pasture. A few areas are used as woodland.

This soil is suited to cultivated crops. The flooding and the wetness are the main limitations (fig. 20). Most floods occur during the winter and spring months when crops are not grown, but some occasionally occur during the growing season. In most years the wetness delays planting for a few days, and in some years it also hinders harvesting. Good water management practices in cultivated areas help to increase the effective length of the growing season and widen the range of suitable plants. Crop residue management and cover crops help to maintain the organic matter content and tilth.

This soil is suited to hay and pasture. The grass and legume species that can withstand the wetness and the brief periods of flooding are better suited than other varieties. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, controlled grazing, and proper stocking rates are needed.

This soil is well suited to woodland. Productivity is

Figure 20.—Flooding in an area of Newark silt loam, depressional, frequently flooded, used as cropland.

very high. Plant competition, the equipment limitation, and seedling mortality are management concerns. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, cutting or girdling, or by managing the existing stand. Operating equipment when the soil is wet can result in compaction and the formation of ruts. Equipment should be operated only when the soil is dry. Logging roads can be built in nearby areas of soils that are less likely to form ruts and to become compacted. The wetness is also a limitation when new seedlings are planted. Reinforcement plantings may be needed to achieve a fully stocked stand. The preferred species for planting include eastern cottonwood, sweetgum, and green ash. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to most urban uses. The flooding and the seasonal high water table are the main limitations.

This soil is in capability subclass IIw.

NhB2—Nicholson silt loam, 2 to 6 percent slopes, eroded

This very deep, moderately well drained, gently sloping soil is on broad, slightly convex ridgetops on uplands, mostly in the northeastern part of Meade

County. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 182 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches; dark yellowish brown silt loam

Subsoil:
8 to 23 inches; strong brown silty clay loam
23 to 43 inches; a fragipan of yellowish brown, mottled silty clay loam and silt loam
43 to 70 inches; yellowish red, mottled gravelly silty clay

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate above the fragipan and slow in the fragipan. Plant roots easily penetrate the soil; however, the root zone is only moderately deep because of the fragipan. Available water capacity is moderate, and surface runoff is medium. The seasonal high water table is at a depth of 18 to 30 inches.

Included with this soil in mapping are a few areas of Hammack, Baxter, and Crider soils. These soils are in landscape positions similar to those of the Nicholson soil. Also included are a few areas of Nicholson soils that are severely eroded and a few areas of soils that have slopes of more than 6 percent. Included soils make up 10 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of this Nicholson soil are used for cultivated crops, small grain, hay, or pasture.

This soil is suited to most of the cultivated crops commonly grown in the survey area. Erosion is a hazard if conventional tillage is used. During extended dry periods, the soil may become droughty because of the restricted rooting depth and the moderate available water capacity. Crops respond well to applications of lime and fertilizer. Conservation tillage, cover crops, crop residue management, and a cropping system that includes grasses and legumes help to control erosion, maintain productivity, and improve tilth.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil; however, the growth of some deep-rooted plants is limited by the moderately deep root zone. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, controlled grazing, and proper stocking rates help to produce and maintain good yields of high-quality forage.

This soil is suited to woodland. Productivity is high. Plant competition is the main management concern when establishing new stands. The preferred species for planting include yellow-poplar, white oak, northern red oak, eastern white pine, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to some urban uses. The wetness and low strength are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIe.

NhC2—Nicholson silt loam, 6 to 12 percent slopes, eroded

This very deep, moderately well drained, sloping soil is on convex ridgetops and side slopes on uplands, mostly in the northeastern part of Meade County. Some areas are karst. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 80 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches; dark yellowish brown silt loam

Subsoil:
8 to 23 inches; strong brown silty clay loam
23 to 43 inches; a fragipan of yellowish brown, mottled silty clay loam and silt loam
43 to 70 inches; yellowish red, mottled gravelly silty clay

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate above the fragipan and slow in the fragipan. Plant roots easily penetrate the soil; however, the root zone is only moderately deep because of the fragipan. Available water capacity is moderate, and surface runoff is medium. The seasonal high water table is at a depth of 18 to 30 inches.

Included with this soil in mapping are a few areas of Hammack, Baxter, and Crider soils. These soils are in landscape positions similar to those of the Nicholson soil. Also included are a few areas of soils that are severely eroded. Included soils make up about 15 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of the Nicholson soil are used for cultivated crops, small grain, hay, or pasture.

This soil is suited to most of the cultivated crops commonly grown in the area. The wetness is a limitation. In some years it delays planting. Crops respond well to applications of lime and fertilizer. Conservation tillage, cover crops, crop residue management, and a cropping system that includes grasses and legumes help to control erosion, maintain productivity, and improve tilth.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil; however, the growth of some deep-rooted plants is limited by the moderately deep root zone. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, controlled grazing, and proper stocking rates help to produce and maintain good yields of high-quality forage.

This soil is suited to woodland. Productivity is high. Plant competition is the main management concern when establishing new stands. The preferred species for planting include yellow-poplar, white oak, northern red oak, eastern white pine, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to some urban uses. The wetness and low strength are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIIe.

NkC4—Nicholson soils, 4 to 12 percent slopes, very severely eroded

These very deep, moderately well drained, gently sloping and sloping soils are on convex upland ridgetops and side slopes on the Fort Knox Military Reservation in the northeastern part of Meade County. Soil disturbance varies within short distances. In many places, the surface layer and most of the upper part of the subsoil have been destroyed and eroded away, exposing the fragipan. Individual areas range from 8 to 204 acres in size.

The typical sequence, depth, and composition of the layers of these soils are as follows—

Surface layer:

0 to 6 inches; reddish yellow silt loam

Subsoil:

6 to 18 inches; strong brown silty clay loam

18 to 38 inches; a fragipan of yellowish brown, mottled silty clay loam and silt loam

38 to 68 inches; yellowish red, mottled gravelly silty clay

These soils are low in natural fertility and organic matter content. Permeability is moderate above the fragipan and slow in the fragipan. The root zone is shallow because of past erosion. Penetration by plant roots is difficult because the soils are severely compacted. Available water capacity is moderate, and surface runoff is rapid. The seasonal high water table is at a depth of 18 to 30 inches.

Included with these soils in mapping are a few areas of Baxter and Crider soils. These soils are in landscape positions similar to those of the Nicholson soils. Also included are a few areas of soils that are moderately eroded. Included soils make up 15 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of the Nicholson soils are used by military personnel during tank training. In a few areas the acreage is idle land.

These soils are poorly suited to farming. Current land use and past erosion have created many large gullies. In many areas land leveling is needed before the soils can be farmed. The severe hazard of erosion, the low natural fertility, and the restricted rooting depth are limitations if the soils are used for hay or pasture.

These soils are suited to woodland. Productivity is moderate. Plant competition, the hazard of erosion, and seedling mortality are the main management concerns. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Careful harvesting and planting operations help to prevent further erosion. Seedling mortality is very high in areas where the fragipan is exposed at the surface. Containerized or larger planting stock or special site preparation measures, such as bedding or furrowing, reduce the seedling mortality rate. The preferred species for planting include eastern white pine, loblolly pine, yellow-poplar, and white oak. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Strip plantings of herbaceous plants, shrubs, and trees are more attractive than solid plantings. Grasses, legumes, and

grain crops can be planted for food and cover. A good plant cover requires maintenance measures, which include applying fertilizer and reseeding or replanting where the vegetation failed to become established. Shallow water areas are needed. Brush piles or other nesting sites also are needed.

These soils are poorly suited to most urban uses. The hazard of erosion, the seasonal high water table, the dense fragipan, and low strength are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

These soils are in capability subclass VIe.

No—Nolin silt loam, occasionally flooded

This very deep, well drained, nearly level soil is on flood plains throughout the survey area. Slopes range from 0 to 3 percent. Individual areas range from 4 to 458 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches; brown silt loam

Subsoil:
8 to 62 inches; dark yellowish brown silt loam that has mottles below a depth of 28 inches

Substratum:
62 to 72 inches; dark yellowish brown silt loam

This soil is high in natural fertility and moderate or high in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is slow. The seasonal high water table is at a depth of 36 to 60 inches. The soil is occasionally flooded for brief periods in late winter and early spring.

Included with this soil in mapping are a few areas of Clifty, Cuba, Steff, Lindside, Newark, and Huntington soils. These soils are in landscape positions similar to those of the Nolin soil. Also included are a few areas of a soil that is loam or fine sandy loam throughout. Included soils make up 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Nolin soil are used for cultivated crops, hay, or pasture. A few areas are used as woodland.

This soil is well suited to cultivated crops. Most of the commonly grown crops grow well on the soil, and yields are high. The soil can be worked throughout a wide range in moisture content without clodding or crusting. The flooding is a hazard, but in most years it does not affect summer crops. The soil is poorly suited to winter crops because of the flooding. Cover crops and crop residue management help to maintain the organic matter content and tilth.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. Perennials, however, may be damaged by flooding in some years. Proper seeding mixtures and rates, applications of lime and fertilizer, controlled grazing, and weed control are needed.

This soil is well suited to woodland. Productivity is very high. Plant competition is the main management concern. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. The preferred species for planting include yellow-poplar, eastern white pine, eastern cottonwood, cherrybark oak, and black walnut. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to most urban uses because of the flooding and the seasonal high water table. In places dikes and levees can be used to protect urban structures.

This soil is in capability subclass IIw.

Nv—Nolin silt loam, depressional, frequently flooded

This very deep, well drained, nearly level soil is in karst alluvial depressions on uplands in the eastern part of Breckinridge County and in the central and eastern parts of Meade County. Slopes range from 0 to 2 percent. Individual areas range from 4 to 96 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches; brown silt loam

Subsoil:
8 to 62 inches; dark yellowish brown silt loam that has mottles below a depth of 28 inches

Substratum:
62 to 72 inches; dark yellowish brown silt loam

This soil is high in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is slow. The seasonal high water table is at a depth of 36 to 60 inches. The soil is frequently flooded for brief periods in winter and spring.

Included with this soil in mapping are a few areas of Lindside and Newark soils. These soils are in landscape positions similar to those of the Nolin soil. They make up about 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Nolin soil are used for cultivated crops, hay, or pasture. A few areas are used as woodland.

This soil is well suited to cultivated crops. Most of the commonly grown crops grow well on the soil, and yields are high. The soil can be worked throughout a wide range in moisture content without clodding or crusting. The flooding is the main management concern. In some years it affects summer crops. The soil is poorly suited to winter crops because of the flooding. Cover crops and crop residue management help to maintain the organic matter content and tilth.

This soil is well suited to hay and pasture. Most of the grasses and legumes grown in the area grow well on the soil. Perennials, however, may be damaged by flooding in some years. Proper seeding mixtures and rates, applications of lime and fertilizer, controlled grazing, and weed control are needed.

This soil is well suited to woodland. Productivity is very high. Plant competition is the main management concern. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. The flooding causes seedling mortality in some areas. The preferred species for planting include yellow-poplar, eastern cottonwood, green ash, cherrybark oak, and pin oak. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to most urban uses. The flooding and the seasonal high water table are the main limitations.

This soil is in capability subclass IIw.

PeA—Pekin silt loam, 0 to 2 percent slopes

This very deep, moderately well drained, nearly level soil is on stream terraces, mostly in the southeastern part of Breckinridge County. Individual areas range from 4 to 33 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 10 inches; dark grayish brown silt loam

Subsoil:
10 to 26 inches; yellowish brown and brown silt loam and mottled silt loam
26 to 50 inches; a fragipan of brown, mottled silt loam

Substratum:
50 to 64 inches; light grayish brown loam

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate above the fragipan and slow in the fragipan. Plant roots easily penetrate the soil; however, the root zone is only moderately deep because of the fragipan. Available water capacity is moderate, and surface runoff is slow. The seasonal high water table is at a depth of 18 to 30 inches.

Included with this soil in mapping are a few small areas of Crider and Nicholson soils on adjacent foot slopes and Nolin soils on adjacent flood plains. These soils are in landscape positions similar to those of the Pekin soil. They make up about 15 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Pekin soil are used for cultivated crops, hay, or pasture.

This soil is suited to most of the cultivated crops commonly grown in the survey area. In some years the wetness delays planting. During extended dry periods, the soil may become droughty because of the restricted rooting depth and the moderate available water capacity. Crops respond well to applications of lime and fertilizer. Cover crops and crop residue

management help to maintain the organic matter content and tilth.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil; however, the growth of some deep-rooted plants is limited by the moderately deep root zone. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is suited to woodland. Productivity is moderately high. Plant competition is the main management concern. The preferred species for planting include eastern white pine, shortleaf pine, yellow-poplar, and white ash. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to some urban uses. The wetness, the flooding, and the slow permeability are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIw.

PeB—Pekin silt loam, 2 to 6 percent slopes

This very deep, moderately well drained, gently sloping soil is on stream terraces, mostly in the southeastern part of Breckinridge County. Individual areas range from 4 to 37 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 10 inches; dark grayish brown silt loam

Subsoil:
10 to 26 inches; yellowish brown and brown silt loam and mottled silt loam
26 to 50 inches; a fragipan of brown, mottled silt loam

Substratum:
50 to 64 inches; light grayish brown loam

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate above the fragipan and slow in the fragipan. Plant roots easily penetrate the soil; however, the root zone is only moderately deep because of the fragipan. Available water capacity is moderate, and surface runoff is medium. The seasonal high water table is at a depth of 18 to 30 inches.

Included with this soil in mapping are a few small areas of Crider and Nicholson soils on adjacent foot slopes and Nolin soils on adjacent flood plains. These soils are in landscape positions similar to those of the Pekin soil. They make up 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Pekin soil are used for cultivated crops, hay, or pasture.

This soil is suited to most of the cultivated crops commonly grown in the survey area. In some years the wetness delays planting. During extended dry periods, the soil may become droughty because of the restricted rooting depth and the moderate available water capacity. Erosion is a hazard if conventional tillage is used. Conservation tillage, contour stripcropping, and a cropping system that includes grasses and legumes help to control erosion and reduce the runoff rate. Crops respond well to applications of lime and fertilizer. Cover crops and crop residue management help to maintain the organic matter content and tilth.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil; however, the growth of some deep-rooted plants is limited by the moderately deep root zone. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is suited to woodland. Productivity is moderately high. Plant competition is the main management concern. The preferred species for planting include eastern white pine, shortleaf pine, yellow-poplar, and white ash. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to some urban uses. The wetness, the hazard of erosion, and the slow permeability are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIe.

Pt—Pits, quarries

This map unit consists of open excavations from which the soil and underlying bedrock have been removed. The exposed limestone bedrock and other material support few plants. Individual areas range from 4 to 288 acres in size.

Most of the quarries are in the northern part of the survey area. They are mainly limestone quarries. A few sand and gravel quarries are along the Ohio River (fig. 21). The excavations are deep and have nearly vertical walls.

Included in mapping are small areas of Crider, Baxter, Fredonia, Caneyville, and Gilpin soils. Also included are areas of spoil and stockpiles of quarried rock in most units and an abandoned asphalt quarry south of Garfield in Breckinridge County. Quarries smaller than about 4 acres are identified by a special spot symbol on the soil map sheets.

This map unit is in capability subclass VIIIs.

RaC2—Riney loam, 6 to 12 percent slopes, eroded

This very deep, well drained, sloping soil is on narrow ridgetops and side slopes in the Sand Ridge area in the southeastern part of Meade County. Slopes are somewhat irregular and convex. They are dissected by intermittent drainageways. Individual areas range from 4 to 81 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches; brown loam

Subsoil:
8 to 30 inches; strong brown and yellowish brown loam and sandy loam
30 to 50 inches; yellowish brown and red, mottled sandy clay loam

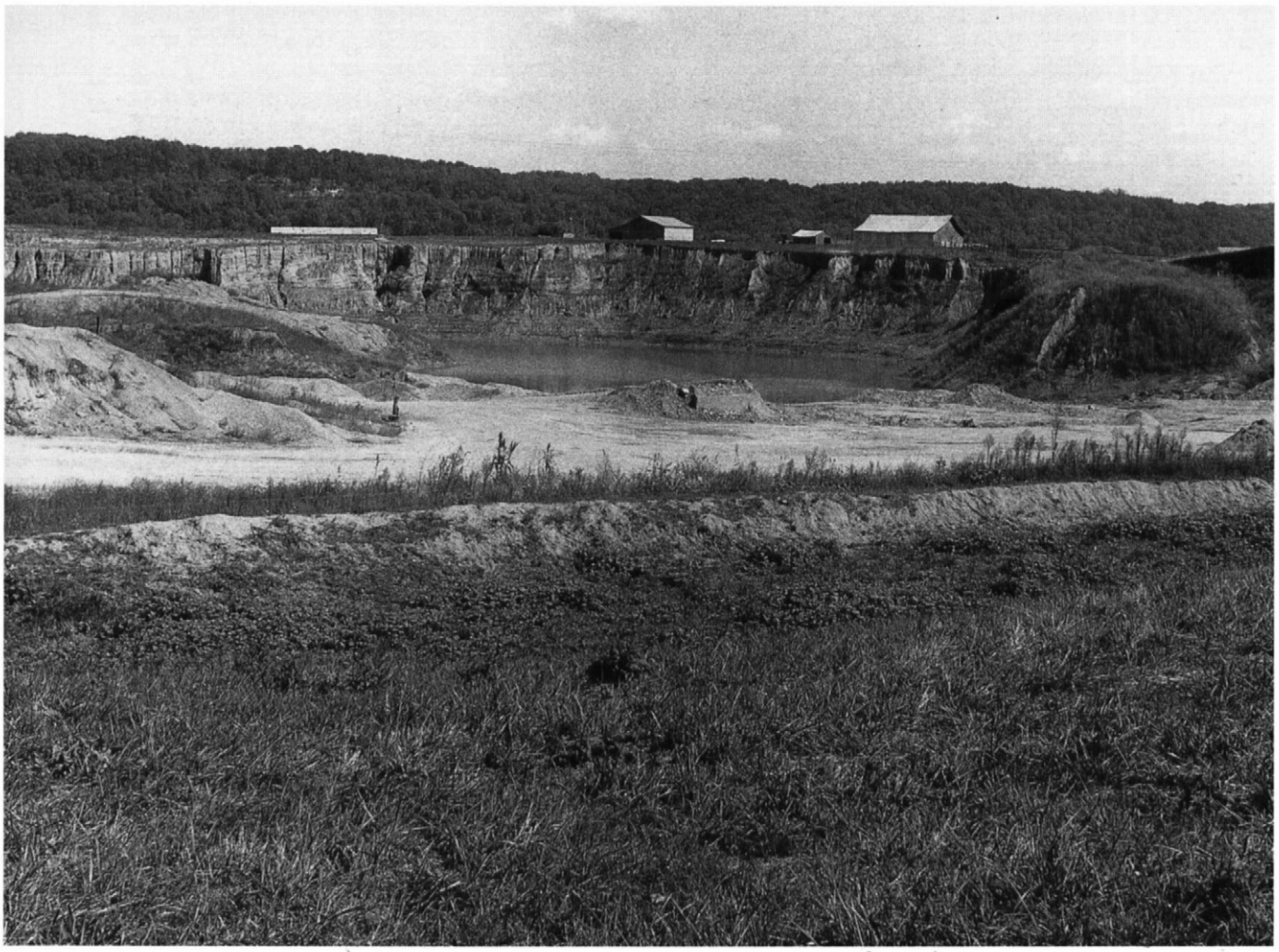

Figure 21.—A sand and gravel quarry in an area of Pits, quarries. Sciotoville silt loam, 2 to 6 percent slopes, is in the foreground.

50 to 62 inches; red, yellowish brown, and light brownish gray sandy clay loam

This soil is low or medium in natural fertility and low or moderate in organic matter content. Permeability is moderately rapid. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is moderate, and surface runoff is medium.

Included with this soil in mapping are a few small areas of Lily, Crider, Baxter, and Gilpin soils. These soils are in landscape positions similar to those of the Riney soil. Also included are a few areas of Riney soils that are severely eroded and areas of a soil that has a thin loess cap. Included soils make up about 15 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of this Riney soil are used for cultivated crops, small grain, hay, or pasture. A few areas are used as woodland.

This soil is suited to cultivated crops and small grain. The hazard of erosion is the main management concern. Conservation tillage, contour stripcropping, cover crops, and crop residue management help to control erosion and maintain the organic matter content. Including grasses and legumes in the cropping system is also very beneficial.

This soil is suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Good management practices are needed to establish and maintain hay and pasture. Seeding or renovating stands in late summer or early fall generally results in better stands, minimizes competition from weeds, and helps to control erosion. Applications of lime and fertilizer, weed control, and controlled grazing help to maintain good yields of high-quality forage.

This soil is well suited to woodland. Productivity is high. Plant competition is the main management concern when establishing new stands. Undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. The preferred species for planting include yellow-poplar, white ash, loblolly pine, and black walnut. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to most urban uses. The slope and seepage are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIIe.

ReD—Riney-Lily complex, 12 to 20 percent slopes

These very deep and moderately deep, well drained, moderately steep soils are on uplands. They are on side slopes in the Sand Ridge area in the southeastern part of Meade County. Most areas are dissected by small, intermittent drains. The two soils occur as areas so closely intermingled that they could not be separated at the scale used in mapping. Generally, the Riney soil is on the middle and lower slopes and the Lily soil is on the upper slopes. Individual areas range from 4 to 110 acres in size.

Riney and similar soils make up about 45 percent of the map unit, and Lily and similar soils make up about 30 percent. Inclusions make up the remainder of the map unit.

The typical sequence, depth, and composition of the layers of the Riney soil are as follows—

Surface layer:
0 to 8 inches; brown loam

Subsoil:
8 to 30 inches; strong brown and yellowish brown loam and sandy loam
30 to 50 inches; yellowish brown and red, mottled sandy clay loam
50 to 62 inches; red, yellowish brown, and light brownish gray sandy clay loam

The Riney soil is low or medium in natural fertility and low or moderate in organic matter content. Permeability is moderately rapid. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is moderate, and surface runoff is rapid.

The typical sequence, depth, and composition of the layers of the Lily soil are as follows—

Surface layer:
0 to 3 inches; very dark grayish brown loam

Subsurface layer:
3 to 8 inches; yellowish brown loam

Subsoil:
8 to 24 inches; yellowish brown and strong brown loam and gravelly clay loam

Bedrock:
24 inches; fractured sandstone

The Lily soil is low in natural fertility and organic matter content. Permeability is moderately rapid. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is rapid. Bedrock is at a depth of 20 to 40 inches.

Included in this unit in mapping are a few areas of Gilpin, Dekalb, Rosine, Crider, Baxter, and Caneyville soils. These soils are in landscape positions similar to those of the Riney and Lily soils. Also included are a few areas of rock outcrop, some small escarpments, a few areas of soils that are severely eroded, and a few areas of soils that have stones on the surface. Inclusions make up 25 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of the Riney and Lily soils are used as pasture or woodland.

These soils are poorly suited to farming. The moderately steep slope, the hazard of erosion, the stones on the surface, and the scattered areas of rock outcrop are limitations in farmed areas. Good management practices, such as applying a controlled grazing system and maintaining optimum fertility levels, are needed in pastured areas.

These soils are suited to woodland. Productivity is high on cool slopes and moderately high on warm slopes. The hazard of erosion, plant competition, and the equipment limitation are the main management concerns. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. The slope limits the use of harvesting or planting equipment in some areas. Tree seedlings can be planted by hand, or seed can be distributed by direct seeding methods. Seedling mortality is a concern on warm slopes. The preferred species for planting on cool slopes include yellow-poplar, white ash, white oak, black walnut, northern red oak, and eastern white pine. Those preferred on warm slopes include white oak, shortleaf pine, loblolly pine, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for woodland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Brushy thickets can be established in areas of mature woodland. Food plots or areas of green browse can be planted along field borders or logging roads. Shallow water areas are needed. Den trees should not be harvested.

These soils are poorly suited to urban uses. The moderately steep slope, the hazard of erosion, and the scattered areas of rock outcrop are the main limitations.

These soils are in capability subclass IVe.

ReE—Riney-Lily complex, 20 to 30 percent slopes

These very deep and moderately deep, well drained, steep soils are on uplands. They are on side slopes in the Sand Ridge area in the southeastern part of Meade County. Most areas are dissected by small drains. The two soils occur as areas so closely intermingled that they could not be separated at the scale used in mapping. Generally, the Riney soil is on the middle and lower slopes and the Lily soil is on the upper slopes. Individual areas range from 6 to 143 acres in size.

Riney and similar soils make up about 40 percent of the map unit, and Lily and similar soils make up about 40 percent. Inclusions make up the remainder of the map unit.

The typical sequence, depth, and composition of the layers of the Riney soil are as follows—

Surface layer:
0 to 8 inches; brown loam

Subsoil:
8 to 30 inches; strong brown and yellowish brown loam and sandy loam
30 to 50 inches; yellowish brown and red, mottled sandy clay loam
50 to 62 inches; red, yellowish brown, and light brownish gray sandy clay loam

The Riney soil is low or medium in natural fertility and low or moderate in organic matter content. Permeability is moderately rapid. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is moderate, and surface runoff is rapid.

The typical sequence, depth, and composition of the layers of the Lily soil are as follows—

Surface layer:
0 to 3 inches; very dark grayish brown loam

Subsurface layer:
3 to 8 inches; yellowish brown loam

Subsoil:
8 to 24 inches; yellowish brown and strong brown loam and gravelly clay loam

Bedrock:
24 inches; fractured sandstone

The Lily soil is low in natural fertility and organic matter content. Permeability is moderately rapid. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is rapid. Bedrock is at a depth of 20 to 40 inches.

Included in this unit in mapping are a few areas of Gilpin, Dekalb, Rosine, Crider, Baxter, and Caneyville soils. These soils are in landscape positions similar to those of the Riney and Lily soils. Also included are a few areas of rock outcrop, some small escarpments, a few areas of soils that are severely eroded, and a few areas of soils that have stones on the surface. Inclusions make up 20 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of the Riney and Lily soils are used as woodland. A few areas are used as pasture.

These soils are poorly suited to farming. The slope, the hazard of erosion, the moderate depth to bedrock, the stones on the surface, and the scattered areas of rock outcrop are limitations in farmed areas. Good management practices, such as applying a controlled grazing system and proper stocking rates and maintaining optimum fertility levels, are needed in pastured areas.

These soils are suited to woodland. Productivity is high on cool slopes and moderately high on warm slopes. The hazard of erosion, plant competition, and the equipment limitation are the main management concerns. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. Permanent access roads can be protected by installing water breaks and culverts and by applying gravel. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Tracked equipment or other specialized equipment is needed because of the slope. Log yards can be established in level areas adjacent to permanent access roads. Tree seedlings can be planted by hand, or seed can be distributed by direct seeding methods. Seedling mortality is a concern on warm slopes. Reinforcement plantings may be needed to achieve a fully stocked stand. The preferred species for planting on cool slopes include yellow-poplar, white ash, white oak, black walnut, northern red oak, and eastern white pine. Those preferred on warm slopes include white oak, shortleaf pine, loblolly pine, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for woodland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Brushy thickets can be established in areas of mature woodland. Food plots or areas of green browse can be planted along field borders or logging roads. Shallow water areas are needed. Den trees should not be harvested.

These soils are poorly suited to most urban uses. The slope, the hazard of erosion, and the scattered areas of rock outcrop are the main limitations.

These soils are in capability subclass VIe.

Rf—Robbs silt loam

This very deep, somewhat poorly drained, nearly level soil is on broad uplands throughout Breckinridge County and in the northwestern part of Meade County. Slopes range from 0 to 3 percent. Individual areas range from 4 to 130 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches; grayish brown silt loam

Subsoil:
8 to 22 inches; yellowish brown, mottled silt loam
22 to 72 inches; a fragipan of yellowish brown, light brownish gray, and light gray silt loam

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate above the fragipan and slow in the fragipan. Plant roots easily penetrate the soil; however, the root zone is only moderately deep because of the fragipan. Available water capacity is moderate, and surface runoff is slow. The seasonal high water table is at a depth of 12 to 24 inches.

Included with this soil in mapping are a few small areas of Sadler and Zanesville soils. These soils are in landscape positions similar to those of the Robbs soil. They make up 10 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of the Robbs soil are used for cultivated crops, hay, or pasture. A few areas are used as woodland.

This soil is suited to cultivated crops. The moderately deep root zone, the wetness, and the moderate available water capacity are the main limitations. In some years the wetness delays planting. Crop residue management and cover crops help to maintain the organic matter content and tilth.

This soil is suited to hay and pasture. The grass and legume species that can withstand the wetness are better suited than other varieties. The dense fragipan limits the growth of some deep-rooted plants. Proper

seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is well suited to woodland. Productivity is high. Plant competition is the main management concern. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Operating equipment when the soil is wet can result in compaction and the formation of ruts. Equipment should be operated only when the soil is dry. The preferred species for planting include eastern white pine, green ash, yellow-poplar, and shortleaf pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

The soil is poorly suited to most urban uses. The wetness and the slow permeability are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIw.

RkF—Rock outcrop-Caneyville complex, 30 to 90 percent slopes

This map unit occurs as areas of Rock outcrop intermingled with areas of a moderately deep, well drained, very steep Caneyville soil. It is on side slopes above the Ohio River valley in the northern part of the survey area. The areas of Rock outcrop and the Caneyville soil could not be separated at the scale selected for mapping. Individual areas range from 9 to 360 acres in size.

The Rock outcrop makes up about 40 percent of the map unit, and Caneyville and similar soils make up about 30 percent. Inclusions make up the remainder of the map unit.

The Rock outcrop consists of limestone that crops out as individual outcrops or as continuous, horizontal ledges or escarpments. The outcrops range from 5 to 35 feet thick. They include loose rock fragments ranging from channers to large boulders. Springs and seeps, some of which flow throughout the year, are associated with the soils that are directly below the outcrops.

The typical sequence, depth, and composition of the layers of the Caneyville soil are as follows—

Surface layer:
0 to 6 inches; brown silt loam

Subsoil:
6 to 10 inches; yellowish red silty clay loam
10 to 24 inches; red, mottled clay

Bedrock:
24 inches; hard, light gray limestone

The Caneyville soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately slow. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is very rapid. The shrink-swell potential is moderate. Limestone bedrock is at a depth of 20 to 40 inches.

Included in this unit in mapping are a few areas of Alford, Fredonia, Gilpin, Lenberg, and Crider soils. These soils are in landscape positions similar to those of the Caneyville soil. Also included are areas of a moderately deep colluvial soil derived from sandstone and shale. Included soils make up about 30 percent of the map unit. Individual inclusions are less than 4 acres in size.

Most areas of the unit are used as woodland.

This map unit is not suited to farming. The slope and the Rock outcrop make farming impractical.

This map unit is suited to woodland. The hazard of erosion, the equipment limitation, and plant competition are the main management concerns. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. Permanent access roads can be protected by installing water breaks and culverts and by applying gravel. Because of the slope and the cliffs, tracked or other specialized equipment is needed. Log yards can be established on benches or in level areas adjacent to permanent access roads. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. Undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Seedling mortality is a concern on warm slopes. Reinforcement plantings may be needed to achieve a fully stocked stand. The preferred species for planting on cool slopes include eastern white pine, northern red oak, white oak, and yellow-poplar. Those preferred on warm slopes include white oak, Virginia pine, and eastern redcedar. See table 7 for specific information relating to potential productivity.

The potential for woodland wildlife habitat is good.

Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Brushy thickets can be established in areas of mature woodland. Food plots or areas of green browse can be planted along field borders or logging roads. Shallow water areas are needed. Den trees should not be harvested.

This map unit is not suited to urban uses. The slope, the Rock outcrop, the slow permeability, and the shrink-swell potential are the main limitations.

The Rock outcrop is in capability subclass VIIIs. The Caneyville soil is in capability subclass VIIe.

RmD—Rock outcrop-Corydon complex, 12 to 30 percent slopes

This map unit occurs as areas of Rock outcrop intermingled with areas of a shallow, well drained, moderately steep and steep Corydon soil. It is mostly on south-facing side slopes on uplands in the central part of the survey area. The areas of Rock outcrop and the Corydon soil could not be separated at the scale selected for mapping. Individual areas range from 4 to 125 acres in size.

The Rock outcrop makes up about 50 percent of the map unit, and Corydon and similar soils make up about 25 percent. Inclusions make up the remainder of the map unit.

The Rock outcrop consists of limestone that crops out as individual outcrops or as continuous, horizontal ledges or escarpments. The outcrops range from 5 to 25 feet thick. They include loose rock fragments ranging from channers to large boulders. Springs and seeps, some of which flow throughout the year, are associated with the soils that are directly below the outcrops.

The typical sequence, depth, and composition of the layers of the Corydon soil are as follows—

Surface layer:
0 to 6 inches; very dark grayish brown silt loam

Subsurface layer:
6 to 9 inches; very dark grayish brown, mottled silty clay loam

Subsoil:
9 to 19 inches; yellowish red silty clay

Bedrock:
19 inches; light gray limestone

The Corydon soil is low in natural fertility and moderate in organic matter content. Permeability is moderately slow. The root zone is shallow. Available water capacity is low, and surface runoff is rapid or very rapid. The shrink-swell potential is moderate. Limestone bedrock is at a depth of 10 to 20 inches.

Included in this unit in mapping are a few areas of Caneyville and Fredonia soils on narrow benches and a few areas of Crider and Baxter soils on foot slopes. These soils are in landscape positions similar to those of the Corydon soil. Also included are areas of a soil having a surface layer that is not thick and dark; areas of a soil that is more than 20 inches deep over bedrock; and areas of a moderately deep to shallow, loamy colluvial soil that formed in material weathered from sandstone and shale. Included soils make up about 25 percent of the map unit. Individual inclusions are less than 4 acres in size.

Most areas of the unit are used as woodland.

This map unit is not suited to farming. The extent and pattern of the Rock outcrop make operation of equipment impractical. A permanent cover of vegetation is needed to help control erosion and reduce the runoff rate.

This map unit is suited to woodland. The hazard of erosion, the equipment limitation, seedling mortality, and plant competition are management concerns. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. Permanent access roads can be protected by installing water breaks and culverts and by applying gravel. Because of the slope and the Rock outcrop, tracked or other specialized equipment is needed. Log yards can be established on benches or level areas adjacent to permanent access roads. Tree seedlings can be planted by hand, or seed can be distributed by direct seeding methods. Seedling mortality is a concern on warm slopes. Reinforcement plantings may be needed to achieve a fully stocked stand. Undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. The preferred species for planting include white oak, northern red oak, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for woodland wildlife habitat is poor. Providing adequate food, cover, water, and nesting sites helps to improve the habitat. Brushy thickets can be established in areas of mature woodland. Food plots or areas of green browse can be planted along field borders or logging roads. Shallow water areas are needed. Den trees should not be harvested.

This map unit is not suited to most urban uses. The Rock outcrop, the slope, the shallow depth to bedrock, the slow permeability, and the shrink-swell potential are limitations.

The Rock outcrop is in capability subclass VIIIs. The Corydon soil is in capability subclass VIIe.

RnC2—Rosine silt loam, 6 to 12 percent slopes, eroded

This very deep, well drained, sloping soil is on narrow side slopes on uplands, mostly in the western and northern parts of the survey area. Slopes are somewhat irregular and convex. They are dissected by intermittent drainageways. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 260 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 7 inches; dark yellowish brown silt loam

Subsoil:
7 to 21 inches; yellowish brown silt loam
21 to 46 inches; yellowish brown, mottled channery silty clay loam
46 to 54 inches; strong brown and light brownish gray silty clay

Substratum:
54 to 64 inches; light brownish gray, mottled silty clay loam

Bedrock:
64 inches; gray and brown, soft siltstone

This soil is medium in natural fertility and moderate or high in organic matter content. Permeability is moderately slow. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium. The shrink-swell potential is low in the upper part of the subsoil and moderate in the lower part.

Included with this soil in mapping are a few areas of Zanesville, Gilpin, Lenberg, and Caneyville soils; a soil that is similar to the Rosine soil but that is 40 to 60 inches deep over shale or siltstone bedrock; and a deep, loamy soil that formed in loess and sandstone residuum. These soils are in landscape positions similar to those of the Rosine soil. Also included are a few areas of soils that are not eroded and areas of a moderately deep soil having a gray, clayey subsoil that is neutral or calcareous in the lower part. Included soils make up 15 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of the Rosine soil are used for cultivated crops, small grain, hay, or pasture.

This soil is suited to cultivated crops and small grain. The hazard of erosion and the low content of organic matter are the main management concerns. If the soil is cultivated, conservation tillage, contour stripcropping, cover crops, crop residue management, and a cropping system that includes grasses and legumes help to prevent further erosion.

This soil is suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Seeding or renovating in late summer or early fall generally results in better stands, minimizes competition from weeds, and helps to control erosion. Applications of lime and fertilizer, weed control, and controlled grazing help to produce and maintain good yields of high-quality forage.

This soil is well suited to woodland. Productivity is high. Plant competition is a management concern when establishing new stands. The preferred species for planting include white oak, northern red oak, yellow-poplar, white ash, and shortleaf pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to most urban uses. The slope and low strength are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIIe.

RoC3—Rosine silty clay loam, 6 to 12 percent slopes, severely eroded

This very deep, well drained, sloping soil is on narrow side slopes on uplands, mostly in the western and northern parts of the survey area. Slopes are irregular and convex. They are dissected by intermittent drainageways. Erosion has removed 75 to 100 percent of the original surface layer. Rills and small gullies are common. Individual areas range from 4 to 250 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 6 inches; yellowish brown silty clay loam

Subsoil:
6 to 16 inches; yellowish brown silt loam

16 to 41 inches; yellowish brown, mottled channery silty clay loam
41 to 49 inches; strong brown and light brownish gray silty clay

Substratum:
49 to 61 inches; light brownish gray, mottled silty clay loam

Bedrock:
61 inches; gray and brown, soft siltstone

This soil is low in natural fertility and low or moderate in organic matter content. Permeability is moderately slow. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium. The shrink-swell potential is low in the upper part of the subsoil and moderate in the lower part.

Included with this soil in mapping are a few severely eroded areas of Zanesville, Gilpin, Lenberg, and Caneyville soils; a few areas of a soil that is similar to the Rosine soil but that is 40 to 60 inches deep over shale or siltstone bedrock; and a few areas of a deep, loamy soil that formed in loess and sandstone residuum. These soils are in landscape positions similar to those of the Rosine soil. Also included are a few areas of soils that are not eroded and areas of a moderately deep soil having a gray clayey subsoil that is neutral or calcareous in the lower part. Included soils make up about 20 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Rosine soil are used for cultivated crops, hay, or pasture. In a few areas, the soil is used as woodland or the acreage is idle land.

This soil is poorly suited to cultivated crops. The hazard of erosion, the slope, and the low content of organic matter are the main management concerns. The soil should only be cultivated occasionally to minimize further erosion. Conservation tillage, contour stripcropping, cover crops, crop residue management, and a cropping system that includes grasses and legumes help to control erosion.

This soil is suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Seeding or renovating in late summer or early fall generally results in better stands, minimizes competition from weeds, and helps to control erosion. Applications of lime and fertilizer, weed control, rotational grazing, and proper stocking rates help to maintain productivity.

This soil is well suited to woodland. Productivity is moderately high. Plant competition is a management concern when establishing new stands. Undesirable species can be controlled by applying site preparation measures, such as clearing and disking and applying herbicides, or by managing the existing stand. The preferred species for planting include white oak, yellow-poplar, eastern white pine, and shortleaf pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Strip plantings of herbaceous plants, shrubs, and trees are more attractive than solid plantings. Grasses, legumes, and grain crops can be planted for food and cover. A good plant cover requires maintenance measures, which include applying fertilizer and reseeding or replanting where the vegetation failed to become established. Shallow water areas are needed. Brush piles or other nesting sites also are needed.

This soil is suited to most urban uses. The slope, the clayey texture of the subsoil, and low strength are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IVe.

RsD2—Rosine-Gilpin-Lenberg complex, 12 to 20 percent slopes, eroded

These very deep and moderately deep, well drained, moderately steep soils are on moderately wide, complex side slopes throughout Breckinridge County and in the northwestern part of Meade County. Most areas are dissected by small, intermittent drains. The three soils occur as areas so closely intermingled that they could not be separated at the scale used in mapping. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 732 acres in size.

Rosine and similar soils make up about 35 percent of the map unit, Gilpin and similar soils make up about 25 percent, and Lenberg and similar soils make up about 20 percent. Inclusions make up the remainder of the map unit.

The typical sequence, depth, and composition of the layers of the Rosine soil are as follows—

Surface layer:
0 to 2 inches; dark brown silt loam

Subsurface layer:
2 to 7 inches; yellowish brown silt loam

Subsoil:
7 to 21 inches; yellowish brown silt loam
21 to 46 inches; yellowish brown, mottled channery silty clay loam

46 to 54 inches; strong brown and light brownish gray silty clay

Substratum:
54 to 64 inches; strong brown, mottled silty clay loam

Bedrock:
64 inches; gray and brown, soft siltstone

The Rosine soil is medium in natural fertility and moderate or high in organic matter content. Permeability is moderately slow. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is rapid. The shrink-swell potential is low in the upper part of the subsoil and moderate in the lower part.

The typical sequence, depth, and composition of the layers of the Gilpin soil are as follows—

Surface layer:
0 to 4 inches; dark brown loam

Subsurface layer:
4 to 10 inches; yellowish brown loam

Subsoil:
10 to 24 inches; strong brown and dark brown loam and channery loam
24 to 29 inches; strong brown very channery loam

Bedrock:
29 inches; fractured, yellowish brown sandstone

The Gilpin soil is low in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is rapid. Sandstone, siltstone, or shale bedrock is at a depth of 20 to 40 inches.

The typical sequence, depth, and composition of the layers of the Lenberg soil are as follows—

Surface layer:
0 to 3 inches; very dark grayish brown silt loam

Subsoil:
3 to 15 inches; yellowish brown and light yellowish brown, mottled silty clay
15 to 31 inches; strong brown and gray silty clay

Bedrock:
31 inches; gray and brownish yellow, interbedded, soft shale and siltstone

The Lenberg soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately slow. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is rapid. The shrink-swell potential is moderate. Shale or siltstone bedrock is at a depth of 20 to 40 inches.

Included in this unit in mapping are a few areas of Caneyville and Dekalb soils on side slopes and Cuba and Clifty soils in narrow valleys. These soils are in landscape positions similar to those of the Rosine, Gilpin, and Lenberg soils. Also included are areas of a soil that is similar to the Rosine soil but that is 40 to 60 inches deep over shale or siltstone bedrock; areas of a moderately deep, clayey soil that formed in material weathered from calcareous shale; areas of a deep, loamy soil that formed in loess and sandstone residuum; scattered areas of rock outcrop; and a few areas of severely eroded soils. Inclusions make up 20 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of the Rosine, Gilpin, and Lenberg soils are used as woodland. A few areas have been cleared and are used as pasture.

These soils are poorly suited to farming. The moderately steep slope, the hazard of erosion, and the scattered areas of rock outcrop are the main management concerns. Good management practices, such as applying a controlled grazing system and proper stocking rates and maintaining optimum fertility levels, are needed in pastured areas.

These soils are suited to woodland. Productivity is high on cool slopes and moderately high on warm slopes in areas of the Rosine soil. It is moderately high in areas of the Gilpin and Lenberg soils. The hazard of erosion, the equipment limitation, plant competition, and seedling mortality are management concerns. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. The slope limits the use of harvesting or planting equipment in some areas. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Seedling mortality is a concern on warm slopes in areas of the Rosine and Gilpin soils. Reinforcement plantings may be needed to achieve a fully stocked stand. The preferred species for planting on cool slopes include white oak, northern red oak, yellow-poplar, eastern white pine, and shortleaf pine. Those preferred for planting on warm slopes include white oak, shortleaf pine, Virginia pine, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for woodland wildlife habitat is fair in

areas of the Rosine and Gilpin soils and good in areas of the Lenberg soil. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Brushy thickets can be established in areas of mature woodland. Food plots or areas of green browse can be planted along field borders or logging roads. Shallow water areas are needed. Den trees should not be harvested.

These soils are poorly suited to urban uses. The moderately steep slope, the hazard of erosion, the shrink-swell potential, a danger of slippage, and the scattered areas of rock outcrop are the main limitations.

These soils are in capability subclass IVe.

RsD3—Rosine-Gilpin-Lenberg complex, 12 to 20 percent slopes, severely eroded

These very deep and moderately deep, well drained, moderately steep soils are on moderately wide, complex side slopes throughout Breckinridge County and in the northwestern part of Meade County. Most areas are dissected by small, intermittent drains. The three soils occur as areas so closely intermingled that they could not be separated at the scale used in mapping. Erosion has removed 75 to 100 percent of the original surface layer. Rills and small gullies are common. Individual areas range from 4 to 250 acres in size.

Rosine and similar soils make up about 35 percent of the map unit, Gilpin and similar soils make up about 25 percent, and Lenberg and similar soils make up about 20 percent. Inclusions make up the remainder of the map unit.

The typical sequence, depth, and composition of the layers of the Rosine soil are as follows—

Surface layer:
0 to 4 inches; yellowish brown silt loam

Subsoil:
4 to 16 inches; yellowish brown silt loam
16 to 41 inches; yellowish brown, mottled channery silty clay loam
41 to 49 inches; strong brown and light brownish gray silty clay

Substratum:
49 to 61 inches; strong brown, mottled silty clay loam

Bedrock:
61 inches; gray and brown, soft siltstone

The Rosine soil is low in natural fertility and organic matter content. Permeability is moderately slow. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is rapid. The shrink-swell potential is low in the upper part of the subsoil and moderate in the lower part.

The typical sequence, depth, and composition of the layers of the Gilpin soil are as follows—

Surface layer:
0 to 4 inches; yellowish brown loam

Subsoil:
4 to 18 inches; strong brown and dark brown loam and channery loam
18 to 23 inches; strong brown very channery loam

Bedrock:
23 inches; yellowish brown, fractured sandstone

The Gilpin soil is low in natural fertility and organic matter content. Permeability is moderate. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is rapid. Sandstone, siltstone, or shale bedrock is at a depth of 20 to 40 inches.

The typical sequence, depth, and composition of the layers of the Lenberg soil are as follows—

Surface layer:
0 to 4 inches; yellowish brown, mottled silty clay loam

Subsoil:
4 to 12 inches; yellowish brown and light yellowish brown, mottled silty clay
12 to 28 inches; strong brown and gray silty clay

Bedrock:
28 inches; gray and brownish yellow, interbedded, soft shale and siltstone

The Lenberg soil is low in natural fertility and organic matter content. Permeability is moderately slow. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is rapid. The shrink-swell potential is moderate. Shale or siltstone bedrock is at a depth of 20 to 40 inches.

Included in this unit in mapping are a few areas of Dekalb and Caneyville soils on side slopes and Cuba and Clifty soils in narrow valleys. These soils are in landscape positions similar to those of the Rosine, Gilpin, and Lenberg soils. Also included are areas of a soil that is similar to the Rosine soil but that is 40 to 60 inches deep over shale or siltstone bedrock; areas

of moderately deep and deep, clayey soils that formed in material weathered from calcareous shale; areas of a deep, loamy soil that formed in loess and sandstone residuum; scattered areas of rock outcrop; and a few areas of soils that are not eroded. Inclusions make up 20 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of the Rosine, Gilpin, and Lenberg soils are used as woodland. A few cleared areas are used as pasture.

These soils are poorly suited to farming. The moderately steep slope, the hazard of erosion, and the scattered areas of rock outcrop are the main management concerns. Good management practices, such as applying a controlled grazing system and proper stocking rates and maintaining optimum fertility levels, are needed in pastured areas.

These soils are suited to woodland. Productivity is moderately high on cool slopes and moderate on warm slopes in areas of the Rosine soil. It is moderate in areas of the Gilpin and Lenberg soils. The hazard of erosion, the equipment limitation, plant competition, and seedling mortality are management concerns. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. The slope limits the use of harvesting or planting equipment in some areas. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Seedling mortality is a concern on warm slopes in areas of the Rosine and Gilpin soils. Larger planting stock or special site preparation, such as bedding or furrowing, reduces the seedling mortality rate. In some areas reinforcement plantings may be needed to achieve a fully stocked stand. The preferred species for planting include white oak, northern red oak, eastern white pine, and shortleaf pine. See table 7 for specific information relating to potential productivity.

The potential for woodland wildlife habitat is fair in areas of the Rosine and Gilpin soils and good in areas of the Lenberg soil. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Brushy thickets can be established in areas of mature woodland. Food plots or areas of green browse can be planted along field borders or logging roads. Shallow water areas are needed. Den trees should not be harvested.

These soils are poorly suited to urban uses. The moderately steep slope, the hazard of erosion, the shrink-swell potential, a danger of slippage, and the scattered areas of rock outcrop are the main limitations.

These soils are in capability subclass VIe.

RsE—Rosine-Gilpin-Lenberg complex, very rocky, 20 to 30 percent slopes

These very deep and moderately deep, well drained, steep soils are on uplands. They are on moderately wide, complex side slopes throughout Breckinridge County and in the northwestern part of Meade County. The Gilpin soil is on the steeper, more convex, upper side slopes. The Rosine and Lenberg soils are on the less sloping, middle and lower side slopes. Most areas are dissected by intermittent drains. Rock outcrop, mostly ledges or escarpments, cover about 7 percent of the surface. The three soils occur as areas so closely intermingled that they could not be separated at the scale used in mapping. Individual areas range from 6 to 1,279 acres in size.

Rosine and similar soils make up about 30 percent of the map unit, Gilpin and similar soils make up about 30 percent, and Lenberg and similar soils make up about 15 percent. Inclusions make up the remainder of the map unit.

The typical sequence, depth, and composition of the layers of the Rosine soil are as follows—

Surface layer:
0 to 3 inches; dark brown silt loam

Subsurface layer:
3 to 7 inches; yellowish brown silt loam

Subsoil:
7 to 21 inches; yellowish brown silt loam
21 to 46 inches; yellowish brown, mottled channery silty clay loam
46 to 54 inches; strong brown and light brownish gray silty clay

Substratum:
54 to 64 inches; strong brown, mottled silty clay loam

Bedrock:
64 inches; gray and brown, soft siltstone

The Rosine soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately slow. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is rapid. The shrink-swell potential is low in the upper part of the subsoil and moderate in the lower part.

The typical sequence, depth, and composition of the layers of the Gilpin soil are as follows—

Surface layer:
0 to 3 inches; dark brown loam

Subsurface layer:
3 to 10 inches; yellowish brown loam

Subsoil:
10 to 24 inches; strong brown and dark brown loam and channery loam
24 to 29 inches; strong brown very channery loam

Bedrock:
29 inches; yellowish brown, fractured sandstone

The Gilpin soil is low in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is rapid. Sandstone, siltstone, or shale bedrock is at a depth of 20 to 40 inches.

The typical sequence, depth, and composition of the layers of the Lenberg soil are as follows—

Surface layer:
0 to 3 inches; very dark grayish brown silt loam

Subsoil:
3 to 15 inches; yellowish brown and light yellowish brown, mottled silty clay
15 to 31 inches; strong brown and gray silty clay

Bedrock:
31 inches; gray and brownish yellow, interbedded, soft shale and siltstone

The Lenberg soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately slow. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is rapid. The shrink-swell potential is moderate. Shale bedrock is at a depth of 20 to 40 inches.

Included in this unit in mapping are small areas of Caneyville, Dekalb, and Zanesville soils on side slopes and Cuba and Clifty soils in narrow valleys. These soils are in landscape positions similar to those of the Rosine, Gilpin, and Lenberg soils. Also included are areas of a soil that is similar to the Rosine soil but that is 40 to 60 inches deep over shale or siltstone bedrock; areas of moderately deep and deep, clayey soils that formed in material weathered from calcareous shale; areas of a deep, loamy soil that formed in loess and sandstone residuum; scattered areas of outcrop; areas of colluvial soils on foot slopes; a few areas of soils that are severely eroded; areas where stones cover 10 to 15 percent of the surface; and a few areas of soils that have slopes of less than 20 percent. Inclusions make up 25 percent of the map unit. Individual inclusions are less than 4 acres in size.

Most areas of the Rosine, Gilpin, and Lenberg soils are used as woodland.

These soils are not suited to cultivated crops. The slope, the hazard of erosion, and the scattered areas of rock outcrop are the main management concerns.

These soils are suited to pasture; however, in some areas management may be difficult. Applications of lime and fertilizer, rotational grazing, proper stocking rates, and timely renovation help to maintain a good stand of pasture plants.

These soils are suited to woodland. Productivity is high on cool slopes and moderately high on warm slopes in areas of the Rosine soil. It is moderate in areas of the Gilpin soil and moderately high in areas of the Lenberg soil. The hazard of erosion, the equipment limitation, and plant competition are the main management concerns. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. Permanent access roads can be protected by installing water breaks and culverts and by applying gravel. Because of the slope and the cliffs, tracked equipment or other specialized equipment is needed. Log yards can be established on benches or in level areas adjacent to permanent access roads. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. Undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Seedling mortality is a concern on warm slopes in areas of the Rosine and Gilpin soils. Larger planting stock or special site preparation, such as bedding or furrowing, reduces the seedling mortality rate in these areas. Reinforcement plantings also may be needed to achieve a fully stocked stand. The preferred species for planting on cool slopes include yellow-poplar, white oak, northern red oak, eastern white pine, and shortleaf pine. Those suitable for planting on warm slopes include white oak, Virginia pine, shortleaf pine, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for woodland wildlife habitat is fair in areas of the Rosine and Gilpin soils and good in areas of the Lenberg soil. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Brushy thickets can be established in areas of mature woodland. Food plots or areas of green browse can be planted along field borders or logging roads. Shallow water areas are needed. Den trees should not be harvested.

These soils are not suited to most urban uses. The steep slope, low strength, the hazard of erosion, a danger of slippage, and the rock outcrop are the main limitations.

These soils are in capability subclass VIe.

SaA—Sadler silt loam, 0 to 2 percent slopes

This very deep, moderately well drained, nearly level soil is on broad ridgetops on uplands throughout Breckinridge County and in the northwestern part of Meade County. Individual areas range from 4 to 293 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:

0 to 8 inches; brown and yellowish brown silt loam

Subsoil:

8 to 28 inches; yellowish brown and brown silt loam and silty clay loam

28 to 61 inches; a fragipan of strong brown and yellowish brown, mottled silt loam

61 to 78 inches; yellowish brown and light brownish gray very gravelly fine sandy loam

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate above the fragipan and slow in the fragipan. Plant roots easily penetrate the soil; however, the root zone is only moderately deep because of the fragipan. Available water capacity is moderate, and surface runoff is slow. The seasonal high water table is at a depth of 18 to 24 inches.

Included with this soil in mapping are small areas of Robbs, Zanesville, and Nicholson soils. These soils are in landscape positions similar to those of the Sadler soil. They make up about 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Sadler soil are used for cultivated crops, small grain, hay, or pasture.

This soil is suited to most of the cultivated crops and small grain commonly grown in the area. The wetness is a moderate limitation that delays planting in spring. During extended dry periods, the soil may become droughty because of the restricted rooting depth and the moderate available water capacity. It can be cultivated intensively without significant soil loss. Crops respond well to applications of lime and fertilizer. Cover crops and crop residue management help to maintain the organic matter content and tilth.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil; however, the growth of some deep-rooted plants is limited by the moderately deep root zone. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is well suited to woodland. Productivity is moderately high. Plant competition is the main management concern. The preferred species for planting include white oak, eastern white pine, shortleaf pine, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to some urban uses. The wetness, low strength, and the slow permeability are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIw.

SaB2—Sadler silt loam, 2 to 6 percent slopes, eroded

This very deep, moderately well drained, gently sloping soil is on broad ridgetops on uplands throughout Breckinridge County and in the northwestern part of Meade County. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 1,119 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:

0 to 8 inches; brown and yellowish brown silt loam

Subsoil:

8 to 26 inches; yellowish brown and brown silt loam

26 to 59 inches; a fragipan of strong brown and yellowish brown, mottled silt loam

Substratum:

59 to 76 inches; yellowish brown and light brownish gray very gravelly fine sandy loam

This soil is medium in natural fertility and low or moderate in organic matter content. Permeability is moderate above the fragipan and slow in the fragipan. Plant roots easily penetrate the soil; however, the root

zone is only moderately deep because of the fragipan. Available water capacity is moderate, and surface runoff is medium. The seasonal high water table is at a depth of 18 to 24 inches.

Included with this soil in mapping are small areas of Robbs, Zanesville, and Nicholson soils. These soils are in landscape positions similar to those of the Sadler soil. Also included is a deep, loamy soil that formed in loess and sandstone residuum. Included soils make up 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Sadler soil are used intensively for cultivated crops, small grain, hay, or pasture (fig. 22).

This soil is suited to most of the cultivated crops and small grain commonly grown in the area. In some years the wetness delays planting in spring. During extended dry periods, the soil may become droughty because of the restricted rooting depth and the moderate available water capacity. Crops respond well to applications of lime and fertilizer. Cover crops and crop residue management help to maintain the organic matter content and tilth.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil; however, the growth of some deep-rooted plants is limited by the moderately deep root zone. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is well suited to woodland. Productivity is moderately high. Plant competition is the main management concern. The preferred species for planting include white oak, eastern white pine, shortleaf pine, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to

Figure 22.—Burley tobacco, an important cash crop in the counties, in an area of Sadler silt loam, 2 to 6 percent slopes, eroded.

maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to some urban uses. The wetness, low strength, and the slow permeability are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIe.

ScA—Sciotoville silt loam, 0 to 2 percent slopes

This very deep, moderately well drained, nearly level soil is on stream terraces along the Ohio River and its major tributaries. Individual areas range from 4 to 97 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches; brown silt loam

Subsoil:
9 to 14 inches; yellowish brown silt loam
14 to 28 inches; yellowish brown, mottled silt loam
28 to 53 inches; a fragipan of dark yellowish brown, mottled silt loam

Substratum:
53 to 75 inches; dark yellowish brown, mottled silt loam

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate above the fragipan and slow in the fragipan. Plant roots easily penetrate the soil; however, the root zone is only moderately deep because of the fragipan. Available water capacity is moderate, and surface runoff is slow. The seasonal high water table is at a depth of 18 to 30 inches.

Included with this soil in mapping are a few small areas of Elk, Wheeling, Weinbach, and McGary soils. These soils are in landscape positions similar to those of the Sciotoville soil. They make up about 10 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of the Sciotoville soil are used for cultivated crops, hay, or pasture.

This soil is suited to most of the cultivated crops commonly grown in the survey area. The wetness is a moderate limitation. In some years it delays planting. During extended dry periods, the soil may become droughty because of the restricted rooting depth and the moderate available water capacity. Conservation tillage, contour stripcropping, and a cropping system that includes grasses and legumes help to control erosion and reduce the runoff rate. Crops respond well to applications of lime and fertilizer. Cover crops and crop residue management help to maintain the organic matter content and tilth.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil; however, the growth of some deep-rooted plants is limited by the moderately deep root zone. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is suited to woodland. Productivity is moderately high. Plant competition is the main management concern. The preferred species for planting include yellow-poplar, white ash, white oak, eastern white pine, and eastern cottonwood. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to some urban uses. The wetness and the slow permeability are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIw.

ScB—Sciotoville silt loam, 2 to 6 percent slopes

This very deep, moderately well drained, gently sloping soil is on stream terraces along the Ohio River and its major tributaries. Individual areas range from 4 to 63 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches; brown silt loam

Subsoil:
9 to 14 inches; yellowish brown silt loam
14 to 28 inches; yellowish brown, mottled silt loam

28 to 53 inches; a fragipan of dark yellowish brown, mottled silt loam

Substratum:

53 to 75 inches; dark yellowish brown, mottled silt loam

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate above the fragipan and slow in the fragipan. Plant roots easily penetrate the soil; however, the root zone is only moderately deep because of the fragipan. Available water capacity is moderate, and surface runoff is medium. The seasonal high water table is at a depth of 18 to 30 inches.

Included with this soil in mapping are a few small areas of Elk, Wheeling, Weinbach, and McGary soils. These soils are in landscape positions similar to those of the Sciotoville soil. They make up about 10 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of the Sciotoville soil are used for cultivated crops, small grain, hay, or pasture.

This soil is suited to most of the cultivated crops and small grain commonly grown in the survey area. The wetness is a moderate limitation. In some years it delays planting. During extended dry periods, the soil may become droughty because of the restricted rooting depth and the moderate available water capacity. Erosion is a hazard if conventional tillage is used. Conservation tillage, contour stripcropping, and a cropping system that includes grasses and legumes help to control erosion and reduce the runoff rate. Crops respond well to applications of lime and fertilizer. Cover crops and crop residue management help to maintain the organic matter content and tilth.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil; however, the growth of some deep-rooted plants is limited by the moderately deep root zone. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is suited to woodland. Productivity is moderately high. Plant competition is the main management concern. The preferred species for planting include yellow-poplar, white ash, white oak, eastern white pine, and eastern cottonwood. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to some urban uses. The wetness and the slow permeability are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIe.

Sf—Steff silt loam, occasionally flooded

This very deep, moderately well drained, nearly level soil is on flood plains in narrow valleys and near the larger streams in Breckinridge County. It formed in alluvium washed from nearby uplands. Slopes range from 0 to 2 percent. Individual areas range from 4 to 121 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:

0 to 8 inches; brown silt loam

Subsoil:

8 to 22 inches; yellowish brown, mottled silt loam

22 to 43 inches; dark yellowish brown, mottled silt loam

43 to 49 inches; light gray and strong brown silt loam

Substratum:

49 to 63 inches; light gray and strong brown, stratified silt loam

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is slow. The seasonal high water table is at a depth of 18 to 24 inches. The soil is occasionally flooded for brief periods in late winter and in spring.

Included with this soil in mapping are small areas of Clifty, Cuba, Stendal, Nolin, Lindside, and Newark soils. These soils are in landscape positions similar to those of the Steff soil. Also included are a few areas of soils that have more sand or clay throughout. Included soils make up about 15 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Steff soil are used for cultivated crops, small grain, hay, or pasture. A few areas are used as woodland.

This soil is well suited to cultivated crops. The hazard of erosion is slight. The soil can be cultivated in short rotations without increasing soil loss. Most crops respond to applications of lime and fertilizer. The plow

layer is easy to till and can be worked throughout a wide range of moisture conditions without clodding or crusting. Cover crops and crop residue management help to maintain the organic matter content and tilth.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Perennials, however, may be damaged by flooding in some years. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, controlled grazing, and proper stocking rates are needed.

This soil is well suited to woodland. Productivity is high. Plant competition and seedling mortality are the main management concerns. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking and applying herbicides, or by managing the existing stand. In some years the flooding damages new seedlings. Reinforcement plantings may be needed to achieve a fully stocked stand. The preferred species for planting include yellow-poplar, eastern white pine, white oak, and white ash. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to most urban uses. The wetness, the flooding, and low strength are the main limitations. These limitations are difficult to overcome.

This soil is in capability subclass IIw.

St—Stendal silt loam, occasionally flooded

This very deep, somewhat poorly drained, nearly level soil is on flood plains in narrow valleys and near the larger streams in Breckinridge County. It formed in alluvium washed from nearby uplands. Slopes range from 0 to 2 percent. Individual areas range from 4 to 116 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:

0 to 8 inches; dark yellowish brown silt loam

Substratum:

8 to 20 inches; light brownish gray and brown silt loam

20 to 64 inches; light brownish gray, mottled silt loam

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is slow. The seasonal high water table is at a depth of 12 to 18 inches. The soil is occasionally flooded for brief periods in winter and spring.

Included with this soil in mapping are a few small areas of Clifty, Cuba, Steff, Nolin, Lindside, Newark, and Melvin soils. These soils are in landscape positions similar to those of the Stendal soil. They make up about 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Stendal soil are used for cultivated crops, hay, or pasture. A few areas are used as woodland.

This soil is suited to cultivated crops. The flooding and the wetness are the main limitations. Most floods occur during the winter and spring months when crops are not grown, but some floods occur during the growing season. In most years the wetness delays planting. Applying good water management practices in cultivated areas helps to increase the effective length of the growing season and widen the range of suitable plants. Cover crops and crop residue management help to maintain the organic matter content and tilth.

This soil is suited to hay and pasture. The grass and legume species that can withstand the wetness and the brief periods of flooding are better suited than other varieties. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is well suited to woodland. Productivity is high. Plant competition, seedling mortality, and the equipment limitation are the main management concerns. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking and applying herbicides, or by managing the existing stand. In some years the flooding damages new seedlings. Reinforcement plantings may be needed to achieve a fully stocked stand. Operating equipment when the soil is wet can result in compaction and the formation of ruts. Equipment should be operated only when the soil is dry. Logging roads can be built in nearby areas of soils that are less likely to form ruts and to become compacted. The preferred species for planting include eastern white pine, American sycamore, and green ash. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair.

Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to most urban uses. The wetness, the flooding, and low strength are the main limitations. These limitations are difficult to overcome.

This soil is in capability subclass IIw.

VrF—Varilla-Gilpin-Rock outcrop complex, very bouldery, 20 to 65 percent slopes

This map unit occurs as areas of very deep and moderately deep, somewhat excessively drained and well drained, steep and very steep soils intermingled with areas of Rock outcrop. It is on uplands, mainly in the western and northern parts of Breckinridge County along Tar Fork, Clover Lick Creek, and Rough River. The Varilla soil is on colluvial side slopes and foot slopes below the Rock outcrop or escarpments. The Gilpin soil is on convex shoulder slopes and upper side slopes above the escarpments. The Rock outcrop typically consists of nearly continuous sandstone escarpments, 15 to 35 feet in height, between the Varilla and Gilpin soils. Random boulders and stones cover about 4 percent of the soil surface. The Varilla and Gilpin soils and the areas of Rock outcrop could not be separated at the scale selected for mapping. Individual areas range from 8 to 442 acres in size.

Varilla and similar soils make up about 35 percent of the map unit, Gilpin and similar soils make up about 20 percent, and the Rock outcrop makes up about 15 percent. Inclusions make up the remainder of the map unit.

The typical sequence, depth, and composition of the layers of the Varilla soil are as follows—

Surface layer:
0 to 2 inches; dark grayish brown stony sandy loam

Subsurface layer:
2 to 6 inches; dark grayish brown, mottled loam

Subsoil:
6 to 24 inches; dark yellowish brown and yellowish brown very channery loam and sandy loam
24 to 62 inches; yellowish brown extremely channery sandy loam

Bedrock:
62 inches; yellowish brown sandstone

The Varilla soil is low in natural fertility and moderate or high in organic matter content. Permeability is moderately rapid. The root zone is very deep but is somewhat difficult for plant roots to penetrate because of the content of rock fragments. Available water capacity is moderate, and surface runoff is very rapid.

The typical sequence, depth, and composition of the layers of the Gilpin soil are as follows—

Surface layer:
0 to 3 inches; dark brown loam

Subsurface layer:
3 to 10 inches; yellowish brown loam

Subsoil:
10 to 24 inches; strong brown and dark brown loam and channery loam
24 to 29 inches; strong brown very channery loam

Bedrock:
29 inches; yellowish brown, fractured sandstone

The Gilpin soil is low in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is very rapid. Sandstone, siltstone, or shale bedrock is at a depth of 20 to 40 inches.

The Rock outcrop consists of sandstone ledges, escarpments, and individual outcrops extending horizontally along the slope. Escarpments range from 15 to 35 feet high. Outcrops consist mainly of the Tar Springs Sandstone geologic formation.

Included in this unit in mapping are small areas of Dekalb, Lenberg, and Rosine soils on side slopes; areas of Markland soils on foot slopes; and areas of Clifty, Cuba, Steff, and Stendal soils in narrow drainageways. These soils are in landscape positions similar to those of the Varilla and Gilpin soils. Also included are a few areas of loamy soils that are 40 to 60 inches deep over sandstone bedrock, areas of a soil that has fewer coarse fragments in the subsoil than the Varilla soil, and areas of a deep, colluvial soil that has more clay in the subsoil than the Varilla soil. Included soils make up about 30 percent of the complex. Individual inclusions are less than 2 acres in size.

Most areas of the unit are used as woodland (fig. 23).

This map unit is not suited to farming because of the slope, the hazard of erosion, the stones on the surface, the Rock outcrop, and restricted use of equipment.

This map unit is suited to woodland. Productivity is

Figure 23.—Woodland in an area of Varilla-Gilpin-Rock outcrop complex, very bouldery, 20 to 65 percent slopes.

high on cool slopes and moderately high on warm slopes. The hazard of erosion, the equipment limitation, plant competition, and seedling mortality are management concerns. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. Permanent access roads can be protected by installing water breaks and culverts and by applying gravel. Because of the slope and boulders, tracked equipment or other specialized equipment is needed. Log yards can be established on benches or in level areas adjacent to permanent access roads. Tree seedlings can be planted by hand, or seeds can be distributed by direct seeding methods. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Seedling mortality is a concern on warm slopes. Reinforcement plantings may be needed to achieve a fully stocked stand. The preferred species for planting on cool slopes include white oak, yellow-poplar, eastern white pine, and shortleaf pine. Those preferred for planting on warm slopes include white oak, shortleaf pine, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for woodland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Brushy thickets can be established in areas of mature woodland. Food plots or areas of green browse can be planted along field borders or logging roads. Shallow water areas are needed. Den trees should not be harvested.

This map unit is not suited to most urban uses

because of the slope, the hazard of erosion, and the Rock outcrop. These limitations are difficult to overcome.

The Varilla and Gilpin soils are in capability subclass VIIe. The Rock outcrop is in capability subclass VIIIs.

W—Water

This map unit consists of various sizes of permanent bodies of water, including small ponds, double line streams, and large lakes. Depth of the water is generally more than 6 feet.

We—Weinbach silt loam

This very deep, somewhat poorly drained, nearly level soil is on stream terraces along the Ohio River and its major tributaries. Slope ranges from 0 to 2 percent. Individual areas range from 4 to 110 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches; brown silt loam

Subsurface layer:
9 to 17 inches; brown, mottled silt loam

Subsoil:
17 to 27 inches; grayish brown and strong brown silt loam
27 to 45 inches; a fragipan of grayish brown and strong brown silty clay loam
45 to 56 inches; brown, mottled silt loam

Substratum:
56 to 65 inches; brown, stratified loam

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate above the fragipan and slow in the fragipan. Plant roots easily penetrate the soil; however, the root zone is only moderately deep because of the fragipan. Available water capacity is moderate, and surface runoff is slow. The seasonal high water table is at a depth of 12 to 24 inches.

Included with this soil in mapping are a few small areas of Sciotoville, Wheeling, and Elk soils. These soils are in landscape positions similar to those of the Weinbach soil. Also included are areas of a soil that is similar to the Weinbach soil but does not have a fragipan. Included soils make up 15 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Weinbach soil are used for cultivated crops, hay, or pasture. A few areas are used as woodland.

This soil is suited to cultivated crops. The moderately deep root zone, the wetness, and the moderate available water capacity are the main limitations. In most years the wetness delays planting, and in some years it delays harvesting. The dense fragipan limits the rooting depth and the available water capacity. Cover crops and crop residue management help to maintain the organic matter content and tilth.

This soil is suited to hay and pasture. The grass and legume species that can withstand the wetness are better suited than other varieties. Adequate seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is well suited to woodland. Productivity is high. Plant competition and the equipment limitation are the main management concerns. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Operating equipment when the soil is wet can result in compaction and the formation of ruts. Equipment should be operated only when the soil is dry. The preferred species for planting include yellow-poplar, green ash, sweetgum, loblolly pine, and American sycamore. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to most urban uses. The wetness and the slow permeability are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIw.

WtF—Westmoreland-Caneyville-Rock outcrop complex, 30 to 80 percent slopes

This map unit occurs as areas of deep and moderately deep, well drained, very steep soils intermingled with areas of Rock outcrop. It is on side slopes of the Muldraugh escarpment on uplands in Meade County. The Westmoreland soil is on the

middle and lower linear side slopes. The Caneyville soil is on the steeper, more convex, upper side slopes and above the Rock outcrop. The Westmoreland and Caneyville soils and the areas of Rock outcrop could not be separated at the scale selected for mapping. Individual areas range from 6 to 249 acres in size.

Westmoreland and similar soils make up about 30 percent of the complex, Caneyville and similar soils make up about 25 percent, and the Rock outcrop makes up about 15 percent. Inclusions make up the remainder of the map unit.

The typical sequence, depth, and composition of the layers of the Westmoreland soil are as follows—

Surface layer:
0 to 3 inches; dark brown silt loam

Subsurface layer:
3 to 6 inches; dark brown, mottled silt loam

Subsoil:
6 to 28 inches; brown and strong brown silt loam and channery silt loam
28 to 40 inches; strong brown, mottled silt loam

Substratum:
40 to 48 inches; strong brown and brownish yellow channery silty clay loam

Bedrock:
48 inches; siltstone

The Westmoreland soil is low in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is very rapid. Siltstone, sandstone, or limestone bedrock is at a depth of 40 to 60 inches.

The typical sequence, depth, and composition of the layers of the Caneyville soil are as follows—

Surface layer:
0 to 6 inches; brown silt loam

Subsoil:
6 to 10 inches; yellowish red silty clay loam
10 to 24 inches; red, mottled clay

Bedrock:
24 inches; hard, light gray limestone

The Caneyville soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately slow. The root zone is moderately deep. Available water capacity is moderate, and surface runoff is very rapid. The shrink-swell potential is moderate. Limestone bedrock is at a depth of 20 to 40 inches.

The Rock outcrop primarily is limestone, or in some areas it is sandstone. It occurs as individual outcrops or as continuous, horizontal ledges or escarpments. The outcrops range from 5 to 25 feet thick. They include loose rock fragments ranging from channers to large boulders. Springs and seeps, some of which flow throughout the year, are associated with the soils that are directly below the outcrops.

Included in this unit in mapping are a few areas of Alford, Crider, and Rosine soils. These soils are in landscape positions similar to those of the Westmoreland and Caneyville soils. Also included are areas of a deep, loamy-skeletal soil; areas of a deep, loamy soil that formed in loess and sandstone residuum; and areas of a shallow, clayey soil on the upper side slopes above the Rock outcrop. Included soils make up about 30 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of the unit are used as woodland.

This map unit is not suited to farming because of the steep slope, the hazard of erosion, the depth to bedrock, and the Rock outcrop.

This map unit is suited to woodland. Productivity is moderately high on cool slopes and moderate on warm slopes. The hazard of erosion, the equipment limitation, and plant competition are the main management concerns. Erosion is a hazard on logging roads and skid trails. Building roads and trails on a grade of less than 10 percent helps to control erosion. Permanent access roads can be protected by installing water breaks and culverts and by applying gravel. Because of the slope and cliffs, tracked equipment or other specialized equipment is needed. Log yards can be established on benches or in level areas adjacent to permanent access roads. Tree seedlings can be planted by hand, or seed can be distributed by direct seeding methods. Undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Seedling mortality is a concern on warm slopes. Reinforcement plantings may be needed to achieve a fully stocked stand. The preferred species for planting on cool slopes include white oak, yellow-poplar, eastern white pine, white ash, and loblolly pine. Those preferred on warm slopes include shortleaf pine, loblolly pine, eastern white pine, and white oak. See table 7 for specific information relating to potential productivity.

The potential for woodland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Brushy thickets can

be established in areas of mature woodland. Food plots or areas of green browse can be planted along field borders or logging roads. Shallow water areas are needed. Den trees should not be harvested.

This map unit is poorly suited to most urban uses. The slope, the hazard of erosion, the depth to bedrock, and the Rock outcrop are the main limitations.

The Westmoreland and Caneyville soils are in capability subclass VIIe. The Rock outcrop is in capability subclass VIIIs.

WxB—Wheeling fine sandy loam, 2 to 6 percent slopes

This very deep, well drained, gently sloping soil is on stream terraces along the Ohio River and its major tributaries. Slopes are smooth and convex. Individual areas range from 4 to 371 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches; brown fine sandy loam

Subsurface layer:
8 to 15 inches; yellowish brown loam

Subsoil:
15 to 50 inches; dark yellowish brown loam

Substratum:
50 to 77 inches; dark yellowish brown loam that has thin strata of fine sandy loam below a depth of 60 inches

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium.

Included with this soil in mapping are a few areas of Elk, Sciotoville, and Weinbach soils. These soils are in landscape positions similar to those of the Wheeling soil. They make up about 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Wheeling soil are used for cultivated crops or small grain. A few areas are used for hay and pasture.

This soil is well suited to cultivated crops. Erosion is a hazard if conventional tillage is used. Conservation tillage, stripcropping, cover crops, and crop residue management help to control erosion and maintain the organic matter content.

This soil is well suited to hay and pasture. A cropping system that includes hay or pasture and grain crops helps to control erosion, maintain the organic matter content, and improve tilth.

This soil is well suited to woodland. Productivity is high. Plant competition is a management concern when establishing new stands. The preferred species for planting include black walnut, yellow-poplar, white oak, and eastern white pine.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is well suited to most urban uses. Seepage is the main limitation.

This soil is in capability subclass IIe.

WxC2—Wheeling fine sandy loam, 6 to 12 percent slopes, eroded

This very deep, well drained, sloping soil is on stream terraces along the Ohio River and its major tributaries. Slopes are smooth, short, and convex. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 50 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches; yellowish brown fine sandy loam

Subsoil:
8 to 45 inches; dark yellowish brown loam

Substratum:
45 to 72 inches; dark yellowish brown loam that has thin strata of fine sandy loam below a depth of 55 inches

This soil is medium in natural fertility and low or moderate in organic matter content. Permeability is moderate. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is high, and surface runoff is medium.

Included with this soil in mapping are a few areas of Elk, Sciotoville, and Weinbach soils. These soils are in landscape positions similar to those of the Wheeling soil. Also included are a few areas of Chagrin and Lakin soils on flood plains near the Ohio River and areas of Lindside, Newark, and Melvin soils on flood plains in narrow drainageways. Included soils make up

about 10 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of the Wheeling soil are used for cultivated crops or small grain. A few areas are used for hay and pasture.

This soil is suited to cultivated crops and small grain. Most crops grow well on the soil. Erosion is a hazard if conventional tillage is used. Conservation tillage, contour stripcropping, cover crops, and crop residue management help to control erosion and maintain the organic matter content and tilth.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. They include deep-rooted plants, such as alfalfa. Most areas of the soil are above flood level, but in a few areas flooding can damage perennial grasses and legumes. Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are needed.

This soil is well suited to woodland. Productivity is high. Plant competition is a management concern when establishing new stands. The preferred species for planting include black walnut, yellow-poplar, white oak, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to most urban uses. The slope and seepage are the main limitations.

This soil is in capability subclass IIIe.

Ya—Yeager loamy sand, occasionally flooded

This very deep, well drained, nearly level soil is on flood plains along the Ohio River. Slopes range from 0 to 2 percent. Individual areas range from 6 to 70 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:

0 to 9 inches; dark brown loamy sand

Substratum:

9 to 41 inches; yellowish brown and brown loamy sand that has mottles below a depth of 31 inches

41 to 67 inches; yellowish brown, mottled sandy loam and sand

This soil is low in natural fertility and low or moderate in organic matter content. Permeability is moderately rapid or rapid. The root zone is very deep, and plant roots easily penetrate the soil. Available water capacity is moderate, and surface runoff is slow. The soil is occasionally flooded for brief periods in winter and spring.

Included with this soil in mapping are small areas of Chagrin, Huntington, Lindside, and Newark soils. These soils are in landscape positions similar to those of the Yeager soil. Also included are a few areas of Wheeling and Lakin soils on stream terraces. Included soils make up 10 percent of the map unit. Included soils are less than 3 acres in size.

Most areas of the Yeager soil are used for cultivated crops, hay, or pasture. A few areas are used as woodland.

This soil is poorly suited to cultivated crops. Productivity is low because of the rapid permeability, the low available water capacity, and the low natural fertility. The soil can be worked throughout a wide range of moisture content, however, without clodding or crusting.

This soil is suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. Perennials, however, may be damaged by flooding in some years. Proper seeding mixtures and rates, applications of lime and fertilizer, controlled grazing, and weed control are needed.

This soil is well suited to woodland. Productivity is high. Plant competition and seedling mortality are the main management concerns. Undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. In some years the flooding damages new seedlings. Reinforcement plantings may be needed to achieve a fully stocked stand. The preferred species for planting include yellow-poplar, white oak, northern red oak, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is fair. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is poorly suited to most urban uses. The flooding is the main limitation.

This soil is in capability subclass IIw.

ZaB2—Zanesville silt loam, 2 to 6 percent slopes, eroded

This deep, well drained and moderately well drained, gently sloping soil is on narrow ridgetops on uplands throughout Breckinridge County and in the northwestern part of Meade County. Slopes are smooth and slightly convex. Erosion has removed 25 to 75 percent of the original surface layer. Areas of the map unit range from 4 to 157 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches; brown silt loam

Subsoil:
9 to 23 inches; yellowish brown silty clay loam that has mottles below a depth of 20 inches
23 to 55 inches; a fragipan of yellowish brown, mottled silt loam

Substratum:
55 to 59 inches; yellowish brown, mottled silt loam

Bedrock:
59 inches; unweathered sandstone

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate above the fragipan and slow in the fragipan. Plant roots easily penetrate the soil; however, the root zone is only moderately deep because of the fragipan. Available water capacity is moderate, and surface runoff is medium. The seasonal high water table is at a depth of 24 to 36 inches.

Included with this soil in mapping are a few small areas of Sadler, Robbs, Nicholson, and Rosine soils. These soils are in landscape positions similar to those of the Zanesville soil. Also included are areas of a deep, loamy soil that formed in loess and sandstone residuum and a reclaimed strip-mined area along the southwestern edge of Breckinridge County. Included soils make up about 10 percent of the map unit. Individual inclusions are less than 2 acres in size.

Most areas of the Zanesville soil are used for cultivated crops, small grain, hay, or pasture.

This soil is well suited to cultivated crops and small grain. It can be worked throughout a wide range of moisture conditions without clodding or crusting. Erosion is a hazard if conventional tillage is used. Conservation tillage, contour stripcropping, crop residue management, and a cropping system that includes grasses and legumes help to control erosion and reduce the runoff rate. During extended dry periods, the soil may become droughty because of the restricted rooting depth and the moderate available water capacity.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil; however, the growth of deep-rooted plants is limited by the dense fragipan. Good yields can be produced with proper applications of lime and fertilizer. Weed control, controlled grazing, and erosion control when seeding or renovating are needed.

This soil is well suited to woodland. Productivity is moderately high. Plant competition is the main management concern. The preferred species for planting include white oak, yellow-poplar, white ash, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to some urban uses. The wetness, the depth to bedrock, the slow permeability, and low strength are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIe.

ZaC2—Zanesville silt loam, 6 to 12 percent slopes, eroded

This deep, well drained and moderately well drained, sloping soil is on narrow ridgetops and side slopes on uplands throughout Breckinridge County and in the northwestern part of Meade County. Most slopes are smooth and convex. Erosion has removed 25 to 75 percent of the original surface layer. Individual areas range from 4 to 239 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches; brown silt loam

Subsoil:
9 to 23 inches; yellowish brown silty clay loam that has mottles below a depth of 20 inches
23 to 55 inches; a fragipan of yellowish brown, mottled silt loam

Substratum:
55 to 59 inches; yellowish brown, mottled silt loam

Bedrock:
59 inches; unweathered sandstone

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate above the fragipan and moderately slow or slow in the fragipan. Plant roots easily penetrate the soil; however, the root zone is only moderately deep because of the fragipan. Available water capacity is moderate, and surface runoff is medium. The seasonal high water table is at a depth of 24 to 36 inches.

Included with this soil in mapping are a few small areas of Gilpin, Rosine, Nicholson, and Sadler soils. These soils are in landscape positions similar to those of the Zanesville soil. Also included are areas of a deep, loamy soil that formed in loess and sandstone residuum. Included soils make up 15 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of the Zanesville soil are used for cultivated crops, small grain, hay, or pasture.

This soil is suited to cultivated crops and small grain. Most of the commonly grown crops grow well on the soil. The hazard of erosion and the low content of organic matter are the main management concerns. Conservation tillage, contour stripcropping, crop residue management, and a cropping system that includes grasses and legumes help to prevent further erosion. During extended dry periods, the soil may become droughty because of the restricted rooting depth and the moderate available water capacity.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. The dense fragipan limits the growth of deep-rooted plants. Weed control, controlled grazing, and erosion control are needed.

This soil is suited to woodland. Productivity is moderately high. Plant competition is the main management concern. The preferred species for planting include white oak, yellow-poplar, white ash, and eastern white pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Food plots can be established along roads or field borders. Planting brushy thickets in open areas increases the extent of the cover and adds diversity. Creating brush piles and maintaining grasses, legumes, and wild herbaceous plants improve the location of nesting sites.

This soil is suited to some urban uses. The wetness, the depth to bedrock, the slow permeability, and low strength are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IIIe.

ZnC3—Zanesville silty clay loam, 6 to 12 percent slopes, severely eroded

This deep, well drained and moderately well drained, sloping soil is on narrow ridgetops and side slopes on uplands throughout Breckinridge County and in the northwestern part of Meade County. Slopes are somewhat irregular and convex. Erosion has removed 75 to 100 percent of the original surface layer. Rills and small gullies are common. Individual areas range from 4 to 232 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 4 inches; yellowish brown silty clay loam

Subsoil:
4 to 19 inches; yellowish brown silty clay loam that has mottles below a depth of 16 inches
19 to 51 inches; a fragipan of yellowish brown, mottled silt loam

Substratum:
51 to 55 inches; yellowish brown, mottled silt loam

Bedrock:
55 inches; unweathered sandstone

This soil is low in natural fertility and organic matter content. Permeability is moderate above the fragipan and slow in the fragipan. Plant roots easily penetrate the soil; however, the root zone is only moderately deep because of the fragipan. Available water capacity is moderate, and surface runoff is medium. The seasonal high water table is at a depth of 24 to 36 inches.

Included with this soil in mapping are a few small areas of Sadler, Rosine, and Gilpin soils. These soils are in landscape positions similar to those of the Zanesville soil. Also included are a few areas of Zanesville soils that are moderately eroded and a few areas of a deep, loamy soil that formed in loess and sandstone residuum. Included soils make up about 20 percent of the map unit. Individual inclusions are less than 3 acres in size.

Most areas of this Zanesville soil are used for cultivated crops, small grain, hay, or pasture. In a few areas, the soil is used as woodland or the acreage is idle land.

This soil is poorly suited to cultivated crops. Erosion is a hazard if conventional tillage is used. Conservation tillage, contour stripcropping, crop residue management, and a cropping system that includes grasses and legumes help to prevent further erosion.

This soil is suited to hay and pasture. Most of the commonly grown grasses and legumes grow well on the soil. The dense fragipan limits the growth of deep-rooted plants. Applications of lime and fertilizer, weed control, controlled grazing, and erosion control when seeding or renovating are needed.

This soil is suited to woodland. Productivity is moderate. Plant competition and seedling mortality are the main management concerns. Competition from undesirable species can be controlled by applying site preparation measures, such as clearing and disking, applying herbicides, and cutting or girdling, or by managing the existing stand. Reinforcement plantings may be needed to achieve a fully stocked stand. The preferred species for planting include white oak, eastern white pine, shortleaf pine, and loblolly pine. See table 7 for specific information relating to potential productivity.

The potential for openland wildlife habitat is good. Providing food, cover, water, and nesting sites helps to maintain or improve the habitat. Strip plantings of herbaceous plants, shrubs, and trees are more attractive than solid plantings. Grasses, legumes, and grain crops can be planted for food and cover. A good plant cover requires maintenance measures, which include applying fertilizer and reseeding or replanting where the vegetation failed to become established. Shallow water areas are needed. Brush piles or other nesting sites also are needed.

This soil is suited to some urban uses. The wetness, the depth to bedrock, the slow permeability, and low strength are the main limitations. Proper design, installation, and site preparation help to reduce or overcome these limitations.

This soil is in capability subclass IVe.